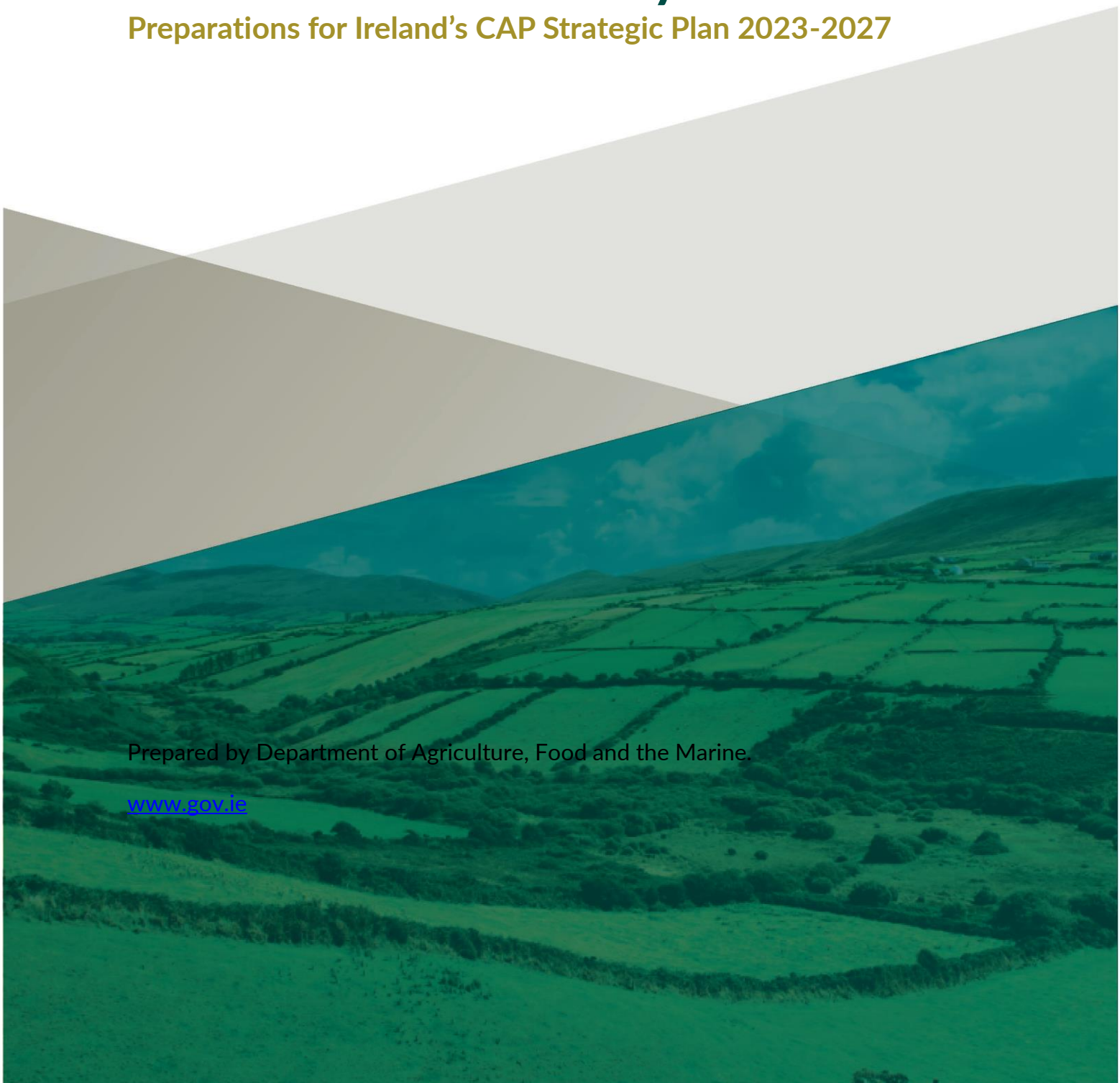
Rialtas na hÉireann
Government of Ireland

Ireland's SWOT Analysis

Preparations for Ireland's CAP Strategic Plan 2023-2027



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Introduction

This SWOT analysis, undertaken as part of the development of Ireland's CAP Strategic Plan 2023-2027, details the Strengths, Weaknesses, Opportunities and Threats identified in the Irish agri-food sector to date. The SWOT Analysis was conducted using both qualitative and quantitative data sources and is structured around the nine Specific Objectives and one Cross-cutting objective of the new Common Agricultural Policy 2023-2027. Qualitative data sources included *inter alia* national and international policy papers, research and evaluation papers and surveys. Quantitative data sources included *inter alia* Eurostat, the OECD, the CSO and the EPA. Quantative analysis was generally undertaken at an aggregated level but was also undertaken at a disaggregated level, where this data was readily available.

The agri-food sector is Ireland's largest indigenous industry. In 2019, there were 137,000 farms in Ireland which produced over €8 billion in output. Of these 137,000 farms, 99.7% were classified as family farms (approximately 136,589). According to the CSO, family farms are those which are operated as family-based enterprises [1], i.e. those farms which employ a large proportion of family labour. In Ireland, agricultural labour provided by family members is particularly high, at 93%.[2]

In Ireland, farm size is determined through standard output (SO). Small farms are defined as farms with a SO of less than €8,000. Small-medium size farms are defined as farms with a SO of between €8,000 and €25,000. Medium farms are defined as farms with a SO of between €25,000 to €50,0000; large farms are defined as farms with a SO of €50,000 to €100,000; and lastly, very large farms are those with a SO greater than €100,000.

In 2016, 32% of farms in Ireland were considered small (i.e. have a SO of less that €8,000), 33% were considered small-medium, 15% were considered medium, 8% were considered large and 12% were considered very large. The 12% of farms considered to be very large produced 62% of output on 29% of land. The 32% of farms considered to be small produced 3% of output on 12% of land. Small-medium farms and medium farms both produced 11% of output each, with small-medium farms utilising 26% of land and medium farms utilising 19%. Lastly, large farms produced 13% of output on 15% of land.

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[1] https://www.cso.ie/en/releasesandpublications/ep/p-fss/farmstructuresurvey2016/bgna/

[2] Context Indicator C.22 (2019 update)
https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

As can be expected, small farms utilise the smallest agricultural area, despite making up a large proportion of total farms overall; and very large farms utilise the greatest agricultural area, despite being the second smallest proportion of total farms. Small-medium farms, who make up the highest proportion of farms overall (at 33%), utilised the second largest amount of agricultural area. Overall, the majority of farms in Ireland (65%) are small and small-medium sized farms.[3]

The 2019 Teagasc National Farm Survey (which excludes small farms) found that about one-third of farms in Ireland are considered to be viable, while a further third are considered sustainable, due to the presence of an off-farm source of income. The final third of farms are considered to be vulnerable.[4]

This analysis aims to detail the current strengths and weaknesses of the Irish agri-food sector, while also detailing any potential opportunities and threats emerging. Amounting to over 300 pages, it is intended to form the basis of Ireland's Needs Assessment.

[3] CSO 2016 Farm Structure Survey

[4] 2019 Teagasc National Farm Survey

Objective 1: support viable farm income and resilience across the Union to enhance food security

Strengths

Obj1.S1: The agri-food sector is Ireland's largest indigenous industry

Ireland's agri-food sector[5] is the country's largest indigenous industry, contributing significantly to the national economy and acting as a key driver of the rural economy. In 2019, over €8 billion in output was produced by 137,000 farms in Ireland. That same year, Ireland exported 14.5 billion worth of agri-food products to over 180 markets worldwide. In addition, the agri-food sector accounted for 6.7% of GNI* (Modified Gross National Income) and 7.1% of total employment. In 2019, the sector contributed significantly to employment in rural and coastal areas in particular, providing between 10-14% of employment to regions outside of Dublin and the mid-east.[6] According to Eurostat, 97,900 people were directly employed by the agricultural sector and 54,700 were directly employed by the food industry in 2019.[7] Beyond direct employment, the agri-food industry is a source of income for the wider economy also; with estimated output multipliers ranging from 2.5 for the beef sector to around 2 for the dairy sector, which compared to an average output multiplier of 1.4 for the rest of the economy.[8]

Obj1.S2: The agri-food sector continuously demonstrates resilience

The 2007/2008 global financial crisis and subsequent severe recession had numerous negative effects on the Irish economy but, despite this, Irish food and beverage exports during this period continued to perform well against all other exports. Between 2009 and 2014, total Irish exports grew by almost 4%, while food and beverage exports increased by 45% amounting to €10.5 billion in 2014. The continued growth in agri-

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[5] The agri-food sector is defined as primary production (classified as Agriculture, Fishing and Forestry) along with Food and Beverages (grouped with National Income and Expenditure classification), and the Wood Processing sector.

[6] DAFM, Annual Review and Outlook for Agriculture, Food and the Marine, 2020

[7] Common Context Indicator C.13 'Employment by economic activity' https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[8] Agri-Food Strategy to 2030 (Public Consultation) https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/foodindustrydevelopmenttrademarkets/agri-foodandtheeconomy/agri-foodstrategyto2030/PublicConsultationDocument301019.pdf

food exports between 2009 and 2014 demonstrates the resilience of the sector and highlighted the strategic importance of the agri-food industry to the Irish economy.[9]

The resilience of the agri-food sector has again been emphasised following the emergence of Covid-19. Despite the global economy contracting due to the pandemic, global food demand has remained robust. Teagasc estimates that in 2020, margins increased (relative to 2019) across all agricultural sectors bar tillage, which saw a significant decrease due to lower yields. Irish milk production was up 3% on the 2019 level and although milk prices dropped in Q2 2020, there was a rapid recovery, thereafter, leading to an estimated increase in dairy enterprise net margin of 5% per litre on 2019. In relation to beef enterprises, aggregate production is estimated to have increased. For suckler and finisher cows, gross margins were up 11% and 3% respectively on the 2019 level. In relation to sheep enterprises, lamb prices are estimated to have increased by 9% and gross margin per ha of mid-season lowland lamb is estimated to have increased by 43% on 2019 levels. In relation to pig enterprises, pig prices are estimated to have increased by 5% and feed prices are estimated to be down 2% on 2019 levels, leading to an 8% increase in margin over feed costs. In contrast, Irish cereal yields, winter wheat and spring barley, were down 14% and 11% respectively and despite an increase in prices, gross margins for both cereal types decreased too; and therefore the average cereal enterprises net margin for 2020 is estimated to be down €75 per ha.

Obj1.S3: Productivity in the agri-food sector is high

Total factor productivity (TFP) of Irish farms decreased following the 2007-2008 financial crisis; but since 2012, there has been a steady increase in productivity levels and in 2017 the productivity of labour, capital and land were all above 2005 levels.[10] In 2019, total labour productivity in the primary sector (made up of agriculture, forestry and fishing) amounted to €30,447 per person.[11] Between 2015 and 2019, the labour productivity of agriculture increased by 26.4% from 14,357 €/AWU in 2015 to 18,152

[9] Food Wise 2025 https://www.gov.ie/en/publication/a6b0d-food-wise-2025/

[10] Analytical factsheet for Ireland: Nine objectives for future Common Agricultural Policy https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/by_country/documents/analytical_factsheet_ie.pdf

[11] Common Context Indicator C.12 'Labour productivity by economic sector' https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

€/AWU in 2019.[12] Having high productivity in the agri-food sector is the key to have a sustainable and viable sector.

Obj1.S4: Agricultural factor income in Ireland is greater than the EU-27 average

Agricultural factor income per annual work unit (AWU) fluctuated greatly between 2015 and 2019, ranging from 12,275.2 €/AWU in 2009 to 21,551 €/AWU in 2017. Despite fluctuating every year, agricultural factor income in Ireland is higher than the EU-27 average and has been every year since 2005. This indicates that Irish farmers see a higher income returned from the factors of production than their European counterparts.[13]

Obj1.S5: Increasing Gross Value Added at basic costs in agriculture

Gross Value Added (GVA) at basic prices is a measure of gross income before depreciation, subsidies and taxes on production and compensation of employees. Over the last five years, gross value added at basic prices in agriculture has increased by €804 million. GVA at basic prices is the difference between the output at basic prices and intermediate consumption. Over the past five years, agricultural output at basic prices increased by 21%, from €7,404m in 2015 to €8,943m in 2020. At the same time, total intermediate consumption increased, but at a much lower rate, increasing by 15% from €4,933 in 2015 to €5,667 in 2020.[14] In 2019, Irelands total GVA at basic prices was €322,216m, however the primary sector, which includes agriculture, forestry and fishing contributed only 1% to this overall figure.[15]

Obj1.S6: Prevalence of family farms committed to maintaining their farm enterprise

Farming is a predominantly family activity within the EU. According to Eurostat, approximately 89.5% of agricultural labour provided in the EU in 2016 (EU-28) was

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[12] Common Context Indicator C.14 "Labour productivity in agriculture" (2019 update) https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[13] Common Context Indicator C.25 'Agricultural factor income' https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[14] https://www.cso.ie/en/releasesandpublications/er/oiiaa/outputinputandincomeinagriculture-advanceestimate2020/

[15] Common Context Indicator C.10 https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

provided by family members. This includes sole holders, i.e. the farmer; and other family members working on the farm.[16] In Ireland, agricultural labour provided by family members is particularly high, at 93%.[17] In addition, the prevalence of family farms is particularly high as demonstrated by the CSO's 2016 Farm Structure Survey which found that of the 137,500 farms in Ireland in 2016, 99.7% were classified as family farms.[18] In Ireland, most farmers want their land to remain within the family unit when they retire or die and therefore, farms and agricultural land tend to be inherited rather than bought and sold which ensures family succession.[19]

In Ireland, there is a connection to the farm enterprise which is not exclusively business based. This generates conditions where family members provide unpaid farm family labour, an important feature of Irish farms contributing to farm viability. According to Eurostat, family workers get paid only 39.2% of an average wage (based on EUR/hour worked). In 2019, Teagasc surveyed 835 farms of all sizes and found that on average, total labour units (measured in annual work units where each unit is equivalent to 1,800 hours) on farm amounted to 1.12 units. Of these total labour units, 1.03 units were attributed to family members. The amount of unpaid labour supplied was highest on Dairy farms at 1.4 labour units and lowest on Cattle Other farms at 0.9.[20] The relative importance of family labour is particularly pronounced in small farms (farms with less than €8,000 of standard output), where family labour makes up 100% of total labour for Cattle rearing; and 98% of total labour for Cattle other and Sheep.[21] The fact that most farms in Ireland are classified as family farms and that farm labour is commonly provided by family members and often goes unpaid, demonstrates farmers' commitment to maintain their family farm business.

Obj1.S7: Temperate climate conducive for our grass-based livestock production systems

Ireland's temperate climate facilitates the maintenance of the country's greatest natural asset, its grasslands, by providing one of the longest grass growing season in

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[16] Eurostat (2019) 'Agriculture, forestry and fishery statistics' https://ec.europa.eu/eurostat/documents/3217494/10317767/KS-FK-19-001-EN-N.pdf/742d3fd2-961e-68c1-47d0-11cf30b11489

[17] Common Context Indicator C.22 'Farm labour force' (2019 update) https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[18] https://www.cso.ie/en/releasesandpublications/ep/p-fss/farmstructuresurvey2016/

[19] Geoghagan, C (2018) Understanding the economics of land access in Ireland. https://aran.library.nuigalway.ie/bitstream/handle/10379/7256/Thesis_final_corrected%20.pdf?sequence=1&isAllowed=y

[20] https://www.teagasc.ie/media/website/publications/2020/TeagascNFS2019-Preliminary-Results.pdf

[21] https://www.teagasc.ie/media/website/publications/2017/Small-Farms-Survey.pdf

the Northern Hemisphere and the ability to grow large quantities of grass in deep, rich, and fertile soils. According to Teagasc, Irish dairy farms spent 236 days at grass in 2019, an increase of 7 days since 2018.[22] In 2018, 90% of Ireland's utilised agricultural area (UAA) was considered permanent grassland and meadow. This compares to the EU-27 figure of 31%.[23] Grass-based livestock production systems are more efficient and environmentally sustainable compared to alternative intensive feed systems and therefore, Ireland is at a comparative advantage in the production of grass-based dairy and beef.[24]

Obj1.S8: Positive investment dynamic in the agricultural sector

In 2019, gross new investments on Irish farms totalled on aggregate close to €996 million nationally, an increase of 4%. In addition, between 2012 and 2018, Gross Fixed Capital Formation (GFCF), which measures investments in assets that are used repeatedly or continuously over a number of years to produce goods for agriculture, increased by 42.8% overall, despite decreasing slightly in 2016, amounting to a total of €1,031 million in current prices in 2018.[25] Investments were highest on dairy farms and were up 8% on 2018 levels. Investments on dairy farms made up more than half of total investments in 2019, amounting to an average of €34,221 per farm. Tillage farms experienced a huge increase in investments in 2019, up 59% on average to €18,337 per farm. In contrast, investments in drystock systems decreased in 2019 by 8% for Cattle Other and 11% for Cattle Rearing and Sheep farms. Dairy farmers invested mostly in buildings (48%), machinery (46%) and land improvement (6%); and all other systems invested in machinery mainly.[26] Part of this increase in investments relates to

[22] Teagasc's Outlook 2021- Economic Prospects for Agriculture https://www.teagasc.ie/media/website/publications/2020/Outlook-2021.pdf

[23] Common Context Indicator C.18 ' Agricultural area' (2018) https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[24] Food Wise 2025 https://www.gov.ie/en/publication/a6b0d-food-wise-2025/

[25] Common Context Indicator C.28 'Gross fixed capital formation in agriculture' https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[26] https://www.teagasc.ie/media/website/publications/2020/TeagascNFS2019-Preliminary-Results.pdf

large farms having to introduce measures to comply with environmental and safety standard requirements.[27]

Obj1.S9: Low level of indebtedness on Irish farms

The 2019 Teagasc National Farm Survey (NFS) reported that 62% of farms had no farm business related debt. Of the 38% of total farms that did have debt, average debt was just over €59,500. The percentage of farms with debt and the average debt per farm varied greatly across farm enterprises. For instance, 64% of dairy farms had borrowings compared to only 26% of sheep farms. The average debt per dairy farm was just over €112,000; and average debt per sheep farm was just under €26,000. Just under 40% of farm related debt across farming systems was classified as long-term i.e. more than ten years. This is the most common form of borrowing amongst dairy farmers.[28] The Central Bank's 2019 SME Market Report provides data on lending to non-financial Small and Medium Enterprises. Since 2010, the Primary Industries sector, i.e. Agriculture, Forestry and Fishing, generally accounted for the highest levels of lending; however, it was recently overtaken by the "Wholesale, Retail, Trade, Repairs" sector.[29] Annual new lending to SME's decreased by 1.7% up to Q4 2018 and this was partly due to a decrease of -4.5% lending to Primary Industries.[30] Excluding Financial Intermediation and Property Related Sectors, the agri-food sector accounted for 24% of all new SME loans in 2018 with primary agriculture accounting for €741m or 21% of total lending. During the same period, new lending to Food and Beverage companies was €104m, only 3% of the total. There has been an ongoing decline in the amount of loans outstanding in the agri-food sector since 2010, with current figures amounting to €3.509 billion at the end of Q1 2019, a 31% decrease since 2010 where loans outstanding stood at €5 billion.[31]

A 2015 report on the financial status of Irish farms conducted by Teagasc concluded that Irish farms in general have low debt to asset ratios by European standards and

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[27] Fi-compass (June 2020) " Financial needs in the agriculture and agri-food sectors in Ireland" https://fi-compass.eu/sites/default/files/publications/financial_needs_agriculture_agrifood_sectors_Ireland.pdf

[28] https://www.teagasc.ie/media/website/publications/2020/TeagascNFS2019-Preliminary-Results.pdf

[29] IGEES Spending Review 2020 'State-Supported Loan Schemes' https://www.gov.ie/en/collection/daf0c-spending-review-papers-2020/

[30] Central Bank: SME Market Report 2019 https://www.centralbank.ie/docs/default-source/publications/sme-market-reports/sme-market-report-2019.pdf?sfvrsn=9

[31] Spending Review 2020: State-Supported Loan Schemes. https://www.gov.ie/en/collection/daf0c-spending-review-papers-2020/

therefore, are considered to have a sound financial structure.[32] Having a low prevalence of indebtedness amongst enterprises in the agri-food sector enhances its overall resilience as businesses are in general more equipped to deal with short-term revenue shocks, such as extreme weather conditions resulting in lower yields; or an increase in operational costs, such as an increase in price of animal feed, because they do not have to repay a loan.

Obj1.S10: Strong economic viability of some sectors

According to Teagasc, a farm can be considered economically viable if total Family Farm Income (FFI) remunerates family labour at the minimum agricultural wage (assumed to be €20,129 per labour unit); and also provides a 5% return on the capital invested in non-land assets, such as machinery and livestock. This implies that farms with relatively modest incomes can still be considered viable if the labour input and capital investment is low; and farms with seemingly large incomes may not be viable if they require substantial labour input or significant investment in machinery or livestock.[33] In 2019, 74% of Dairy farms and 61% of tillage farms were found to be viable. However, the proportion of viable Cattle Rearing farms, Cattle Other and Sheep farms remained very low at 13% and 24%.

Obj1.S11: Off-farm income sources provide support to maintain farm enterprises

If the farm business is not viable, the household is still considered sustainable if the farmer or spouse has an off-farm income source. The 2019 Teagasc NFS found that 52.5% of farm households had an off-farm income source in 2019 as a result of the farmer or their spouse being employed outside the farm enterprise[34]; up slightly from 51.5% in 2018.[35] Dairy farm households were most likely to have an off-farm employment source of income, with a higher proportion of spouses being hired off-farm than any other farming system, resulting from the generally younger demography

[32] https://www.teagasc.ie/media/website/publications/2016/6358-Financial-Status-of-Irish-Farms.pdf
[33] https://www.teagasc.ie/media/website/publications/2020/Teagasc-National-Farm-Survey-2019.pdf
[34] https://www.teagasc.ie/media/website/publications/2020/Teagasc-National-Farm-Survey-2019.pdf
[35] https://www.teagasc.ie/media/website/publications/2019/NFS-2018_final_web.pdf

of these households. An additional 31.1% of farm households were in receipt of a pension, the majority of which were non-dairy farm households.[36]

In 2015, Teagasc undertook a Small Farm Survey and this found that 88% of Small Farm Households (farms with a total standard output of less than €8,000) had an off-farm source of income. This comprised of an off-farm job for 45% of small farm households, a pension for 39% and a social assistance payment for 20%. In comparison, 77% of larger farms (farms with a total standard output greater than €8,000) had an off-farm source of income, comprising of an off-farm job for 50%, a pension for 26% and a social assistance payment for 8%.[37]

In 2019, some 44% of cattle rearing, 38% of cattle other and 36% of sheep farm households were considered sustainable due to their off-farm income source. A farm is considered economically vulnerable if the farm business is not viable and if neither the farmer nor spouse has an off-farm income source. Having an off-farm income source ensures the economic sustainability of many farms that would not be considered economically viable otherwise. In the absence of off-farm employment opportunities, some 63% of farm households in the Teagasc NFS sample and over 80% of small farms would be economically vulnerable.

Obj1.S12: Effective development and delivery of schemes supporting family farm income

Numerous supports at both EU and national level are provided to farmers in order to mitigate income volatility and ensure farming remains a viable career option. Direct payments are a valuable source of income for farmers and protect against price volatility. Ireland's direct payments system is robust, demonstrating on an ongoing basis its capacity to deliver payments on time. This system is underpinned by close collaboration with stakeholders to ensure that issues for farmers arising from implementation are addressed efficiently and equitably. On average, total direct payments received per farm in 2019 was €18,325, however, this figure varies greatly across farm systems.[38] Ireland's main direct payment, i.e. Basic Payment Scheme (BPS), is currently based on an entitlements system which is somewhat linked to an individual's historic production. During stakeholder consultation, some submissions

[36] https://www.teagasc.ie/media/website/publications/2020/Teagasc-National-Farm-Survey-2019.pdf
[37] https://www.teagasc.ie/media/website/publications/2017/Small-Farms-Survey.pdf
[38] https://www.teagasc.ie/media/website/publications/2020/Teagasc-National-Farm-Survey-2019.pdf

received queried the possibility of exploring a move away from the existing entitlement system to a flat rate system of payment.

Further income related supports provided to farmers include tax incentives, low cost loan schemes and fixed price contracts. Tax incentives including for example income averaging allows farmers to pay tax on their income over a five-year period whereby the level of tax payable is based on the average of the five years profit and losses, meaning one-fifth of all profits over the five years is charged to tax for the year.39 The 'Agriculture Cash Flow Support Loan Scheme' (ACSLS) was developed in cooperation with the Strategic Bank Corporation of Ireland (SBCI) in order to ease cash flow difficulties at farm level. The ACSLS provided a flexible source of working capital at low cost and aimed to reduce the cost of maintaining a farm enterprise. The scheme provided a total of €145 million of working capital finance to farmers throughout Ireland and assisted farmers in addressing the impact of lower commodity prices in some agriculture sectors in 2016 and 2017.[40]

The Future Growth Loan Scheme, developed by DAFM and DBEI, in cooperation with the Department of Finance, the Strategic Bank Corporation of Ireland (SBCI) and the European Investment Fund (EIF) is a long-term capital investment scheme which supports SME's farmers and fishermen. This scheme makes up 800 million of investment loans available to eligible Irish businesses but a specific minimum of €50,000 has been secured for farmers. One unique characteristic of the Scheme is that loans up to €500,000 are unsecured, making it a viable source of finance for young and new entrant farmers, especially those who do not have high levels of collateral. In addition, smaller-scale farmers who often do not have the leverage to negotiate for more favourable terms with their banking institution, can also benefit from this loan.

The dairy industry in particular has tried to reduce income volatility and make dairy farming a more viable career option by offering a range of supports including fixed price contracts, innovative loans such as MilkFlex and financial support schemes such as FundEquip. MilkFlex is an innovative loan product designed to protect dairy farm incomes from market volatility, changing weather patterns and disease outbreak.[41] FundEquip is a scheme developed by Glanbia in partnership with the Strategic Bank Corporation of Ireland, Finance Ireland Credit Solutions DAC and leading equipment suppliers designed to assist farmers in purchasing critical infrastructure required on

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[39] https://www.revenue.ie/en/self-assessment-and-self-employment/farm/farming/income-averaging.aspx

[40] Agriculture Cash Flow Loan Support Scheme, Spending Review, October 2018 https://assets.gov.ie/3804/051218164204-aa13269bdfd24a0b88482d9922beb960.pdf

[41] https://www.financeireland.ie/products/milkflex/overview/

dairy farms.[42] The support provided at both EU and national level assists farmers in maintaining a viable farm income which ensures farming is a feasible career option, ultimately ensuring the resilience of the agri-food industry.

[42] https://www.glanbiaconnect.com/news/new-fundequip-scheme-for-purchase-of-equipment

Weaknesses

Obj1.W1: Low income in agri-food sector compared to other sectors of the economy

The gap in income between farming and other sectors of the economy in Ireland was emphasised by the CSO's 'Geographical Profiles of Income in Ireland 2016' publication. This publication found that median earned income rates differed significantly across occupations, with farmers earning the lowest at just over €19,536. This was well below the average median earned income of €49,740.[43] According to the European Commissions 'EU Farm Economics Overview', based on 2015 and 2016 FADN data, family farm labour commonly goes unpaid across the EU; with Ireland having one of the highest proportions of unpaid labour hours across the EU-28 at around 95%.[44] As a result of a large proportion of farm labour going unpaid, the average agricultural entrepreneurial income in Ireland was 39.2% of the national average income in 2019 (based on €/hour worked).[45] As agricultural incomes are low in comparison to other sectors of the economy, workers could be enticed to leave the sector for more attractive job opportunities outside of agriculture. During consultation several stakeholders also highlighted the long and unsociable hours associated with farming as a weakness, which present challenges in attracting and sustaining new entrants to the sector.

Obj1.W2: Farm viability varies across farming systems

In 2019, average family farm income was €23,576; however, family farm income differed considerably by farm system. As already noted, Dairy farms recorded the highest average income levels at €66,828 in 2019. This compared to €9,006 for Cattle rearing farms, €13,761 for Cattle other farms, €14,780 for Sheep farms and €32,700 for tillage farms. The 2019 NFS demonstrates a significant variation in the economic viability of farms across different farm systems. In 2019, only 12% of Dairy farms were considered economically vulnerable, and 75% were considered viable. In that same year, 43% of Cattle rearing farms were considered economically vulnerable and only 13% were considered viable. In addition, the spouses of dairy farmers are slightly more likely to be employed outside the farm enterprise and as a result, dairy households tend

[43] https://www.cso.ie/en/releasesandpublications/ep/p-gpii/geographicalprofilesofincomeinireland2016/occupationsandsector/
[44] https://ec.europa.eu/info/files/food-farming-fisheries/farming/documents/eu-farm-economics-overview-2015_en.pdf
[45] Common Context Indicator C.26 ' Agricultural entrepreneurial income' https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

to have an additional off-farm source of income too. Although 40% of Cattle rearing farmers and Cattle other farmers worked off-farm, their average income levels were the two lowest, resulting in these farm enterprises being less viable. The large variation in income levels is driven by differences in farm size (ha) and profitability.

According to the same survey, the average farm size of Cattle rearing farms and Cattle other farms is 31.6 ha and 36.2 ha respectively, which are below the average farm size of 43.2 ha for all farming systems. Unsurprisingly, these two farm types have the lowest FFI/ha, ranging from €285/ha for Cattle rearing to €380/ha for Cattle other, compared to an average €548/ha across all farming systems. The average Sheep farm is 46.9 ha (slightly above the average), however, FFI/ha for Sheep farms is low at €315/ha. As a result, these farm types rely heavily on direct payments, particularly Areas facing Natural and other specific Constraints, with direct payments representing 162% of total FFI on Cattle rearing farms, 129% of total FFI on Cattle other farms and 132% on Sheep farms. Cattle rearing, Cattle other and Sheep farms are the three least viable farming systems.[46] Given that Cattle rearing, Cattle finishing and Sheep farms account for over 100,000 of the 130,000 farms in the country, this is a major issue.

Obj1.W3: High percentage of Utilised Agricultural Area in areas facing natural constraint

In 2019, 76.9% of Utilised Agricultural Area in Ireland was situated in areas of natural constraint (ANC) (68.5% in ANC 'other than mountain' and 8.4% in ANC 'Specific'). This is well above the EU-27 average of 57.9% and is the 7th highest of all EU-27 countries.[47] These areas of land are often situated in remote areas and often suffer from poor soil conditions and difficult topography and therefore farmers face significant hardship when trying to perform agricultural activities on this land. As a result, farmers are heavily reliant on direct income support, particularly support to Areas facing natural constraints (Measure 13) under the Rural Development Programme in order to continue farming.

Obj1.W4: High reliance on Direct Payments

[46] Teagasc National Farm Survey (2019 results) https://www.teagasc.ie/media/website/publications/2020/Teagasc-National-Farm-Survey-2019.pdf

[47] Common Context Indicator C.32 'Areas of natural constraints' https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/performance-agricultural-policy/cap-indicators/context-indicators_en

Teagasc's 2019 National Farm Survey highlights the importance of direct payments for Irish farms, with direct payments in 2019 accounting for 78% of family farm incomes, an increase of 6% in aggregate terms on 2018 levels. On average, total direct payments received were €18,325 per farm. As with Family Farm Income (FFI), the dependence on direct payments varies widely, with Dairy farms representing the lowest percentage of direct payments as part of Family Farm Income at 31%; and Cattle Rearing representing the highest at 162%. The market income (before direct payments) is less than zero on Drystock farms, indicating that on average these farms do not make a profit from production and are heavily dependent on support. Although dairy farms rely on direct payments as an income source the least, they receive the highest farm level direct payment. In 2019, dairy farms received an average of €20,360 in direct payments, compared to €14,562 for cattle rearing farms. Again, Cattle Rearing, Cattle Other and Sheep are the most reliant farming systems on Direct Payments. [48]

It should be noted that farmers across the EU are highly dependent on direct income support, i.e. direct income support (Pillar I) as well as support to Areas facing natural constraints (Measure 13) under rural development (Pillar II). The EU average share of direct payments in agricultural factor income in 2018 was 24.4%. However, this masked considerable differences between Member States, ranging from 7% in Malta to 56% in Lithuania. In Ireland, the share of direct support in agriculture factor income was 35%.[49]

Obj1.W5: Decrease in lending to the agricultural sector

In 2018, there was a decrease in the total supply of finance to the agricultural sector. A report undertaken by Fi-compass found that lending decreased by €49 million, mainly as a result of the presence of existing loans and uncertainty related to Brexit. The report further indicated a funding gap of between €822 million and €1 billion in the agricultural sector, with more than 60% of the gap relating to long-term investment loans and more than 20% of the gap relating to medium-term loans. This financial gap was predicted based on two components. Firstly, it was based on the estimated value of loan applications that were rejected by banks; or whereby loan offers were rejected by applicants due to non-acceptable lending conditions. Secondly, it was based on the estimated value of viable loan applications that were not submitted by farmer as a

[48] Teagasc National Farm Survey (2019 results) https://www.teagasc.ie/media/website/publications/2020/Teagasc-National-Farm-Survey-2019.pdf

[49] https://agridata.ec.europa.eu/extensions/DashboardIndicators/FarmIncome.html?select=EU27_FLAG,1

result of being discouraged by potential rejection. Access to finance for farmers was hindered mainly due to the economic unviability of farms, the fact that many farmers lack appropriate collateral and due to the risk associated with the farming sector, which many banks believe is too high. In addition, interest rates for agricultural loans are particularly high compared to other EU countries and there is uncertainty related to Brexit.[50]

Obj1.W6: GDP per capita is unevenly dispersed across regions in Ireland

The volume index of GDP per capita in Purchasing Power Standards in Ireland is 191. This compares to an EU-27 average volume index of 100. Ireland has the second highest GDP per capita in PPS across Europe, however, GDP per capita is not evenly dispersed throughout the country. According to Eurostat, the volume index of GDP per capita in PPS in rural regions across the EU-27 is 71, however, rural regions in Ireland have an index of only 49. For intermediate regions across the EU-27, the volume index of GDP per capita in PPS is 88 and for urban regions, the volume index of GDP per capita in PPS is 125. Both intermediate regions and urban regions in Ireland have a higher volume index of GDP per capita in PPS compared to the EU average at 121 and 252 respectively. This indicates that GDP per capita is much lower in rural regions in Ireland, which suggests less economic activity in those regions.

Obj1.W7: Changing demographics and decline in young farmer numbers

According to Teagasc's National Farm Survey 2019 Sustainability Report, the percentage of all farms with a high age profile in Ireland increased from 25% at the start of the study period to 32% by the end of the study period, when measured on a three year rolling average basis. [51] The European Network for Rural Development found that the number of farmers in Ireland under the age of 35 halved between the years 2000 and 2010[52]; and since then, there has continued to decline. Altogether, the total number of young farmers decreased from 8,700 farmers (or 6% of all farmers) in

[50] Fi-compass (2020) "Financial needs in the agriculture and agri-food sectors in Ireland" https://www.fi-compass.eu/sites/default/files/publications/financial_needs_agriculture_agrifood_sectors_Ireland.pdf

[51] https://www.teagasc.ie/media/website/publications/2020/NFS-2019-Sustainability-Report.pdf

[52] https://enrd.ec.europa.eu/sites/enrd/files/w33_generational-renewal_factsheet_ireland.pdf

2010, to 7,400 farmers (5% of all farmers) in 2016.[53] While this demographic challenge is not unique to Ireland, a continued decline in young farmers is a concern in terms of the future viability and the sustainability of the sector. Independent cost benefit analysis and associated econometric analysis carried out for the 2015 Agri Taxation Review found that farmers over 65 years typically produced between 4% and 7.1% less output than farmers under 65 years of age. It was also highlighted during stakeholder consultations, that a small percentage of land holders in Ireland are women and women rarely inherit land. This poses a further challenge as women are often cited as more likely to drive the change necessary to ensure the future viability of some farm enterprises.

Obj1.W8: Low uptake of digital technologies

According to a study undertaken by Teagasc in 2016, Irish farmers have been slow in adopting new technologies, such as precision agriculture and robotic milking, mainly as a result of the costs and complexities associated with their uptake.[54] The findings of a survey undertaken by 768 farmers indicated that just over 50% of farmers lacked confidence using new technologies and only 46% of farmers claim to be using technology on their farm. The survey further indicated that technology awareness is limited; with only around one third of farmers registering awareness for 10 individual systems and pieces of equipment.[55] Without the uptake and adoption of new technologies, sustainable productivity growth in farming will not be achieved; and this will greatly hinder the resilience of the Irish agri-food industry.

Obj1.W9: Low levels of farm diversification to mitigate viability risk

The past 50 years has seen Irish agriculture become increasingly specialised in livestock production, particularly beef and dairy farming, as a result of increasing demand for these food products. Such specialisation brings increased risk to farm enterprises in cases of market volatility, disease outbreak and long term changes in consumer behaviours; particularly for full time specialist farming enterprises.[56] While many Irish

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[53] https://www.cso.ie/en/releasesandpublications/ep/p-syi/psyi2018/agri/farmsandfarmers/
[54] Teagasc Technology Foresight 2035 https://www.teagasc.ie/media/website/publications/2016/Teagasc-Technology-Foresight-Report-2035.pdf
[55] Digital Agriculture Technology, Adoption and Attitudes Study (2019) https://www.ifa.ie/wp-content/uploads/2020/11/Digital-Ag-Tech-Adoption-Attitudes.pdf
[56] https://data.oireachtas.ie/ie/oireachtas/committee/dail/32/joint_committee_on_climate_action/reports/2019/2019-03-28_report-climate-change-a-cross-party-consensus-for-action_en.pdf

farm households are financially diversified, through their off-farm labour activity, there are low levels of on-farm diversification with farms focusing primarily on traditional farm enterprises with a further specialisation into specific sectors. Consideration of other on farm enterprises could help mitigate the risk thereby improving viability. Attitudinal research in the area of farm diversification indicates a low level of interest amongst farmers to diversify their business, with 63% of respondents indicating they would not be interested in diversifying their farm business and only 2% of farmers expressing a preference for setting up a diversified farm-based business.[57] This lack of interest towards farm diversification could hinder the sustainable development of the agri-food industry and could ultimately reduce its overall resilience.

Obj1.W10: Insufficient adoption of risk management tools

The agri-food sector is susceptible to both economic and climatic risks; and as a result, yields are unpredictable and prices are volatile, leading to income volatility for farmers. Agricultural income is further susceptible to considerable fluctuations arising from the impact of both international and national economic developments and a dependence on direct payments; and therefore, uncertainty in the agri-food sector is high. Despite the price risk in the agri-food sector being high, particularly in some sectors like dairy; and despite farmers being generally risk adverse, often forward contracting at less than the average expected milk price[58],there is generally limited demand for risk management tools. A study undertaken on risk management in EU agriculture found that the lack of availability of risk management tools in Ireland was linked to a lack of demand for this type of support by the farming community; and a lack of sufficiently available funding, given the large scope of the Rural Development Programme and limited EAFRD envelope.[59] However, the current risk management framework includes options such as participation in Producer Organisations and financial management training via the Knowledge Transfer Programme for which there is limited up-take. There may be scope to increase the number of farmers who avail of these tools and in turn increase the farming sector's capacity to withstand income volatility.

Normal variations in production, prices and weathers should be addressed in farmers' normal business strategy and do not require a policy response. Infrequent, but

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[57] Teagasc Research survey on attitudes to farm diversification https://www.teagasc.ie/media/website/publications/2013/5912_Farm_Diversification_Technology_Update_Final_.pdf

58 Teagasc (2015) Risk and Irish Agriculture https://www.teagasc.ie/media/website/publications/2014/5914_Risk_and_Irish_Agriculture.pdf

[59]Ecorys "Study on risk management in EU agriculture" (2018) https://op.europa.eu/en/publication-detail/-/publication/5a935010-af78-11e8-99ee-01aa75ed71a1

catastrophic events that affect many or all farmers over a wide area will generally be beyond farmers' or markets' capacity to cope and will require policy intervention. In between normal and catastrophic risk lies *marketable* risk which can be addressed through market tools such as insurance and futures market or through cooperative arrangements among farmers. However, in Ireland there is a market failure in relation to risk insurance – it is not generally available to Irish farm enterprises.

Direct payments are a key risk management tool which provide an important income safety net, ensuring there is agricultural activity in all parts of the European Union including in areas with natural constraints[60] (which also receive support under Rural Development Policy) with the various economic, environmental and social associated benefits, including the delivery of public goods.

CAP reforms have led to increased exposure to global commodity price volatility. Commodity price volatility has been an increasing feature of some agricultural markets while prolonged period of low prices has put pressures on farmers in others. The shift of CAP expenditure from production support to decoupled payments has increased trade opportunities for farmers through the integration of the EU into global markets[61]. It has also reduced the price gap between EU and world market prices over time, leading to impressive gains in the trade performance of the EU agri-food sector.

However, the shift away from market management also made farmers more exposed to the risks in the agricultural sector, whether on the internal market because of lower support prices or in global markets due to higher price volatility. As the expectation is that the volatility in prices and farm incomes will remain or even increase in the agricultural sector, risk management is of primary concern for farmers, investors and policymakers. As a small, open economy, heavily reliant on export markets Ireland is particularly vulnerable to price volatility.

The longer-term global outlook is for increasing consumer demand, especially from emerging economies with a growing middle class, for safe, health and nutritious food, meeting high standards of environmental protection and animal welfare. This demand represents a significant growth opportunity for Irish, and all EU, food producers. However, this growth potential may, in the absence of a robust risk management, be threatened by ongoing price volatility.

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[60] European Commission, The Future of Farming, 2017

[61] https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/trade/documents/agri-market-brief-12_en.pdf

Obj1.W11: Ad hoc schemes required to respond to weather related and other crises in the sector

Over the last couple of years, Ireland has delivered a number of ad-hoc emergency measures to the agricultural sector. These were in response to weather related crises and were necessary given the lack of appropriate risk management tools in place to mitigate against the risks of adverse weather conditions. Delivered as state aid under the *De Minimis* and *Agricultural Block Exemption Regulations (ABER*), each ad hoc scheme was designed and implemented at short notice and funded by the exchequer. These measures required a diversion of resources and therefore their rollout demands better planning for similar future events. Approximately €11 million of exchequer funding was allocated to these ad hoc measures over the past decade. Measures include the 2010 Frost damage Scheme, the 2015/2016 Fodder Aid Scheme and the 2017 Inishowen Flood Relief Measure.

Opportunities

Obj1.O1: Improve access to finance

According to an agri-food survey undertaken by Fi-comass in 2018, over 60% of Irish enterprises surveyed said that reducing interest rates and reducing the collateral requirements of loans could reduce the difficulties associated with accessing finance.[62] Since farmers' lack of collateral is one of the main reasons why farmers struggle to access finance, there is scope to develop risk sharing instruments and guarantees to ensure sufficient collateral can be provided. In addition, the cost of finance in the agricultural sector in Ireland is above the EU 28 average,.[63] The survey further found that 54% of Irish enterprises surveyed believe that having more flexible repayment conditions with regards loan/credit schemes could also achieve greater access to finance; and 52% suggested that providing loan/credit schemes with longer tenor could also be a solution.[64] Providing additional working capital instruments, such as the Agriculture Cash Flow Support Loan Scheme and enhancing technical support to farmers could also be beneficial, given the lack of working capital instruments available and the overall lack of financial literacy in the sector.[65]

Obj1.O2: Encourage the use of new digital technologies to reduce input costs and increase efficiency

The agri-food industry worldwide faces significant challenges in relation to feeding an ever-increasing population while remaining conscious of the need to preserve biodiversity and natural resources; and mitigate against the effects of climate change. As a result, it is essential that Ireland's agri-food sector identifies and utilises emerging technologies that will drive competitiveness and sustainable growth. Teagasc, in their Technology Foresight 2035 report identifies technological progress as being essential to achieving sustainable growth. The challenge is to ensure these technologies, such as new sensor technologies and robotics, are used in a productive way; automating

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[62] https://www.fi-compass.eu/sites/default/files/publications/financial_needs_agriculture_agrifood_sectors_Ireland.pdf

[63] https://fi-compass.eu/sites/default/files/publications/financial_needs_agriculture_agrifood_sectors_Ireland.pdf

[64] https://www.fi-compass.eu/sites/default/files/publications/financial_needs_agriculture_agrifood_sectors_Ireland.pdf

[65] https://fi-compass.eu/sites/default/files/publications/financial_needs_agriculture_agrifood_sectors_Ireland.pdf

repetitive tasks, improving production efficiency and protecting natural capital. When these technologies are combined to improve management precision in agricultural production, this is known as precision agriculture.[66]

Precision agriculture is an approach to farm management whereby decisions are made based on information derived from observing, measuring and responding to inter and intra-field crop variability, or aspects of animal rearing.[67] Potential benefits arising from this farming system include an increase in efficiency, reductions in costs, improvements in product quality, reductions in the environmental impact of agriculture, and improvements in animal health and welfare. Altogether, it is a holistic approach to sustainable farming[68] whereby higher yields per animal and hectare are generated through data-driven herd and crop management.[69] Although currently precision agricultural systems are employed mainly by bigger producers as a result of the high cost of new technologies, this is expected to change. Between now and 2035, it is predicted that there will be large-scale adoption of digital technologies including automotive technologies based on sensor-rich, data-intensive systems; autonomous vehicles and drones; robotic systems handling delicate produce such as fruit and vegetables; and tractor-based sensing and micro-satellite deployments. In order to facilitate this adoption, advisors must be fully informed and familiar with the latest developments in technology while also having an awareness of the social context in which these technologies will be employed; and what is likely to drive the change.[70] Many smaller farmers would consider that precision farming technologies used by larger farmers would not be applicable to them. However, precision farming can be useful for small and medium-sized farms, provided that ways are found to reduce investment needs and risk. For smaller farms, the investment costs may be disproportionate to their income which must be considered in terms of addressing this opportunity. The demographics of the farming sector will also militate against the uptake of new technologies.

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[66] Teagasc "Technology Foresight 2035" https://www.teagasc.ie/media/website/publications/2016/Teagasc-Technology-Foresight-Report-2035.pdf

[67] Teagasc "Technology Foresight 2035" https://www.teagasc.ie/media/website/publications/2016/Teagasc-Technology-Foresight-Report-2035.pdf

[68] https://www.teagasc.ie/animals/dairy/research/livestock-systems/precision-farming-systems/

[69] Climate Action Plan https://assets.gov.ie/25419/c97cdecddf8c49ab976e773d4e11e515.pdf

[70] Teagasc "Technology Foresight 2035" https://www.teagasc.ie/media/website/publications/2016/Teagasc-Technology-Foresight-Report-2035.pdf

Obj1.O3: Development of the circular and bio-economy

Promotion and development of the circular and bio-economy are considered crucial to the sustainable growth of the agri-food sector and national economy. Making the transition towards a circular, low carbon and resource-efficient bio-economy will require more research and innovation right across the agri-food sector in resource-efficient production and distribution systems, value-chains based on new and more efficient use of wastes (e.g. food waste), residues and by-products and new business models that maintain and enhance natural capital. Circular agriculture, food, forestry and fisheries, and the bio-economy, will play an important role in Ireland's move to a more sustainable economy and environment and will have broad support of society, markets and consumers

The development of the bio-economy will have a number of benefits for Ireland. Firstly, it will contribute to climate change mitigation; and secondly, it will promote rural employment and drive economic development. Already a number of early-stage companies are being established in Ireland and are becoming promising pioneers in the bio-economy; however, there is scope to continue promoting further development in this area.[71] The government has developed a Bio-economy Implementation Group (BIG) to address key actions for the future development and success of the bio-economy in Ireland.[72] The Department of Agriculture, Food and the Marine and the Sustainable Energy Authority of Ireland (SEAI) have co-funded two bio-economy projects (ABC Economy[73] and BioCircle[74]). The development of these projects as well as the development of other projects should continue in order to ensure the appropriate growth of the bio-economy.

Obj1.O4: Capitalise on changing diets and changing consumer and societal demands

According to the EU Agricultural Outlook for Markets and Income 2018 - 2030, overall demand and supply of food products will continue to grow up to 2030, with consumers demanding more information on foods sourcing and its impact on the environment and

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[71] Department of Business, Enterprise and Innovation. "Realising the opportunities for enterprise in the bioeconomy and circular economy in Ireland" (Background Paper) https://enterprise.gov.ie/en/Publications/Publication-files/Realising-opportunities-for-enterprise-in-bioeconomy-and-circular-economy-in-Ireland-Background-Paper.pdf

[72] Bioeconomy Implementation Group (BIG) https://www.gov.ie/en/publication/9a7e1-the-bioeconomy/

[73] https://www.seai.ie/data-and-insights/seai-research/research-projects/details/agri-bio-circular-economy-abc-economy

[74] https://www.seai.ie/data-and-insights/seai-research/research-projects/details/enhancing-and-assessing-the-impact-of-novel-circular-economy-sectors-in-the-bioeconomy

climate change. These evolving demands will most likely result in higher production costs for producers but will also offer producers an opportunity to add value to their products while providing opportunities for growth. The report expects a trend towards reduced meat, bread and sugar consumption, while it expects consumption of plant-based proteins to increase. It expects cereal prices to remain fairly stable out to 2030, while protein rich crops will benefit from strong demand. Population growth in Africa and income growth in the developing world will lead to higher consumption of dairy products, which EU producers are well placed to take advantage of. Overall, global demand for poultry meat will increase the most, with higher income countries becoming increasingly aware of health and sustainability issues, therefore increasing its demand. [75]

As already noted, meat consumption in the EU is predicted to decrease. This is a result of changing dietary patterns and a shift towards more plant-based diets, including flexitarian, vegetarian and vegan diets. As part of these diets, meat intake is at minimum reduced in favour of plant-based sources of protein. As a result, the market for meat substitutes and plant-based products has evolved quickly and this is predicted to continue. There are also a range of other shifting consumer and dietary preferences such as increasing consumption of certain organic foods in certain markets and increasing demand for fortified, functional and 'grab-and-go' foods amongst others.[76] These new and emerging influences present an opportunity for diversification into new markets, providing high quality food and food ingredients. Diversification of farm enterprises, supported by the EU and national exchequer, offers the potential to improve the economic returns to farm businesses and thereby contribute both the longer-term viability of the farm business and farm household.

Obj1.O5: Reduce reliance on imported feed materials

Potential exists for Ireland to increase domestic production of all crops including protein crops and to supply a greater proportion of the feed materials included in animal feed rations such as legumes and brassicas, thereby reducing reliance on imported feed materials. Ireland currently has a particular reliance on imports of high

[75] EC (2018) EU Agricultural Outlook for Markets and Income, 2018 – 2030. European Commission, DG Agriculture and Rural Development, Brussels https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/medium-term-outlook-2018-report_en.pdf

[76] EC (2018) EU Agricultural Outlook for Markets and Income, 2018 – 2030. European Commission, DG Agriculture and Rural Development, Brussels https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/medium-term-outlook-2018-report_en.pdf

protein feed materials, of which there is a significant deficit, which could be reduced by increasing the production of protein crops. Reducing Ireland's reliance on imported feedstuffs will increase the sectors overall self-sufficiency and this will improve the sectors overall competitiveness. The continuation of the Protein Aid Scheme, a Voluntary Coupled Support (VCS), in the next CAP will help to stabilise and increase protein crop production. CSO statistics show that Ireland also currently imports large amount of fresh fruit and vegetables which the horticulture industry may be well positioned to take advantage of. A number of stakeholders also highlighted this potential for increased production of fruit and vegatables. However, experience of growing these crops in Ireland has shown that they can be particularly susceptible to poor returns on foot of external factors such as unfavourable weather conditions. For example, the 2017 production of peas, beans and lupins was almost 14,000 hectares. However, on foot of difficult weather conditions this area dropped to 8,400 hectares in 2018 and the area did not increase again in 2019. The area increased to approximately 13,735ha in 2020. However, this was due to very low winter sowings and a sharp demand for seed of all spring crops including, protein crops. Preliminary 2021 data is indicating a drop in the area sown to protein crops to just under 10,000ha.

Obj1.O6: Continue to increase exports of agri-food produce to new markets

Changing demands for food worldwide present an opportunity for the Irish agri-food sector to expand into new markets. Between January and June 2020, Irish food and drink exports to Africa, Asia and the Middle East grew by €120m, €35m and €34m respectively, compared to the same period last year. In the past decade, exports to Asia have increased significantly, mainly as a result of their increased consumption of dairy and meat products.[77] More than 25% of the meat produced worldwide is consumed in China and consumption rates are continuing to rise. In addition, China is a dairy-deficit country, meaning its dairy imports are substantial.[78] In order to allow for continued growth into new areas, the Department of Agriculture, Food and the Marine commissioned Bord Bia to undertake a Market Prioritisation exercise to identify markets that offer the best potential for growth over the medium term, particularly in light of Brexit. This report provides insight into different markets and helps companies to identify the appropriate market for their exports, to better understand the needs and requirements of customers in those markets and to understand the mechanics of

[77] https://www.bordbia.ie/industry/news/food-alerts/2020/market-diversification-for-growth/
[78] Prioritising Markets: Opportunities for Growth https://www.bordbia.ie/globalassets/bordbia.ie/industry/exports/prioritising-markets/prioritising-markets-report-meatdairy.pdf

doing business in those markets.[79] Identifying new markets for growth and continuing to encourage the expansion of Irish exports into these markets is a significant opportunity, particularly in light of Brexit.

Obj1.O7: Promote the development of short supply chains

Opportunities exist to improve farm incomes through the use of short food supply chains. Short food supply chains offer an alternative to longer supply chains where farmers have little bargaining power and consumers cannot trace food back to its locality. Short supply chains allow for farmers to sell their produce either directly to the consumer, or with a minimum of intermediaries; ultimately enabling them to retain a greater share of the final sales price and receive a higher farm income. This increase in revenue may also provide farmers the opportunity to reinvest that money back into their farm in order to expand or modernise it, leading to its greater resilience. Evidence further suggests that shorter supply chains can lead to strengthened cooperation between businesses involved in the food chain.[80] Strengthening local food markets can allow for rural economies to grow in sustainable ways. Encouraging businesses to participate in local food projects can allow them to find new ways of selling more of their products and can assist them in attracting new types of customers.[81] Establishing stronger connections between local agricultural, tourism and food supply sectors through initiatives like A Taste of Ireland – Sligo Food Trails[82], can further lead to rural development benefits. In addition, selling directly through successful farmers markets promotes the local economy and provides start-up opportunities for farms and other food enterprises to meet consumer needs[83], adding to the sectors overall resilience.

Obj1.O8: Increase value added at farm level

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[79] Prioritising Markets: Opportunities for Growth https://www.bordbia.ie/globalassets/bordbia.ie/industry/exports/prioritising-markets/prioritising-markets-report-meatdairy.pdf

[80] Short food supply chains and local food systems in the EU https://www.europarl.europa.eu/RegData/etudes/BRIE/2016/586650/EPRS_BRI(2016)586650_EN.pdf

[81] ENRD "Local Food and Short Supply Chains" http://enrd.ec.europa.eu/enrd-static/themes/local-food-and-short-supply-chains/en/local-food-and-short-supply-chains_en.html

[82] https://sligofoodtrail.ie/

[83] Bord Bia "Guide to Selling Through Farmers' Markets, Farm Shops and Box Schemes in Ireland" https://www.bordbia.ie/globalassets/bordbia.ie/lifestyle/information/farmer-markets/guide-to-selling-through-farmers-markets.pdf

Moving up the value chain where possible, in terms of the type of products sold and how they are produced is an important insulation against volatility, therefore adding to farmers' resilience. Ireland's Food Wise Strategy for the future of the agri-food sector contains detailed recommendations aimed at improving value added and productivity at farm and food industry level through a focus on sustainability, efficiency, knowledge transfer and innovation.[84] The OECD reports that increasing trade growth has coincided with deeper integration of the world's agri-food system, increasing the importance of agri-food global value chains (GVCs). Where once, agri-food sectors largely produced for domestic consumption or exported directly to the final consumer, now, agricultural and food processing value chains are often global in their reach. According to the OECD, participation in GVC's by agricultural and food processing sectors (whether by sourcing from or selling into GVCs) has allowed those agricultural and food sectors to experience higher growth in domestic value added, and has added greater value to their exports compared to those with lower levels of participation. This is a result of those sectors being provided with additional opportunities to access new markets, allowing them to become more competitive as a result having greater access to imported inputs.[85]

Obj1.O9: Increase knowledge base of farmers on risk management tools and financial planning.

The Irish agri-food sector has, in recent years, faced a number of risks in relation to climate change, Brexit; and more recently, the emergence of COVID-19. In 2019, Teagasc published a report on risk management tools, albeit specifically in the dairy sector; and concluded that Irish dairy farmer face increasing income volatility as a result of volatile global dairy markets, changing prices of inputs and changing weather conditions. As a result, Teagasc recommended providing farmers with a risk management toolbox to manage this income variability. They further noted that farmers will require education in relation to which tools are appropriate to use on their farm and the appropriate time and way to apply them.[86]

During a workshop undertaken on "Risk management in EU agriculture", it was found that policy makers are likely to face significant challenges when incentivising the uptake of private and market-based instruments, particularly when publicly supported

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[84] Food Wise 2025
https://www.gov.ie/en/publication/a6b0d-food-wise-2025/
[85] OECD, The changing landscape of agricultural markets and trade: prospects for future reforms
[86] https://www.teagasc.ie/media/website/publications/2019/TResearch_Spring2019_RiskManagement_p30-31_proof.pdf

measures are also to be implemented where appropriate.[87] It is worth noting that encouraging diversification within the enterprise could also mitigate against certain sector specific risks.

To further develop the knowledge base, of Irish farmers, on risk management tools, to address normal risk as part of their business and financial planning and build awareness of the various types of risk. The previously mentioned Teagasc report highlighted the fact that farmers require education regarding the adoption and application of tools, in terms of how and when to apply them.

[87] https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/events/documents/cap-have-your-say-risk-mgmt-workshop-summary_en.pdf

Threats

Obj1.T1: Ongoing price volatility in global markets

Global price volatility has been increasing since 2005 and is particularly prominent in the agricultural sector due to a range of economic, natural and political factors. Although it is normal for prices to increase and decrease over time, large and unpredictable changes in prices are problematic, particularly for farmers. Additionally, price volatility reduces farmers' capacities for long-term investments. The agricultural sector is particularly susceptible to price volatility for a number of reasons. In the short-term, the demand for and supply of agricultural products is fixed. Demand for food is fixed because people require food to survive; and the supply of food is fixed because the production of food takes time. This means that any change in the supply or demand of agricultural products can result in market instability and large variations in price. Macroeconomic factors can also influence the price of food, particularly changes in exchange rates and oil prices. In addition, climatic conditions, such as adverse weather conditions or diseases in crops and animals, can also impact prices by impacting output. Geo-political events can further impact prices. For example, the Russian ban on certain EU agri-food products resulted in a destabilisation of agricultural markets.[88] Price volatility impacts some sectors more than others. With the decoupling of farm payments under the CAP and the abolition of milk quotas in 2015, Irish dairy farmers are more exposed to fluctuations in global prices.[89] Volatile prices can have negative effects on farmer incomes, ultimately affecting the resilience of the Irish agricultural sector.

Obj1.T2: Reduced CAP budget and changes made to the provision of Direct Payments in the next CAP period

As already noted, a large share of farmers' incomes is made up of direct payments, particularly payments made under the Basic Payment Scheme (BPS); and as a result, any reduction in the CAP budget and any changes made to the provision of direct payments in the next CAP period will effect farmers' incomes and could have a knock-on effect on the viability of the farming sector. It is currently proposed that under the next CAP period, direct payments will be made up both mandatory and optional elements. The BPS will be replaced with the Basic Income Support for Sustainability

[88] Price volatility in agricultural markets: Risk management and other tools http://www.europarl.europa.eu/RegData/etudes/BRIE/2016/586609/EPRS_BRI(2016)586609_EN.pdf

[89] https://www.teagasc.ie/media/website/publications/2015/End_of_the_Quota_Era_final.pdf

(BISS) and new elements such as eco-schemes and the provision of funding for certain Sectoral Interventions will be introduced. As eco-schemes are mandatory for Member States (MS) to implement this means that a portion of the overall direct payment envelope must be allocated for these schemes and this reduces the overall budget available for the BISS and therefore the level of income support provided to farmers. Although participation by farmers in eco-schemes will be encouraged in order to increase their overall direct payment, participation is voluntary and therefore some farmers may not partake, ultimately decreasing their overall direct payment further. Mandatory convergence and capping of payments will also affect the overall level of direct payments made to some farmers. As a result of all of these changes, it is likely that a number of farmers will see an overall decrease in the level of their direct payments and this will affect their overall family farm income levels which could affect the viability of the farming sector and reduce its resilience, potentially resulting in land abandonment. However, it should also be noted that several farmers will see an overall increase in the level of their direct payments due to the aforementioned changes to the direct payment system.

Obj1.T3: Increasing costs associated with compliance with EU legislation on the environment, food safety and animal welfare

EU farmers and therefore Irish farmers are legally required to implement specific compulsory measures for the protection of the environment, food safety and animal welfare. However, farmers in third countries are not bound by the same set of requirements unless they are exporting to the EU and it is a prerequisite under the EU residue provisions. Therefore, the added cost of compliance with these legal requirements may impact EU and Irish farmers' competitiveness in global agricultural markets.[90] In a Fi-compass report which considers the financial needs of the agriculture and agri-food sectors in Ireland, it was noted that one of the main drivers of investment and financial demand in the agricultural sector in Ireland is compliance with sectoral environmental and safety standards, indicating that there are increased costs associated with compliance.[91] A European Commission study in 2008 found that there was a wide range of costs associated with animal welfare, environment and food safety with regard to different products across countries with additional costs that vary by

[90] European Commission "Assessing farmers' costs of compliance with EU legislation in the fields of the environment, animal welfare and food safety" https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/key_policies/documents/ext-study-farmer-costs-exec_sum_2014_en.pdf

[91] Fi-compass "Financial needs in the agricultural and agri-food sectors in Ireland" https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/key_policies/documents/ext-study-farmer-costs-exec_sum_2014_en.pdf

system for those categories.[92] The fragmented nature of the sector in Ireland also contributes to higher input costs where economies of scale cannot be achieved. The ongoing threat of climate change and effect of adverse weather conditions on our grass-based production system also places additional pressure on the primary producer.

Obj1.T4: Changing geo-political climate

As Ireland exports agri-food products to over 180 markets worldwide, it is critically important that trade relations remain strong. The nature of trade is changing in that while multilateral rules are still negotiated and overseen by the World Trade Organisation, there has been a plethora of regional and bilateral trade agreements globally. The EU, for example, has secured agreements with important export destinations such as Canada, Japan, Vietnam, Singapore and Mexico. It has also recently secured political agreement for a trade deal with the Mercosur countries which will pose some significant competitive challenges, for the beef sector in particular. Obtaining a balance between offensive and defensive interests in trade agreements remains challenging. In addition, unforeseen political and economic shocks, trade tensions and other issues such as exchange rate fluctuations and increased tariff and non-tariff barriers can all have an important bearing on agricultural and food markets and trade, all of which have an effect on farmers' incomes and the resilience of the agri-food sector.

Obj1.T5: Potential effect of Brexit on farm incomes, especially certain vulnerable sectors

In late December 2020, a Trade and Cooperation Agreement was agreed between the EU-27 and the UK, thereby removing the risk of immediate of tariffs and quotas in 2021. However, the changing nature of the trading environment and any changes to the cost or price structure will impact the competitiveness of those sectors exporting to the UK. Horticulture, prepared consumer foods and beef are some of the sectors most reliant on exports to the UK. Drystock (beef and sheep) farms on average have a very low farm income and given the low margin nature of these sectors, external shocks related to market volatility, price variations and input costs can severely impact on livelihoods. Since drystock beef farming is economically less viable and more exposed to developments on the UK market compared to the dairy sector, the areas of the country

[92] https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/cmef/sustainability/assessing-farmers-costs-compliance-eu-legislation-fields-environment-animal-welfare-and-food-safety_en

more dependent on beef farming, such as the West, are more at risk of being adversely affected than regions with a larger concentration of profitable dairy farms.

Obj1.T6: Effects of climate change

Agriculture generates a third of Ireland's national Greenhouse Gas (GHG) emissions, which is reflective of the relative importance of agriculture to the Irish economy, and the lack of heavy industry in comparison to other countries. Ireland's agri-food industry has strong green credentials and a positive international reputation in terms of the carbon intensity of its dairy and beef output with high participation in accredited Origin Green carbon audits.[93] Maintaining this "green" brand image is critically important to the agri-food sector considering its high dependency on exports. The long-term challenge for the sector is to meet the national policy objective of reaching carbon neutrality by 2050 while maintaining the capacity for sustainable food production.

In general, there are also threats associated with changing weather and more unreliable weather patterns. Ireland has already experienced the several extreme weather events in recent years, such as droughts and floods and these events are expected to continue.[94] In addition, changes to Ireland's temperate climate impacts yields and productivity.[95] The occurrence of storms, snow, heatwaves and drought over the previous few years highlights the vulnerability of agriculture to climate change.[96]

How we achieve carbon neutrality will involve an overall reduction in GHG emissions and an increase in carbon removals. It is clear that consumers are becoming more environmentally conscious and are concerned with choosing environmentally responsible producers. In order to ensure farming remains a viable option and that Irish producers receive good prices for their produce in the medium to long-term, as well as access to markets, we need to ensure that Ireland meets its climate obligations and that the production of agri-food products in Ireland is as carbon efficient as possible. In the longer-term, it is the challenge of restructuring and adapting the entire sector to remain competitive and prosperous in a world where carbon-intensive production will come

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[93] https://www.origingreen.ie/who-is-involved/producers/carbon-footprint-assessments/

[94] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf [and] Desmond, M. et al. (2018), *State of Knowledge on Climate Change Impacts for Ireland* [online] http://www.epa.ie/pubs/reports/research/climate/EPA%20RR%20223_web.pdf

[95] Sweeney, J. et al (2008) Climate Change – Refining the Impacts for Ireland: STRIVE Report (2001-CD-C3-M1) ISBN: 978-1-84095-297-1. Technical Report. Environmental Protection Agency, Wexford, Ireland.

[96] https://data.oireachtas.ie/ie/oireachtas/committee/dail/32/joint_committee_on_climate_action/reports/2019/2019-03-28_report-climate-change-a-cross-party-consensus-for-action_en.pdf

under increasing pressure. Altogether, strong climate action will be essential if Ireland is to maintain long-term access to markets for Irish food exports and to maintain the resilience of the agri-food sector overall.

Obj1.T7: Reduced numbers of young farmers

There has been a continued decline in the number of young farmers working in the agricultural sector; falling from 8,700 young farmers, which amounted to 6% of all farmers in 2010, to 7,400 young farmers, or 5% of all farmers in 2016.[97] The CSO's Farm Structures Survey undertaken in 2016 found that in Ireland, young farmers (those under 35 years of age) accounted for just 5.4% of total Irish farmers.[98] Despite a suite of measures being introduced to reverse the declining trend in young farmer numbers, a continued decline in the number of young farmers would threaten the future viability of the agri-food sector.

Objective 2: Enhance market orientation and increase competitiveness, including greater focus on research, technology and digitalisation

Strengths

Obj2.S1: National strategy for the agri-food sector is focused on increasing competitiveness and enhancing market orientation

Food Wise 2025 outlines Ireland's ten-year strategy for the Irish agri-food sector. Its aim is to develop an agri-food sector that acts strategically; ensuring Irish agri-food businesses achieve a competitive critical mass in the international marketplace by targeting quality conscious consumers who are willing to reward food producers for their sustainable production and high-quality produce.[99] The strategy identifies a number of ambitious growth opportunities across all sub-sectors of the agri-food sector over the ten year period, projecting an 85% increase in the value of agri-food

[97] https://www.cso.ie/en/releasesandpublications/ep/p-syi/psyi2018/agri/farmsandfarmers/
[98] Source: Department of Agriculture, Food and the Marine, Annual Review and Outlook 2018
[99] https://www.gov.ie/ga/foilsiuchan/a6b0d-food-wise-2025/

exports; a 70% increase in value added in the agri-food, fisheries and wood products sectors; and a 65% increase in the value of primary production. The strategy acknowledges the importance of maintaining competitiveness and ensuring market development; and outlines a number of recommendations to ensure the continued growth of the agri-food sector.

Obj2.S2: Irish agri-food exports are reliant in a period of unprecedented change and challenge

Total agri-food exports, including non-edible products, are estimated to be €14.3 billion in 2020, compared to €8.9 billion in 2010.[100] Exports of Irish food, drink and horticulture were valued at €13 billion in 2020 (compared to €13.2 billion in 2019). The value of dairy, pigmeat, sheepmeat, horticulture and cereals exports increased in 2020. The performance of Irish exports in 2020 must be seen in the context of a period of unprecedented change and challenge. During the global pandemic, supply chains were disrupted and consumer behaviour adopted and adjusted.[101]

Obj2.S3: Temperate climate provides competitive advantage for grass-based livestock production systems

Ireland's temperate climate provides one of the longest growing seasons in the Northern Hemisphere. Irish grassland has the capability of producing very high yields of 14+ t DM/ha due to temperate climate and productive soils, a highly important element enabling the achievement of sustainable livestock production systems.[102] Ireland, with a land area of 6.9 million hectares, has c. 4 million hectares under agriculture, 3.36 million of which is devoted to grass (silage, hay and pasture)[103]- the largest amount in Europe. As a result, Ireland has a comparative advantage in the production of grass-based dairy and beef.[104] As consumers become more conscious of buying sustainably produced products, Ireland will be in a good position to capitalise

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[100] https://www.gov.ie/en/publication/91e7e-annual-review-and-outlook-for-agriculture-food-and-the-marine-2020/?referrer=http://www.agriculture.gov.ie/agri-foodindustry/agri-foodandtheeconomy/economicpublications/aro2020/

[101] https://www.bordbia.ie/industry/insights/performance-and-prospects/performance-prospects-2021/

[102] https://www.teagasc.ie/media/website/crops/grassland/IGA-Student-Conference.pdf

[103] Kiely, G. Leahy, P. Lewis, C. Sottocornola, M. Laine, A. Koehler, A. (2018) GHG Fluxes from Terrestrial
Ecosystems in Ireland
http://www.epa.ie/researchandeducation/research/researchpublications/researchreports/Research_Report_227.pdf

[104] https://www.teagasc.ie/crops/grassland/grass10/

on their grass-based production system, ultimately increasing Irish farmers' competitiveness on the global market.

Obj1.T8: Increasing threat of global pandemics

The current Covid-19 outbreak has not only highlighted the threat that a pandemic of this nature poses to the health of citizens across the globe, it has also highlighted the threat to economies that rely heavily on export markets. As Ireland is a small, open economy that is heavily reliant on export markets, it is particularly vulnerable to supply chain disruption and price volatility, especially in its agri-food sector. Although the global food chain has remained resilient and the overall impact of COVID-19 has remained limited in the agri-food sector, a prolonging of the crisis could strain the overall flexibility of food systems.[105]

The emergence of the pandemic resulted in a shift in consumer behaviour and a change in the type of food demanded. There was an overall decrease in the demand for beef cuts as foodservice industries closed[106]; and an increase in demand for comfort foods, such as crisps, as consumers attempted to feel comfortable at home.[107] In addition, there were disruptions in food production, mainly due to widespread labour shortages and restrictions on movements. In terms of labour shortages, labourers on farms and processing plants have a higher chance of falling ill given that they work in conditions less conducive to social distancing and often share communal housing. This is evidenced by the considerable number of outbreaks of COVID-19 in meat factories across the globe and in Ireland, which led to the temporary closure of a number of plants, ultimately halting meat production for periods at a time. In addition, there was a lack of seasonal labour supply which impacted on food production.[108] Overall, shifting consumer preferences and disruptions in food production and supply chains can all lead to fluctuations in food prices, which can threaten farmers' incomes and reduce the resilience of the agri-food. Furthermore, there is evidence to suggest that alongside the increase in global travel and greater urbanisation; and, as a result of greater

[105] FAO (2020) "The impact of COVID-19 on food and agriculture in Europe and Central Asia and FAO's response" http://www.fao.org/3/ne001en/ne001en.pdf
[106] https://www.teagasc.ie/media/website/publications/2020/Outlook-2021.pdf
[107] https://www.europeandataportal.eu/en/impact-studies/covid-19/threats-food-security-another-pandemic-lingering-horizon
[108] https://www.europeandataportal.eu/en/impact-studies/covid-19/threats-food-security-another-pandemic-lingering-horizon

exploitation of the natural environment, there has been, and will continue to be, an increase in the likelihood of pandemics emerging.[109]

[109] Disease Control Priorities: Improving Health and Reducing Poverty, 3rd Edition. Chapter 17. https://www.ncbi.nlm.nih.gov/books/NBK525302/

Obj2.S4: Overall increase in investments in the agri-food sector

According to the 2019 Teagasc National Farm Survey, new investments on Irish farms totalled close to €996 million nationally, an increase of 4% on 2018 levels[110]. In 2018, gross fixed capital formation (GFCF) in agriculture was 39% in Ireland, compared to the EU-27 average of 31.6%.[111] Investments on dairy farms were highest, making up more than half of all investments. Dairy farmers invested mostly in buildings (48%), machinery (46%) and land improvement (6%); and all other farming systems (cattle rearing, cattle other, tillage, sheep, pig) mainly invested in machinery.[112]

Obj2.S5: Agriculture productivity is increasing and approaching the EU average

Agriculture productivity was negatively affected during the financial crisis and Total Factor Productivity (TFP) fell between 2007 and 2011. TFP has surpassed pre-crisis levels since 2016 and has been growing ever since. In 2017, Ireland's TFP (108) is just below the EU-28 (109), based on Index, 3-year moving average (2005 = 100).[113] Total factor productivity compares total outputs relative to the total inputs used in production of the output.[114] Productivity based growth, which involves getting more output from a given volume of inputs, is key to ensuring sustainable growth in agricultural incomes and is the basis for environmental sustainability in the agricultural sector.[115] Increases in productivity will ultimately lead to greater efficiency gains for farmers and this will ultimately increase their competitiveness in the global market.

Obj2.S6: Ireland has a reputation for sustainably producing high quality food, supported by recognised Quality Assurance Schemes

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[110] Teagasc 2019 National Farm Survey
https://www.teagasc.ie/media/website/publications/2020/Teagasc-National-Farm-Survey-2019.pdf
[111] Common Context Indicator C.29 'Forest and other wooded land' (2019 update)
https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf
[112] https://www.teagasc.ie/media/website/publications/2020/TeagascNFS2019-Preliminary-Results.pdf
[113] Common context Indicator C.27 ' Total factor productivity in agriculture' (2019 update)
https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf
[114] Common context Indicator C.27 ' Total factor productivity in agriculture'
https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/key_policies/documents/context-indicator-fiches_en.pdf
[115]https://www.teagasc.ie/media/website/publications/2020/6654_TFP_IrishAg_Total_Factor_Productivity_of_Irish_Agriculture_K_Hanrahan.pdf

Quality Assurance is fundamental to promoting food and horticultural products, ultimately providing consumers with assurances on product quality. Bord Bia, Ireland's National Food Board, operates several Quality Assurance Schemes for the food industry based on best practice, current legislative requirements, relevant industry guidelines and international standards. Primarily, Bord Bia assurance schemes provide confirmation that minimum standards in the production of agri-food products have been met and that products are of a high quality. It also plays a role in developing new standards and improving existing standards. Quality Assurance Schemes exist in the following sectors: beef, lamb, dairy, pigmeat, poultry, egg, fresh produce, mushroom compost and casing manufacturers and ornamental plant producers sectors.[116] Origin Green is Ireland's sustainability programme which includes primary producers, processors and Irish retailers. It is the world's only national food and drink sustainability programme and provides the Irish agri-food industry the opportunity to set and achieve measurable sustainability targets with regards the environment. Over 90% of Ireland's food and drink exports are verified by Origin Green and this is what makes Ireland's food and drink produce stand out on the global market, making it a first choice for environmentally conscious consumers. [117]

Obj2.S7: Strong animal health and disease control standards

Animal Health Ireland (AHI) is a partnership between the Department of Agriculture, Food and the Marine and the agri-food sector in the area of animal health and disease control. It was established in order to ensure the profitability and sustainability of the agri-food sector in Ireland by improving animal health. AHI aims to assist livestock producers and processors in ensuring optimal animal health by providing the knowledge, education and coordination required to establish effective control programmes for non-regulated diseases of livestock. Regular consultation with stakeholders, the establishment of Technical Working Groups and the publication of a series of guidance notes on animal health and disease control ensure a strong reputation in the area of animal health and welfare[118] which is important for ensuring competitiveness in a global market where concern for animal health and welfare amongst consumers is rising.

Obj2.S8: Wide range of support provided for research and innovation in the agri-food sector

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[116] https://www.bordbia.ie/farmers-growers/get-infarmevolved/become-quality-assured
[117] https://www.origingreen.ie/what-is-origin-green/
[118] http://animalhealthireland.ie/?page_id=499

In 2015, the Sustainable Healthy Agri-Food Research Plan (SHARP) was launched with three guiding principles: competitiveness, sustainability and consumer orientation. The SHARP is a strategic agenda that identifies a clear set of research priorities in the agri-food sector. Its purpose is to act as a blueprint to guide the funding decisions of all relevant funders. One of the goals of the strategy is to "intensify the innovation capability of Irish food production systems to contribute to the development of new/improved management practices, products, processes, and services which allow for increased market share for premium products and services".[119] A UCD Innovation report found that overall the Irish government provided a high level of state support for science and technology within the agri-food sector.[120]Investment was provided through the Department of Agriculture, Food and the Marine (DAFM), the Department of Education and Skills (DES) and the Department of Enterprise, Trade and Employment (DETE). The majority of support was provided to agencies under the remit of DAFM, e.g. Teagasc (€73 million), for research in the fields of: Animal and Grassland Research and Innovation, Crops, Environment and Land Use, Food; and, Rural Economy and Development.[121] €17.5 million was provided under DAFM's competitive research programme covering the key investment areas of the strategic research and innovation agenda.[122] €22 million was provided to Higher Education Institutes in the area of Agricultural Sciences; and €18.6m was provided to the Science Foundation Ireland (SFI) in that same area including for challenge based funding, and Bio-economy and Agri-Digitalisation Research Centres. Enterprise Ireland spent a total of €17.6 million on research, development and innovation through in-company supports, dairy processing, meat technology and food for health specific technology centres as well as broader centres applicable to agri-food such as the Irish Manufacturing Research (IMR) research centre and CeADAR the National Centre for Applied Data Analytics & Machine Intelligence, public/private collaborations and, through research commercialisation funds and grants.[123]

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[119] https://doksi.net/en/get.php?lid=23237
[120] Pg. 3 UCD Innovation in the Irish Agri-food Sector http://www.ucd.ie/t4cms/BOI_Innovation_report.pdf
[121] https://www.teagasc.ie/
[122] https://wayback.archive-it.org/org-1444/20201125110158/https://www.agriculture.gov.ie/research/competitivenationalprogrammes/
[123] https://www.enterprise-ireland.com/en/Research-Innovation/Companies/Collaborate-with-companies-research-institutes/Technology-Centres.html

Obj2.S9: Targeted application of genomic technologies contributing to gains in national herd efficiency and sustainability

Over the last number of years, Ireland has been focused on designing and implementing programmes aimed at improving the efficiency of beef and sheep production at farm level, with the hope of providing economic and environmental benefits on farm. The Irish Cattle Breeding Federation (ICBF) is a non-profit organisation responsible for providing cattle breeding information services to the Irish dairy and beef industries.[124] The Dairy Economic Breeding Index (EBI), Beef Eurostar and Dairy Beef Index (DBI) are all established databases relating to beef and dairy genetics, which utilise multi-trait analysis and focus on enhancing genetics associated with Irish grass based system of production. The implementation of breeding indices can be used to enhance genetic traits relating to productivity, health and methane emissions, and thereby reduce GHG emissions per unit of output.[125]The Beef Data and Genomics Programme (BDGP)[126] under the 2014-2020 RDP and the nationally funded Beef Environmental Efficiency Pilot (BEEP)[127] provide incentives to assist farmers in making the best breeding and herd management decisions for suckler cow production. In addition, Sheep Ireland, a genetic breeding programme for the Irish sheep industry focused on genetic improvement, was established in 2008.[128] This programme focuses on ewe fertility and on breeding resilience and resistance to diseases which impact on the productivity and therefore profitability of the sheep sector. A National Genotype Programme (NGP) is also in place to encourage sheep breeders to raise genetic resistance to scrapie in the national flock.[129] This is a voluntary programme and since its introduction in 2004 to the end of 2018, a total of 86,535 sheep have been genotyped.

Obj2.S10: Supportive Knowledge Transfer Programmes

Knowledge transfer (KT) groups allow farmers to share best practices and experiences in farming. Currently, there are approximately 18,600 participants enrolled in around 1,100 knowledge transfer groups across the beef, dairy, equine, poultry and tillage

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[124]Irish Cattle Breeding Federation (ICBF) https://www.icbf.com

[125] Schils, R.L.M., Eriksen, J., Ledgard, S.F. Vellinga, Th.V., Kuikman, P.J., Luo, J., Peterson, S.O. and Velthof, G.L. (2013), Strategies to mitigate nitrous oxide emissions from herbivore production systems. *Animal*, 7, pp. 29–40.

[126] https://www.gov.ie/en/service/0899db-beef-data-and-genomics-programme-2017-2022/?referrer=http://www.agriculture.gov.ie/beefschemes/

[127] https://www.icbf.com/wp/?page_id=12735

[128] https://www.sheep.ie/wp/wp-content/uploads/2014/02/Sheep-Breeding-in-Ireland-The-next-5-years.pdf

[129] https://www.gov.ie/en/service/0e0081-scrapie-monitoring-scheme/

sectors.[130] A mid-term evaluation of the Rural Development Programme, undertaken by Indecon International Economic Consultants found that KT groups had a positive impact on farm output and agricultural incomes. In 2020, Teagasc published their *National Farm Survey 2019 Sustainability Report* which found that being a member of a discussion group led to better economic performance across all farming systems.[131] This coincides with Teagasc's 2017 independent evaluation of dairy discussion groups that found that discussion groups were an effective advisory tool and were successful at encouraging peer to peer learning; and that group members were 20% more likely to adopt new technologies and better management practices, ultimately increasing their farm profits.[132]

Obj2.S11: Online digital tools provided to assist farmers in accessing new markets

In order to further increase international market access for Irish food and drinks exports, a seven-point action plan was produced by the Department of Agriculture, Food and the Marine (DAFM) in 2017. One of the seven action points involved creating an online Market Access Portal that could act as a repository of market access and export information on open agri-food exports across the world. This portal is now up and running and is a useful tool for farmers trying to access different markets. The information provided includes certification arrangements, exporter terms and conditions, individual trading statistics and the typical products exported to individual markets.[133] Additionally, Bord Bia undertakes regular market research and analysis and produces a number of useful reports annually to help ensure the Irish agri-food industry is best placed to take advantage of new market opportunities.[134]

Obj2.S12: Ireland ranks highly in the Digital Economy and Society Index 2020

The Digital Economy and Society Index (DESI) is a composite index that summarises relevant indicators on Europe's digital performance and tracks the evolution of EU Member States in digital competitiveness. Ireland ranks 6th out of 28 EU Member States in the Digital Economy and Society Index (DESI) 2020. Based on data prior to the pandemic, Ireland continues to rank first in the Integration of digital technology dimension and has maintained a leading position in the use of e-Commerce by SMEs. Ireland is in the 'top 10' on the Use of internet by individuals and recorded a notable

[130] Annual Review and Outlook of the Agriculture Food and Fisheries
[131] https://www.teagasc.ie/media/website/publications/2020/NFS-2019-Sustainability-Report.pdf
[132] https://www.teagasc.ie/media/website/news/2017/Impact_of_Participation_in_Teagasc_Dairy_Discussion_Groups150113.pdf
[133] https://www.gov.ie/en/publication/53e3f-market-access-report-2019-2020/
[134] https://www.bordbia.ie/industry/insights/?query=&pageSize=6&pageNumber=1

increase in the share of internet users. Ireland has maintained its top 10 position in digital public services, where it excels in open data and the provision of digital public services for businesses. There was no substantial change in Ireland`s position in the Human capital and Connectivity dimensions despite some improvement in key indicators where it has been lagging behind, such as the digital skills of the wider population.[135]

[135] https://ec.europa.eu/digital-single-market/en/scoreboard/ireland

Weaknesses

Obj2.W1: Wide variation in the level of productivity and efficiency in agriculture

There is a large variation in average farm incomes across all farming systems in Ireland due in part to both the size of the farm and the profitability of the farm per hectare. Typically, Dairy farms are characterised by higher incomes/profitability and larger holdings; and Cattle and Sheep farms are characterised by lower incomes/profitability and smaller holdings.[136] In 2016, there were a total of 137,560 farms in Ireland with an average farm size of around 35.5 ha UAA/holding.[137] Research by Teagasc shows that average farm size has increased since then and in 2019, average farm size was 43 hectares. As already noted, large variations in average farm size exist across the different farming sectors. The average size of a Dairy farm in Ireland was 58.9 ha in 2019, compared to an average farm size of 31.6 ha for Cattle Rearing farms and 36.2 for Cattle Other farms.[138] In comparison, the EU average physical farm size is 15.2 ha. However, most farms in the EU-28 can be characterised as small in physical terms, since two-thirds of them had less than 5 ha of UAA and only 6% had more than 50 ha of UAA in 2016.[139]

Teagasc, in its National Farm Survey 'The Sustainability of Small Farming in Ireland,'[140] classifies small farms as those with a standard output of less than €8,000 per annum. In 2016, the CSO estimated a total of 43,500 Small Farms in Ireland. This accounted for almost 32% of farms nationally, with 56% of these farms being Specialist Beef farms, 16% Specialist Sheep farms, 18% Mixed Field Crop farms and the remainder in Mixed Grazing Livestock, Tillage and Other systems. There were no Dairy farms in the Small Farms category. In that same year, 48% of farms in Ireland had a standard output of between €8,000 and €50,000 per annum (medium farms); and 20% of farms had a standard output of between €50,000 and €100,000 (large farms). Of the 20% of large farms, almost 55% of these farms were Dairy Specialist farms.[141] Teagasc found that

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[136] Teagasc 2019 National Farm Survey
https://www.teagasc.ie/media/website/publications/2020/Teagasc-National-Farm-Survey-2019.pdf
[137] Common Context Indicator C.1' Agricultural holdings (farms)'
https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf
[138] Teagasc 2019 National Farm Survey
https://www.teagasc.ie/media/website/publications/2020/Teagasc-National-Farm-Survey-2019.pdf
[139] Common Context Indicator C.17 'Agricultural holdings (farms)' (2019 update)
https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf
140 Teagasc Small Farm Survey
https://www.teagasc.ie/media/website/publications/2017/Small-Farms-Survey.pdf
[141] CSO Farm Structure Survey 2016
https://www.cso.ie/en/releasesandpublications/ep/p-fss/farmstructuresurvey2016/da/fs/

small farms are less productive than larger farms and that gross output per hectare was only €800 on small farms, 30% less than the average for large farms. In addition, small farms are less efficient with total costs consuming 74% of output in comparison to 68% of output on larger farms, mainly a result of overhead costs being higher on small farms, relative to their output level.[142]

In 2016, Specialist Beef production was the most common farm type in Ireland, accounting for 57% of all farm types. This was followed by Specialist Dairy Farms which accounted for 12% and Specialist Sheep which accounted for 11%. Specialist Tillage Farms accounted for 3% of all farm types. In that same year, there were only 1,300 pig farms, which was less than 1% of all farms nationally. In relation to poultry, only 9,000 farms had poultry on farm, which amounted to just over 6% nationally. In that same year, there were a total of 10,600 Cereal farms in Ireland (7%) and 8,400 farms growing Other Crops, Fruit and Vegetables (6%).[143] The majority of farms (64%) in Ireland are beef and sheep farms, which are considered to be the least productive and efficient, which has significant implications for the economic and environmental sustainability of the sector.

Obj2.W2: Wide variation in levels of innovation and adoption of new technologies

The UCD report 'Innovation in the Irish Agri-food Sector' found that in terms of innovation, Dairy farms tend to be at the higher end of the innovation index, while Cattle Rearing and Cattle Finishing enterprises tend to be at the lower end of the index. Dairy farms had an innovation index value of 0.62 which compared to an average score of 0.40 for all farms, indicating a higher than average innovative performance on these farms. Cattle Rearing farms were the least innovative, with an innovation index value of 0.29, well below the average innovation level. Highly innovative farmers tended to have higher farm incomes and larger farms; were more likely to invest; and were younger than less innovative farmers.[144]

Obj2.W3: Lack of access to high speed broadband in rural areas

The lack of adequate broadband infrastructure in Ireland may hinder the competitiveness of rural Ireland, in particular the agri-food sector. Ireland has made

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[142] Pg. 22 Teagasc Small Farm Survey
https://www.teagasc.ie/media/website/publications/2017/Small-Farms-Survey.pdf
[143] CSO Farm Structure Survey 2016
https://www.cso.ie/en/releasesandpublications/ep/p-fss/farmstructuresurvey2016/da/fs/
[144] http://www.ucd.ie/t4cms/BOI_Innovation_report.pdf

progress in addressing the provision and quality of broadband available in Ireland over the past decade, with Next Generation Access (NGA) broadband now available to 90% of rural households. However, Ireland is one of the most expensive countries for broadband in the EU and rural areas in particular perform weakly in terms of access to Very High Capacity Network (VHCN).[145] Access to VHCN coverage in rural areas will be crucial to realise digital opportunities in the agri-food sector and for wider society in rural areas. The delivery of the National Broadband Plan (NBP) and the provision of high-quality broadband to rural areas will enable people to develop digital skills required for an effective Agricultural Knowledge and Innovation System. While it is acknowledged that work is ongoing in the rollout of broadband to rural Ireland, numerous studies have found that the lack of access to broadband is impacting on rural Ireland in many ways and is hindering its overall development.[146] It is essential that the necessary broadband infrastructure is in place to allow agri-food enterprises to conduct their business, and remain competitive.

Obj2.W4: Low level of Producer Organisations

The EU Producer Organisation (PO) Scheme[147] provides a mechanism for producers to work together to optimise production costs, stabilise prices and strengthen their position in the marketplace by becoming part of a larger supply base. In Ireland, there are a limited number of POs in operation, four in the fruit and vegetable sector and two in the beef sector. Two of the fruit and veg POs and the two beef PO's were established and formally recognised in 2019, with the first drawdown of the scheme in 2020. Although cooperatives are well established in Ireland, with more than 95% of cow milk deliveries being managed by processing and collecting cooperatives in 2016[148], these cooperatives are not recognised as being POs. POs can also operate as Inter-branch Organisations (IMO's). IMO's facilitate multiple POs working as one in an integrated manner to increase their bargaining power, while maintaining their individual processes

[145] https://www.dccae.gov.ie/documents/Delivering%20the%20National%20Broadband%20Plan.pdf
[146] Pg. 22 Irish Rural Link http://www.irishrurallink.ie/wp-content/uploads/2016/10/Poverty-and-Social-Inclusion-The-Case-for-Rural-Ireland.pdf
[147] https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/market-measures/agri-food-supply-chain/producer-and-interbranch-organisations
[148] European Commission, Joint Research Centre – Technical Report: Milk Package provisions as regards Producer Organisations and collective negotiations, https://publications.jrc.ec.europa.eu/repository/bitstream/111111111/49771/1/milk_package_pos-jrc_report.pdf

and identities.[149] Currently, there are no IMO's in Ireland. One benefit of Producer Organisations is that they are exempt from EU competition rules for certain activities. These activities relate to POs negotiating collectively on behalf of their members, the planning of production and certain supply measures.

In addition, recognised POs in the fruit and vegetable sector can benefit from access to EU funding within 'operational programmes', for example, to support collective investments in logistics to the benefit of their members.[150] The National Strategy[151] for POs operating in the fruit and vegetable sectors sets out the actions and priorities for support in relation to improving competitiveness, market development and innovation.

Obj2.W5: High reliance on the UK market

In 2020, 33% of Ireland's total food and drink exports were destined for the UK market, 34% were destined to the EU27 and 33% to international markets outside the UK and EU. For example, some 94% of horticulture exports, 68% of all prepared consumer foods and 44% of all beef exports were destined for the UK market in 2020. However, there has been reduced dependence on the UK market since the Brexit referendum, with the UK market accounting for just 10% of growth (€195 million) since 2016. There has been very significant increases in the value of exports to Africa (up 86%), the EU-27 (25%) and to Asia (up 14%).[152] While the UK is likely to remain Ireland's single most important market for reasons of geography and shared tastes, it will be import for Ireland to enhance its market orientation in different countries.

Obj2.W6: Costs of compliance with EU's higher environmental and sanitary production standards

EU farmers and therefore Irish farmers are legally required to implement specific compulsory measures for the protection of the environment, food safety and animal welfare. However, farmers in third countries are not bound by the same set of

[149] https://www.nationalruralnetwork.ie/farm-viability-case-studies/an-overview-of-producer-organisations/

[150] https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/market-measures/agri-food-supply-chain/producer-and-interbranch-organisations_en#bargainingpower

[151] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/farmingsectors/horticulturebeekeeping/horticultureschemes/NationalStrategySustainableOPsOct2017Dec2022050218.pdf

[152] https://www.bordbia.ie/industry/insights/performance-and-prospects/performance-prospects-2021/

requirements.[153] Therefore the added cost of compliance with these legal requirements has the potential to impact EU and Irish farmers' competitiveness in global agricultural markets

Obj2.W7: Low income levels in drystock farming leading to low competitiveness

Although livestock farms are not as profitable as dairy farms, for many Irish farmers, beef and sheep production is the most suitable enterprise in terms of geo-spatial conditions as this type of farming is particularly suitable for poorer soil types. As greater profitability is associated with greater investment, the low levels of profitability on livestock farms may hinder the overall competitiveness of these farmers. A study undertaken by Teagasc on the competitiveness of agri-food systems in Ireland found that the overall competitiveness of the beef sector in Ireland was relatively weak, mainly as a result of land and labour productivity being low; and that opportunity costs in this sector were much larger than competitors' opportunity costs. In relation to the sheep sector, the analysis found that sheep farms were heavily reliant on subsidies and found that as a result of the CAP becoming further liberalised, it is likely that sheep farmers in Ireland will be subject to greater competitive pressures in the future.[154]

Obj2.W8: Decline in young farmer numbers

Teagasc's National Farm Survey 2019 Sustainability Report demonstrated that the percentage of all farms with a high age profile in Ireland increased from 25% at the start of the study period to 32% by the end of the study period, when measured on a three year rolling average basis. [155] In addition, the number of farmers in Ireland under the age of 35 halved between the years 2000 and 2010[156]; and since then, there has continued to decline. Altogether, the total number of young farmers decreased from 8,700 farmers (or 6% of all farmers) in 2010, to 7,400 farmers (5% of all farmers) in 2016.[157] As noted in the UCD 'Innovation in the Irish Agri-food Sector' report, highly innovative farmers are more likely to be younger than less innovative farmers and are

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[153] European Commission "Assessing farmers' costs of compliance with EU legislation in the fields of the environment, animal welfare and food safety" https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/key_policies/documents/ext-study-farmer-costs-exec_sum_2014_en.pdf

[154] Teagasc (2017) The Competitiveness of Irish Agriculture https://www.teagasc.ie/media/website/publications/2017/The-Competitiveness-of-Irish-Agriculture.pdf

[155] https://www.teagasc.ie/media/website/publications/2020/NFS-2019-Sustainability-Report.pdf

[156] https://enrd.ec.europa.eu/sites/enrd/files/w33_generational-renewal_factsheet_ireland.pdf

[157] https://www.cso.ie/en/releasesandpublications/ep/p-fss/farmstructuresurvey2016/

likely to have higher farm incomes and larger farms[158], resulting in them being more competitive. Therefore, the decline in young farmers risks a decline in innovation and this will reduce the overall competitiveness of the Irish agri-food sector.

Opportunities

Obj2.O1: Increasing demand for high quality, safe and sustainable food, including organic produce

The Irish agri-food sector has the opportunity to expand into new markets by adapting and responding to changing societal and consumer demands which are influenced by consumers' health, the environment, climate change and animal welfare. These new markets include the market for convenience food and the market for organics.[159] The demand for organic produce is increasing both nationally and internationally; and therefore, in order to remain competitive, Ireland should continue growing its organic food sector in order to meet this demand. Ireland recently conducted a review of the organic food sector which identified a series of changes arising in the marketplace which included peoples changing preferences on how food is produced. As noted in the review, Ireland already has a clean, 'green' image and therefore, it would be an ideal platform to market organic products.[160] Changing consumer preferences relating to how food is produced could result in a market opportunity arising for farmers whereby an emphasis is placed on 'green,' sustainable production, with the potential to develop branding around this concept to further signify Ireland's green image.[161] The potential to expand the existing networks of local markets, farmers markets and other community based initiatives could be further explored. Stakeholders also pointed to initiatives such as the Open Food Network which could be utilised to digitise and make

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[158] http://www.ucd.ie/t4cms/BOI_Innovation_report.pdf
[159] https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/agricultural-outlook-2019-report_en.pdf
[160] http://www.bordbiavantage.ie/market-information/sector-overviews/organic-market/
Review of Organic Food Sector and Strategy for its Development, 2019-2025 https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/farmingsectors/organicfarming/organicsscheme/ReviewofOrganicFoodSector290119.pdf
[161] https://www.farmingfornature.ie/

more efficient local food initiatives. Ireland's reputation as a source of high quality, safe and sustainable food and drink provides a strong foundation to avail of these opportunities[162], all of which would boost the competitiveness of the Irish agri-food sector and would ensure greater market orientation in the market for sustainable produced agri-food products.

Obj2.O2: Reduce difficulties associated with accessing finance

A fi-compass report found that the main issues hindering farmers' access to finance relate to the economic viability of farms, lack of collateral and the risk associated with farming as an enterprise, which is considered too high for banks. In addition, there is a lack of competition between key financial players, with the financing supply being dominated by two banks.[163] In addition, the repayment capacity depended on the specific sector with non-dairy farmers experiencing more difficulties in accessing finance given lower income expectations.[164]

A lack of capital in the agri-food sector has prevented planned investments, ultimately undermining the competitiveness of the sector.[165] Therefore, it is important to improve access to finance through new initiatives, in tandem with existing funding mechanisms, in order to improve the overall competitiveness of the sector. Building on schemes such as the Agricultural Cash Flow Support Scheme[166] and the Future Growth Loan Scheme[167] would also ensure farmers have greater access to finance. The greater access to finance would lead to more opportunities for investment and would increase the overall competitiveness of the agri-food sector.

Obj2.O3: Use of new technologies to reduce input costs, increase efficiency and add value

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[162] https://www.bordbia.ie/globalassets/bordbia.ie/industry/performance-and-prospects/2019-pdf/performance-and-prospects-2019-2020.pdf

[163] Fi-compass (2020) "Financial needs in the agriculture and agri-food sectors in Ireland" https://fi-compass.eu/sites/default/files/publications/financial_needs_agriculture_agrifood_sectors_Ireland.pdf

[164] https://ec.europa.eu/agriculture/sites/agriculture/files/external-studies/2015/young-farmers/country-reports/annex-i.14-ireland.pdf Pg. 10

[165] Fi-compass "Financial needs in the agriculture and agri-food sectors in Ireland" https://www.fi-compass.eu/sites/default/files/publications/financial_needs_agriculture_agrifood_sectors_Ireland.pdf

[166] https://assets.gov.ie/3804/051218164204-aa13269bdfd24a0b88482d9922beb960.pdf

[167] https://sbci.gov.ie/products/future-growth-loan-scheme

New technologies are changing the shape of the agricultural industry across the globe, with improvements in genetics and machinery increasing the productivity and profitability of the farming sector. There has been a dramatic increase in the emphasis on consumer protection, continuous quality assurance, natural foods, pathogen-free food, reduced antibiotic usage and an increase in concern for animal welfare. For example, within the dairy sector, precision dairy farming is an inherently interdisciplinary field incorporating concepts from (bio) informatics, biostatistics, grass and animal breeding, animal husbandry and nutrition, machine learning, sensor networking, autonomic network management and engineering. Precision agriculture is an approach to farm management whereby decisions are made based on information derived from observing, measuring and responding to inter and intra-field crop variability, or aspects of animal rearing.[168] The potential benefits of precision farming systems include increased efficiency, reduced costs, improved product quality, reduced environmental impact, and improved animal health and welfare, thereby facilitating a holistic approach to sustainable farming (i.e. economic, environmental, stakeholder perception, and food security).[169]

Work being conducted by Science Foundation Ireland Research Centres, the AgriTech Centre of Excellence, the Irish Food Technology Gateway Cluster, Teagasc and by Enterprise Ireland is delivering technological, knowledge and innovation advances across the entire food production chain. There may also be an opportunity to streamline the way new research and technology is disseminated to the primary producer and the role of AKIS could be explored in this regard.

Obj2.O4: Diversification including further development of the circular and bio-economy

Diversification of farm enterprises offers the potential to improve the economic returns to farm businesses and thereby contribute both the longer-term viability of the farm business and farm household. The strength of the agri-food sector and the integral role it plays in Ireland's economy as the largest indigenous industry creates a unique opportunity to generate significant returns from modernisation, restructuring and market development; and to capitalise on the opportunities associated with the bio-economy, circular economy, climate mitigation/adaptation, eco-tourism, sustainable land management and sustainable energy.

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[168] Teagasc "Technology Foresight 2035" https://www.teagasc.ie/media/website/publications/2016/Teagasc-Technology-Foresight-Report-2035.pdf

[169] https://www.teagasc.ie/animals/dairy/research/livestock-systems/precision-farming-systems/

The growing interest in the bio-economy and forestry sectors present opportunities to diversify the economic landscape of rural Ireland. In order to successfully transition to a more circular and bio-based economy; and to contribute to the achievement of the Sustainable Development Goals, there will need to be a shift in the way we produce energy and manage our waste. Creating a favourable environment for diversification into these sectors will allow for a greater production of bio-based products and will ensure the generation of waste is minimised in a sustainable manner, while also increasing job opportunities in both sectors.

Diversification of farm enterprises offers many social, economic and environmental benefits, such as providing the potential to improve economic returns to farm businesses, thereby contributing to both the longer-term viability of the farm business and farm household; and by increasing the potential of land to sequester carbon and produce more energy efficient products.[170]

Obj2.O5: Open access to new markets and expand access to existing markets

In terms of opportunities for further growth in market share, Bord Bia were commissioned by DAFM in 2017 to carry out a market prioritisation exercise for key sectors, analysing a range of factors to identify which markets should be prioritised. Fifteen markets by sector were identified as likely to present growth opportunities for meat, dairy, prepared consumer foods, beverages, and seafood over the next 5-10 years. Key markets identified for different sectors included Asia (meat, dairy, beverages), Mexico (meat), EU (beverages, prepared consumer food), USA (beverages) and the Middle East (prepared consumer food).[171] The diversification strategy appears to be paying dividend, with very significant increases in the value of exports to Africa (up 86%), the EU-27 (25%) and to Asia (up 14%) since 2016.[172] Free Trade Agreements including EU-Australia, EU-Japan, Comprehensive Economic and Trade Agreement with Canada (CETA) and others could lead to new opportunities for food and drink exports.

Obj2.O6: Potential for greater synergy between dairy and beef systems

The dairy calf-to-beef system may present opportunities for beef farmers. The number of dairy cows has seen significant increases in recent years and there is an increasing

[170] https://www.teagasc.ie/rural-economy/rural-development/diversification/
[171] https://www.bordbia.ie/industry/services/exports/prioritising-markets-opportunities-for-growth/
[172] https://www.bordbia.ie/industry/insights/performance-and-prospects/performance-prospects-2021/

supply of calves available for rearing and finishing on beef farms.[173] There is an opportunity to add value to male dairy calves and to facilitate home rearing of these calves thereby reducing reliance on live exports. The Dairy Beef Index enables dairy farmer to produce quality beef cattle from the dairy herd that have both desirable calving attributes (i.e., easy calving and short gestation) and valuable beef carcass attributes.[174]

[173] https://www.teagasc.ie/media/website/publications/2019/Dairy-Beef-2019-Booklet.pdf
[174] https://www.icbf.com/wp/wp-content/uploads/2020/03/The-Dairy-Beef-Index_Explanation2020__1.pdf.

Threats

Obj2.T1: Effects of climate change on primary production

The frequency and intensity of extreme weather and climate events have increased because of global warming and these are predicted to continue increasing under medium and high emission scenarios.[175] Ireland has experienced several extreme weather events in recent years, such as droughts and floods and is expected to continue to experience extreme weather events.[176] Changes to our temperate climate will have an impact on yields and productivity.[177] In 2018 the severe weather caused severe disruption to our predominant grass-based production systems and added significant input costs to the sector reducing the competitive advantage of the sector.[178]

Obj2.T2: Capability and capacity of sector to adjust to new demands/challenges

It is clear that consumers are becoming more environmentally conscious and are concerned with choosing environmentally responsible producers. In order to ensure farming remains a viable option and that Irish producers receive good prices for their produce in the medium to long-term, as well as access to markets, we need to ensure that Ireland meets its climate and environmental obligations. In the longer-term, it is the challenge of restructuring and adapting the entire sector to remain competitive and prosperous in a world where carbon-intensive production will come under increasing pressure. Altogether, significant climate and environmental action at farm and national level will be essential if Ireland is to maintain long-term access to markets for Irish food exports and to maintain the resilience of the agri-food sector overall. If farmers fail to innovate and adapt to changing societal and consumer trends and concerns regarding sustainability, the environment and animal welfare, the competitiveness and viability of their enterprise could be affected.

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[175] https://www.ipcc.ch/site/assets/uploads/2019/08/2c.-Chapter-2_FINAL.pdf

[176] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf [and] Desmond, M. et al. (2018), *State of Knowledge on Climate Change Impacts for Ireland* [online] http://www.epa.ie/pubs/reports/research/climate/EPA%20RR%20223_web.pdf

[177] Sweeney, J. et al (2008) Climate Change – Refining the Impacts for Ireland: STRIVE Report (2001-CD-C3-M1) ISBN: 978-1-84095-297-1. Technical Report. Environmental Protection Agency, Wexford, Ireland.

[178] https://www.gov.ie/en/publication/e2273-agri-food-and-the-economy/

Obj2.T3: Labour shortages along the agri-food sector

Prior to the Covid-19 global pandemic, Ireland and the EU-27 were experiencing low levels of unemployment (unemployment rates of 5.8% in Ireland and 7.3% in the EU-27 in 2018[179]). Labour shortages have been experienced in certain sectors, including meat processing, horticulture, and dairy farming. As a result, applications for employment permits, which is designed to attract highly skilled workers from outside the European Economic Area (EEA), reached an 11-year high in 2019. In late 2019, following a comprehensive review of the Employment Permits system, an additional quote of permits for the Meat Processing sector was announced.[180] Border restrictions and quarantine requirements during the current global pandemic have demonstrated the threat of labour shortages and the frailty of relying on non-domestic seasonal workers. Furthermore, there is also an emerging shortage of skill-labour in the dairy sector.[181]

Obj2.T4: Increasing costs of compliance to meet new obligations

The enforcement of existing animal health and welfare Statutory Management Requirements (SMRs) on the welfare of calves, pigs and farm animals ensures minimum standards for their care and husbandry; and non-compliance with these legislative requirements result in legal and financial consequences. The cost of complying with the aforementioned legislation is a factor that will influence the competitiveness of EU agricultural products.[182] Furthermore, any reduction in these standards may have implications for Ireland's international reputation and this could in turn result in a reduction in market share for Irish produce. During stakeholder consultations, the issue of the cost of compliance with such standards largely falling on primary producers rather than other actors in the value chain was highlighted.

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[179] Common Context Indicator C.7 'Unemployment rate' (2019 update) https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[180] https://www.gov.ie/en/press-release/9a60e5-minister-humphreys-announces-changes-to-the-employment-permits-syste/

[181] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/foodindustrydevelopmenttrademarkets/agri-foodandtheeconomy/foodwise2025/PeopleDairyActionPlan060618.pdf

[182] https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/cmef/sustainability/assessing-farmers-costs-compliance-eu-legislation-fields-environment-animal-welfare-and-food-safety_en

Obj2.T5: Potential effect of Brexit on markets and competitiveness, especially vulnerable sectors

In late December 2020, a Trade and Cooperation Agreement was agreed between the EU-27 and the UK, thereby removing the risk of immediate tariffs and quotas in 2021. However, the changing nature of the trading environment and any changes to the cost or price structure will impact the competitiveness of those sectors exporting to the UK. Horticulture, prepared consumer foods and beef are some of the sectors most reliant on exports to the UK. Under a No Trade Deal Brexit outcome, the prices of Irish finished cattle and young cattle were projected to be 19% lower in 2021 relative to the 2020 level.[183] Drystock (beef and sheep) farms on average have a very low farm income and given the low margin nature of these sectors, external shocks related to market volatility, price variations and input costs can severely impact on livelihoods.

[183] https://www.teagasc.ie/media/website/publications/2020/Outlook-2021.pdf

Objective 3: improve the farmers position in the value chain

Strengths

Obj3.S1: Several Quality Assurance Schemes in place to support Ireland's reputation for producing high quality agri-food products sustainably

Bord Bia operates several Quality Assurance Schemes, which are designed to promote Irish food and horticultural products and to provide consumers with assurances on product quality based on best practice, current legislative requirements, relevant industry guidelines and international standards. Primarily, Bord Bia assurance schemes provide confirmation that minimum standards in the production of agri-food products have been met and that products are of a sufficiently high quality. Quality Assurance Schemes exist in the following sectors: beef, lamb, dairy, pigmeat, poultry, egg, fresh produce, mushroom compost and casing manufacturers and ornamental plant producers sectors.[184] Agri-food products which are quality assured by Bord Bia receive higher prices, therefore improving the primary producers position in the value chain.

Obj3.S2: Well-established POs in the fruit and vegetables sector

Although there are only four Producer Organisations (POs), of which two are well established, in the Irish fruit and vegetables sector, the share of fruit and vegetable production marketed in Ireland by these PO's in 2017 was 71%.[185] In 2019, the EU Producer Organisation Scheme provided €4.2 million of support to POs in the fruit and vegetables sector specifically. Payments were provided to these POs to increase competitiveness, improve market development and support innovation and environmental sustainability. Actions included implementing lean processes and investments in new technology; supporting specialist marketing staff to market produce on behalf of the PO; and supporting market research and the production of insight data to help improve product quality. With regards innovation and environmental sustainability, support was provided to allow POs to work in collaboration with specialist research institutions to undertake research in areas such as waste valorisation and on sustainable production methods.[186] Ireland's National

[184] https://www.bordbia.ie/farmers-growers/get-infarmevolved/become-quality-assured
[185] https://agridata.ec.europa.eu/extensions/DashboardIndicators/AddingValue.html?select=EU27_FLAG,1
[186] Annual Review and Outlook for Agriculture, Food and the Marine (2020) https://www.gov.ie/en/publication/91e7e-annual-review-and-outlook-for-agriculture-food-and-the-marine-2020/

Strategy for Sustainable Operational Programmes[187] outlines actions for improving competitiveness, market development and innovation in the fruit and vegetables sector. It also focuses on delivering sustainable production and greater market orientation around consumer needs, assisting POs in developing new offerings and taking advantage of new opportunities. The establishment of POs in the fruit and vegetables sector has allowed primary producers to work together to better their position in the value chain.

Obj3.S3: Cooperative structure in the dairy sector

A large portion of the dairy sector in Ireland is made up of co-operatives. As Ireland's milk deliveries to (collecting and processing) cooperatives are more than two-thirds of total deliveries (95%), Ireland's dairy industry structure is therefore classified as 'cooperative'.[188] The members of these dairy cooperatives elect a co-op board at their individual annual AGM's; and this board is made up of members of the co-op. The price of milk is then agreed at board level. In addition, the Chief Executive of Co-operatives is required to answer to the board of the co-op. Co-operatives improve dairy farmers' positions in the value chain by allowing members an active role in influencing the strategic decisions taken by the management of the co-op; and allowing them to input into the share of the value of milk retained by the farmer.

Obj3.S4: Fixed price contracting is a strong feature of the dairy sector

The dairy industry has made good progress in making fixed price contracts a feature of the producer/processor relationship in the dairy sector, with numerous milk purchasers offering such contracts for a percentage of milk supply[189]. Research in this area would suggest that contract pricing is an important risk management tool to assist dairy farmers in managing price volatility.[190] Managing price volatility through forward

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[187] https://www.gov.ie/en/publication/6f7b9d-national-strategy-for-sustainable-operational-programmes-2017-2022/

[188] European Commission, Joint Research Centre – Technical Report: Milk Package provisions as regards Producer Organisations and collective negotiations, https://publications

[189] https://www.teagasc.ie/media/website/publications/2018/An-Evaluation-of-Tools-to-Manage-Dairy--Farm-Income-Volatility-in-Ireland.pdf

[190] Teagasc (2015) "Market risk management and the demand for forward contracts among Irish dairy farmers" https://www.researchgate.net/profile/Jason_Loughrey/publication/282123216_Market_risk_management_and_the_demand_for_forward_contracts_among_Irish_dairy_farmers/links/5603babf08ae4accfbb8bfd4/Market-risk-management-and-the-demand-for-forward-contracts-among-Irish-dairy-farmers.pdf?origin=publication_detail

contracting allows dairy farmers' position in the value chain to remain the same, even as prices fluctuate.

Obj3.S5: Regulations introduced at EU level ensure greater transparency and sustainability throughout the food supply chain

In June 2019, the European Council formally adopted a Regulation concerned with ensuring the transparency and sustainability of risk assessments used in the food supply chain.[191] The purpose of this new regulation is to not only improve the transparency of risk assessments in the food supply chain, but also to strengthen the reliability, objectivity and independence of the studies used by the European Food Safety Authority (EFSA) in these assessments. Under this Regulation, the EFSA is to make public all studies and information supporting a request for a scientific output, when the application is validated or found admissible. This is to be done at the very early stage of the risk assessment process. This regulation is applicable from March 2021.[192] In addition, the EU introduced an Unfair Trading Practises Directive in 2019 which is designed to protect weaker suppliers against unfair trading practises by stronger buyers in the food supply chain. The Directive must be transposed into national legislation by April 2021 at the latest.[193] Ultimately, this directive should help strengthen the position of primary producers and small and medium food enterprises at all stages of the food supply chain.

Obj3.S6: National initiatives in place to boost beef farmers' position in the value chain

The Irish Beef Sector Agreement was reached on the 15th September 2019. Under this agreement, a Beef Market Taskforce was established in order to develop a pathway for the beef sector in terms of economic, environmental and social sustainability. The taskforce, made up of various stakeholder organisations in the beef sector and the Department of Agriculture, Food and the Marine (DAFM), was established to provide a robust implementation framework for the actions outlined in the agreement. Under the auspices of this Taskforce, Bord Bia launched a Beef Market Tracker in November 2019.[194] This tracker can be used to identify both the composite price and benchmark price for beef at a given point in time; and can be used to identify wholesale and retail

[191] https://europa.eu/rapid/press-release_MEMO-19-1031_en.htm
[192] https://ec.europa.eu/food/safety/general_food_law/transparency-and-sustainability-eu-risk-assessment-food-chain_en
[193] https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/key_policies/documents/brochure-utp-directive_en.pdf
[194] https://www.bordbia.ie/farmers-growers/farmers/prices-markets/beef-market-tracking

price indices. The taskforce further commissioned the production of a series of independent reports related to the beef sector which include a review of market and customer requirements in the beef sector; an examination of the price composition of the total value of the animal along the supply chain; and, a summary of competition law issues as relevant to the Irish beef sector.

Weakness

Obj3.W1: The primary producers share in the value chain is low

The agri-food sector accounted for an estimated 4.3% of Gross Value Added (GVA) at factor cost in 2019, a drop of 0.6% on 2018 levels. Despite GVA at factor cost growing by almost €5 billion between 2010 and 2019, the relative value of Gross Value Added by the agri-food sector has been gradually decreasing, mainly as a result of other sectors in the economy growing at a quicker rate.[195] Food and drink manufacturers account for the largest share of value added in the food chain and the share has been increasing since 2008. Ireland's primary producer's share of value added in the food chain is low and has declined since 2011. In 2008, Irish farmers' share was just below 20%. In 2016, this share had reduced to 18.1%, well below the EU average of 25%.[196] However, the primary producer's share did increase to 22% in 2017 but it still remains below the EU average.[197] This is due in part to the fact that much of Ireland's agricultural output undergoes substantial transformation and value-added activity post farm gate.

Obj3.W2: EU quality label schemes are underutilised in Ireland

Protected Geographical Indications (PGI's) and other EU Quality Label Schemes are designed to identify and protect the names of quality EU agricultural products and foods which are linked to particular geographical regions and traditional production methods. Recognised as intellectual property, geographical indications play an increasingly important role in trade negotiations between the EU and other countries.[198] Ireland currently has only eight EU quality labels registered for agricultural products and foodstuffs[199], with a further two at application stage. This compares to countries such as Italy, which has almost three hundred product types registered. In 2017, Irish agricultural products and foodstuffs sector under PDOs and PGIs represented only 1% of the total sales value. Between 2010 and 2017, the sales value of agricultural products and foodstuffs decreased by 72% due to a significant decrease

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[195] Annual Review and Outlook for Agriculture, Food and the Marine (2020) https://www.gov.ie/en/publication/91e7e-annual-review-and-outlook-for-agriculture-food-and-the-marine-2020/

[196] https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/by_country/documents/analytical_factsheet_ie.pdf

[197] https://agridata.ec.europa.eu/extensions/DashboardIndicators/AddingValue.html?select=EU27_FLAG,1

[198] https://ec.europa.eu/info/food-farming-fisheries/food-safety-and-quality/certification/quality-labels/quality-schemes-explained_en

[199] https://agridata.ec.europa.eu/extensions/DashboardIndicators/AddingValue.html?select=EU27_FLAG,1

in volume produced.[200] Overall, Ireland under exploits the EU quality label scheme and this reduces farmers' overall position in the value chain.

Obj3.W3: Lack of accurate data on value chain in Ireland

While there is a large amount of publicly available data at primary production level, there is a lack of data relating to the agri-food value chain in general, particularly in the beef sector. There is limited private data available, such as Kantor, on the retail sector. A number of initiatives to improve market transparency and information along the beef supply chain are underway under the auspices of the Beef Market Taskforce.

Obj3.W4: Low number of Producer Organisations

In Ireland, there are a limited number of POs in operation, four in the fruit and vegetable sector and two in the beef sector. The two beef POs are in their infancy and were only recently established and formally recognised. While the cooperative structure is well established in the dairy sector, with more than 95% of cow milk deliveries being managed by processing and collecting cooperatives in 2016[201], these cooperatives are not recognised as POs. Across the EU, there are approximately 178 producer organisations in the beef and veal sector and 189 producer organisations in the arable crops sector. In certain sectors, due to the power of the processing and the retail sector, this leaves the primary producer exposed to being a price taker and limits their position in the value chain.

[200] DG-AGRI (2020) " Study on economic value of EU quality schemes, geographical indications (GIs) and traditional specialities guaranteed (TSGs)" https://op.europa.eu/en/publication-detail/-/publication/a7281794-7ebe-11ea-aea8-01aa75ed71a1

[201] European Commission, Joint Research Centre – Technical Report: Milk Package provisions as regards Producer Organisations and collective negotiations, https://publications.jrc.ec.europa.eu/repository/bitstream/111111111/49771/1/milk_package_pos-jrc_report.pdf

Opportunities

Obj3.O1: Promote Ireland's grass-based production system

Agricultural production in Ireland is dominated by animal products based on a grass-fed livestock production system. In 2017, animal products accounted for almost 78% of total output with milk and cattle contributors of agricultural output value).[202] As consumers become increasingly concerned with how their food is produced and whether it is produced sustainably, it is important that Irish food producers promote their 'natural' image and use of sustainable grass-based production systems. Food wise 2025 considers Irelands grass-fed livestock production system as being comparatively advantageous in terms of cost competitiveness and environmental efficiency, producing high quality food products in an environmentally efficient manner. It further details recommendations aimed at improving value added and productivity at farm and food industry level through a focus on sustainability, efficiency, knowledge transfer and innovation.[203] Changing consumer preferences relating to how food is produced could result in a market opportunity arising for farmers whereby an emphasis is placed on 'green,' sustainable production, with the potential to improve the farmers position in the value chain. There may also be an opportunity to increase the number of products of this nature with a designated PGI label, or other verified labels such as 'grass-fed'.

Obj3.O2: Continue to meet consumer demand for locally sourced produce

Research undertaken by Bord Bia in relation to Food and Farmers' Markets found that the total number of food and farmers' markets in Ireland increased significantly since 2006, growing from less than 100 markets in 2006 to almost 150 markets in operation today.[204] Irish consumers have always been concerned with sourcing food locally - 70% of adults considered buying local produce to be important when they shop for food and that 79% of consumers believed that local production resulted in higher-quality food products[205] Farmers' markets provide an opportunity to refine the product offering with direct customer feedback. More importantly they provide an opportunity for local producers to sell their produce directly to local consumers, thereby shortening

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[202] https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/by_country/documents/analytical_factsheet_ie.pdf
[203] Food Wise 2025 https://www.gov.ie/en/publication/a6b0d-food-wise-2025/
[204] https://www.bordbia.ie/industry/news/press-releases/bord-bia-launches-industry-guide-to-food-markets-in-ireland/
[205] https://www.bordbia.ie/lifestyle/information/farmers-markets/

the supply chain and providing potential to increase the return to the primary producer. Private initiatives such as Grow with Aldi[206] and SuperValu Food Academy[207] are also providing small primary producers' access to retail customers. During stakeholder consultation, the potential to promote local, independent smaller scale abattoirs and cooperatives was highlighted as a means to benefit local producers and growers and shorten the supply chain for local markets.

Obj3.O3: Potential expansion of organic farming sector

A review of the organic food sector in Ireland, undertaken by the Department of Agriculture, Food and the Marine (DAFM), found that the organic food market is growing as a result of the growing health consciousness of consumers which is increasing their preference for organic food products over non-organic food products. This trend is partly due to a rising demand for organic convenience food, which has resulted from increasing numbers of working professionals, especially females and young people, looking to purchase ready-to-eat and ready-to-cook products and convenience food. The review notes that the Irish Organic Retail market is worth €162 million to the Irish economy, with a further €44 million generated by direct sales. The market for organic food in Ireland has been growing in line with the growing trend right across Europe, underlying the opportunity for increased production of organic food products. Consumer research shows that there is also a rising preference for organic food over conventional food in the Irish market.[208] As the production of organic food products is more costly for the producer, it will be important to capture this in organic sales prices and offer support for conversion and maintenance of organic production so that farmers' position in the food value chain is at least maintained, if not improved. During stakeholder consultations, it was highlighted that any future organic farming scheme would need to be cognisant of latest market demands and environmental benefits of organic production systems.

Obj3.O4: Encourage the establishment of more Producer Organisations

Producer Organisations offer primary producers the opportunity to improve their bargaining power in the value chain, allowing them to add greater value to their

[206] https://www.aldi.ie/grow
[207] https://supervalu.ie/real-people/food-academy-programme
[208] DAFM "Review of organic food sector and strategy for its development 2019 – 2025"

produce and allowing them the opportunity to target higher value added markets.[209] Therefore, there is scope to establish greater numbers of producer organisations across the agri-food industry in order to strengthen the primary producers' position in the value chain. There is scope to establish POs across all sectors, including fruit and vegetables, beef and veal, and dairy. Work is currently underway with potential groups to support the establishment of further beef POs, in addition to providing financial support for their establishment under the 2014-2020 Rural Development Programme.

Obj3.O5: Encourage the greater uptake of animal and crop breeding technologies

Food Wise 2025 notes the importance of using the best available breeding technologies in order to ensure the value of output in the dairy and beef sectors is maximised and therefore the farmers' position in the value chain is improved. In order to achieve sustainable productivity at producer level, it is important that primary producers improve the use of genomic technologies and better breeding techniques.[210] Greater use of breeding technologies, such as the Economic Breeding Index (EBI)[211] developed by the ICBF, will allow for long term genetic gain[212] in the national herd which will ultimately benefit the primary producer. Currently, there are a number of ongoing projects designed to improve the quality of beef coming from the dairy herd. While in their nascent stages, initiatives such as the Integrated Dairy-Beef Programme[213] are delivering benefits for participants.

Obj3.O6: Encourage the development of contractual arrangements between the different actors in the value chain

Contractual arrangements should be developed between primary producers, processors and retailers so that all actors in the supply chain are sufficiently rewarded for their produce. The recently launched Twenty20 Beef Club[214] is one example of a

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[209] https://www.nationalruralnetwork.ie/farm-viability-case-studies/an-overview-of-producer-organisations/

[210] Food Wise 2025 https://www.gov.ie/en/publication/a6b0d-food-wise-2025/

[211] https://www.icbf.com/wp/wp-content/uploads/2020/02/Understanding-EBI-PTA-BV-Spring-2020.pdf

[212] https://www.teagasc.ie/media/website/about/our-organisation/Livestock-Teagasc-Technology-Foresight-FINAL.pdf

[213] https://www.icbf.com/wp/wp-content/uploads/2020/01/Integrated-Dairy-Beef-Program-Eoin-Frawley-ICBF.pdf

[214] https://www.glanbiaconnect.com/medias/7962-19-GAB-Twenty20-Brochure-FA-email.pdf?context=bWFzdGVyfHJvb3R8MTE4Mjg5MnxhcHBsaWNhdGlvbi9wZGZ8ODg4MTYwNTQxMDg0Ni5wZGZ8OGNiMDY5NzExODc4YzFlYWI1NDhmYzdjNDA0MGUyYjFjYTAwZGY2NjNlMThkNDQyOTJiMzExZGJiN2U2ZGVkMg

partnership arrangement, which involves primary producers and processors from both the beef and dairy sectors working together to sustainably produce and market Irish heifer and steer beef. This innovative agreement has been designed to add greater value to the beef and dairy sectors by producing products with complete traceability. It further provides beef farmers the opportunity to generate additional income by rearing dairy beef calves. The club aims to ensure that club beef receives a substantial price premium over the prevailing market, ultimately improving the farmers' position in the value chain. While small in nature, this arrangement is a first step in delivering improvements to primary producers in the beef sector and should act as a basis for the development of other similar agreements across all sectors of the agri-food industry.

Obj3.O7: Encourage the continued production of breed-specific premium beef

There has been considerable success in recent years in the development of several breed-specific premium beef. This has involved processing companies, breed societies and producers working in cooperation to market beef from Angus, Hereford and most recently, Shorthorn-sired cattle. A large proportion of the animals processed are beef crosses from the dairy herd. From a sustainability perspective, animals of these breeds tend to finish at a younger age than either pure dairy or continental breeds. The development and promotion of breed specific premium beef, which return price bonuses to producers and improves farmers' positions in the value chain, should continue to be supported by Bord Bia and other private agri-food companies. To-date, the higher value has mainly been achieved from the branded steak cuts, however, there are opportunities to also "premiumise" the forequarter and round cuts also.

Threats

Obj3.T1: The effects of increasing input costs

Primary producers are directly impacted by changes in input costs. Input costs include the cost of feed, the cost of fertilisers and the cost of fuel. These costs can change depending on changes in both market and climate conditions. For example, the occurrence of severe weather events can negatively impact grass-based production systems, resulting in farmers having to purchase additional fodder and supplements to feed livestock and maintain productivity. This increase in input costs primarily affects the producer and is not sufficiently accounted for in price, therefore impacting the farmers' position in the value chain.

Obj3.T2: Increasing costs associated with compliance with EU standards

EU farmers and therefore Irish farmers are legally required to implement specific compulsory measures for the protection of the environment, food safety and animal welfare.[215] The cost of complying with these measures largely falls on primary producers rather than other actors in the value chain and as a result, the cost of compliance results in primary producers suffering the greatest loss in income. Further

[215] European Commission "Assessing farmers' costs of compliance with EU legislation in the fields of the environment, animal welfare and food safety" https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/key_policies/documents/ext-study-farmer-costs-exec_sum_2014_en.pdf

increases in compliance costs could potentially threaten the viability of certain sectors should the market fail to remunerate for the additional costs of production and will worsen the farmers' position in the value chain.

Obj3.T3: Increased consolidation in the processing and retail sector

During stakeholder consultation, stakeholders highlighted the potential threat to farmers' position in the value chain should any further consolidation occur. While there are a number of players in the retail sector, nearly 90% of market share is taken by just five retailers- Supervalu, Dunnes, Tesco, Aldi and Lidl.[216] Further consolidation here, coupled with the lack of publicly available information on the supply chain poses a threat to the primary producers position in the value chain. Stakeholders have also highlighted that the retail price for agri-food products does not reflect the true cost of production; however, primary producers in Ireland have little bargaining power compared to large retailers in the value chain.

[216] https://www.kantarworldpanel.com/grocery-market-share/ireland

Objective 4: contribute to climate change mitigation and adaptation, as well as sustainable energy;

Strengths

Obj4.S1: National objective of an approach to carbon neutrality and resilience in the agriculture and land use sector underpinned by a strong policy and governance framework

Ireland's National Policy Position for climate action[217], adopted in 2014, sets out a national objective for 2050 to transition towards an approach to carbon neutrality in the agriculture and land-use sector, including forestry, which does not compromise on Ireland's national capacity for sustainable food production. The 2019 Climate Action Plan sets the framework for the achievement of Ireland's climate objectives and targets for the period to 2030, including ways in which the agriculture, forestry and land-use sector will contribute to these targets, placing Ireland on a path to achieving net zero carbon emissions by 2050.[218]

The Climate Action Plan includes a strong governance framework to ensure Ireland delivers its climate targets, including a Climate Action Delivery Board chaired by the Department of the Taoiseach and the Department of Communications, Climate Action and Environment which has been established to ensure each department and public body is held accountable for the delivery of actions; as well as the submission of quarterly progress reports to Government. In December 2019, the Government also published the General Scheme Climate Action Amendment Bill to further strengthen the governance of national climate policy, which included a provision for the adoption of five-yearly carbon budgets by the Government and Oireachtas; and the establishment in law of a long term target for reducing Ireland's GHG emissions by 2050.[219] The government subsequently published this bill; and also introduced a roadmap towards climate neutrality, entitled "Ag Climatise,'[220] which aims to guide the development of the Irish agri-food sector towards environmental sustainability and climate resilience.

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[217] National Policy Position on Climate Action and Low Carbon Development (2014) https://www.gov.ie/en/publication/6f393-national-climate-policy-position/

[218] Climate Action Plan 2019- To Tackle Climate Breakdown https://assets.gov.ie/10206/d042e174c1654c6ca14f39242fb07d22.pdf

[219] HEADS OF CLIMATE ACTION (AMENDMENT) BILL 2019 https://dccae.gov.ie/en-ie/news-and-media/press-releases/Pages/Minister-Bruton-Publishes-Draft-Scheme-of-New-Climate-Law.aspx

[220] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/

Obj4.S2: Grass based livestock production system with low carbon footprint

Numerous studies have investigated the carbon footprint associated with livestock production systems in Ireland. In one major study that compared EU-27 countries, Ireland was found to have one of the lowest levels of emissions per unit of milk across the EU-27, at 1 kg carbon dioxide equivalent per kg of milk, compared to an average of 1.4 kg carbon dioxide equivalent per kg of milk.[221]

A further study found high-performance Irish grass-based systems to have a 5-7% lower footprint compared to confinement systems in the UK and the USA respectively. Importantly, this study found that carbon sequestration by grassland soils within the Irish system made a significant contribution to lowering the carbon footprint.[222]

However, differences in methodology and differences in the definitions of system boundaries used has allowed for different studies to have conflicting results[223]. Overall, the available evidence suggests that Ireland has a relatively low carbon footprint for dairy production and average-to-low carbon footprint for beef production.[224]

Obj4.S3: High % Utilised Agricultural Area in Ireland is permanent grassland

Ireland's has the highest percentage of permanent grassland (90% of UAA) across the EU, compared to an EU-27 average of 31%.[225] Ireland, with a land area of 6.9 million hectares, has c. 4 million hectares under agriculture, 3.36 million of which is devoted

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[221] EU Publications (2014) "Evaluation of the livestock sector's contribution to the EU greenhouse gas emissions (GGELS)" [online- accessed 29/07/2020] https://op.europa.eu/en/publication-detail/-/publication/38abd8e0-9fe1-4870-81da-2455f9fd75ad

[222] O'Brien, D., Capper, J.L., Garnsworthy, P.C., Grainger, C. and Shalloo, L. (2014), A case study of the carbon footprint of milk from high-performing confinement and grass-based dairy cows. *Journal of Dairy Science*, 97, pp. 1835–1851.

[223] Lesschen, J.P., van den Berg, M., Westhock, H.J., Witzke, H.P. and Oenema, O. (2011), Greenhouse gas emission profiles of European livestock sectors. *Animal Feed Science and Technology*, 166–167, pp. 16–28.

[224]Climate Change Advisory Council Annual Review 2019 http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

[225] Common context Indicator C.18 'Agricultural area' (2019 update) https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

to grass (silage, hay and pasture).[226] Total grassland area as a share of utilised agricultural area has steadily increased since 2005, increasing from 72.6% in 2005 to 90.6% in 2016.[227] The protection of the level of permanent grassland, which is a significant carbon pool, is protected by the current CAP.[228] Irish grassland has the capability of producing very high yields of 14+ t DM/ha due to temperate climate and productive soils, a highly important element enabling the achievement of sustainable livestock production systems.[229]

Obj4.S4: Significant national cover of hedgerows and individual trees

The third National Forest Inventory (2017) estimates national hedgerow and non-forest woodland at 347,690 hectares.[230] The Teagasc Irish Hedge Map (2011), which included areas of non-forest woodland and scrub, estimated that national cover of hedgerows, individual trees and non-forest woodland and scrub was approximately 450,000 hectares, or 6.4% of the country.[231] The Environmental Protection Agency (2014) estimates hedgerow and non-forest estimated that there could net removal of hedgerows between 1995 and 2015 of between 0.16% and 0.3% per annum which could mean hedgerows would be counted as an emission in the national inventory and not a removal.[232] With the advances of remote sensing technology, it may be possible for further refinement of the accounting of hedgerows and non-forest woodland in the national inventory for the next Land Use, Land Use Change and Forestry (LULUCF) commitment period (2021-2030).

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[226] Kiely, G. Leahy, P. Lewis, C. Sottocornola, M. Laine, A. Koehler, A. (2018) GHG Fluxes from Terrestrial
Ecosystems in Ireland
http://www.epa.ie/researchandeducation/research/researchpublications/researchreports/Research_Report_227.pdf

[227] Eurostat: Share of main land types in utilized agricultural area (UAA) by NUTS 2 regions https://ec.europa.eu/eurostat/databrowser/view/tai05/default/table?lang=en

[228] European Commission: Evaluation of the CAP on climate change and greenhouse gas emissions https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/cmef/sustainability/evaluation-cap-climate-change-and-greenhouse-gas-emissions_en

[229] https://www.teagasc.ie/media/website/crops/grassland/IGA-Student-Conference.pdf

[230] Forest Statistics Ireland 2020 https://www.gov.ie/en/collection/15b56-forest-statistics-and-mapping/#annual-forest-sector-statistics

[231] The Irish Hedge Map- Version 1.0 (2011) https://www.teagasc.ie/media/website/publications/2010/The-Irish-hedge-map-version1_5690.pdf

[232] EPA (2019) "BRIAR: Biomass Retrieval in Ireland using Active Remote sensing" EPA Research Programme 2014–2020, Report No. 305 https://www.epa.ie/pubs/reports/research/climate/Research_Report_305.pdf

Obj4.S5: Highest mean organic carbon of arable land in Europe

According to the last data for 2015, Ireland has the highest mean organic carbon of arable land per kg in Europe, with a mean value per kg ranging from 14.9g per kg in Spain to 82.4g per kg in Ireland.[233] Soil Organic Carbon is an important variable influencing climate change; and as soil is the greatest terrestrial carbon pool, it also plays a key role in climate change regulation processes.[234] According to the EPA, soil organic matter plays a key part in maintaining soil functionality, water and air quality and carbon sequestration.[235] Soil organic matter is generally seen "to contain 58% organic carbon."[236] Soils can be a carbon sink or emission source depending on changes in land use and soil management. The protection of carbon rich grasslands to reduce CO_2 losses and sustainable soil management aids in protecting carbon stocks and contributes to climate change mitigation.[237] Obj5.W7Peatlands cover around 21% of the national land area.[238] It is estimated that Irish peatlands store some 1,566 million tonnes of carbon, representing approximately 64% of the total soil organic carbon stock present in Ireland.[239] However, it is worth noting that peatlands are damaged through practices such as drainage and peat extraction and the conservation status of many of these habitats is unfavourable.[240]

Obj4.S6: High % of land under agri-environment-climate commitments

Ireland has 4.5 million hectares of Utilised Agricultural Area; of which 1.5 million hectares is under agri-environment-climate commitments (AECMs). Therefore, just over 30% of Ireland's agricultural area is under AECM's compared to an average of 13.4% at EU-27 level.[241] Historically, participation in voluntary agri-environment

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[233] Common Context Indicator C.41 'Soil organic matter in arable land' (2019 update) https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[234] Ballabio, C. (2014) A map of the topsoil organic carbon content of Europe generated by a generalized additive model https://onlinelibrary.wiley.com/doi/full/10.1111/ejss.12193

[235] EPA- Land and Soil (https://www.epa.ie/irelandsenvironment/landandsoil/)

[236] Ballabio, C. (2014) A map of the topsoil organic carbon content of Europe generated by a generalized additive model https://onlinelibrary.wiley.com/doi/full/10.1111/ejss.12193

[237] https://www.researchgate.net/publication/266951810_A_map_of_the_topsoil_organic_carbon_content_of_Europe_generated_by_a_generalized_additive_model

[238] National Peatlands Strategy, Department of Arts, Heritage and the Gaeltacht (2015) https://www.npws.ie/sites/default/files/publications/pdf/NationalPeatlandsStrategy2015EnglishVers.pdf

[239] https://www.npws.ie/sites/default/files/publications/pdf/NationalPeatlandsStrategy2015EnglishVers.pdf

[240] https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf

[241] https://agridata.ec.europa.eu/extensions/DashboardIndicators/Environment.html

climate measures has been significant since the opening of the REPS1 Scheme in 1994. Peak participant rates in REPS reached 59,200. Over 50,000 farmers participated in the most recent measure, GLAS.

Obj4.S7: Low % of sealed soils (built environment)

Ireland had 1.03% of sealed soils in 2015 - 16th lowest out of 39 countries recorded.[242] Soil sealing, the covering of the ground by an impermeable material, is one of the main causes of soil degradation in the EU; and soil sealing often affects fertile agricultural land, putting biodiversity at risk and increasing the risk of flooding and water scarcity, ultimately contributing to global warming.[243]

Obj4.S8: Leading innovation and research on climate related support tools

The Department of Agriculture, Food and Marine's "Sustainable Healthy Agri-Food Research Plan (Sharp)"244 contains a Strategic Research and Innovation Strategy, framed by the need for Ireland to address its national agri-food challenges by improving the competitiveness and sustainability of agriculture, food and the bio-economy.

For example, the Agricultural Greenhouse Gas Initiative for Ireland – AGRI-I aims to align research activities and provide added value to agricultural GHG monitoring and mitigation in Ireland.[245] Teagasc also strongly supports investment in climate-related research through their grant-in-aid funding and the provision of national competitive research calls; engagement in EU Research and Innovation Framework Programmes; and transnational initiatives such as Global Research Alliance on Agricultural Greenhouse Gases and the EU Joint Programming Initiative on Food, Agriculture, Climate Change and Environment.[246] Teagasc researchers are also members of the Intergovernmental Panel on Climate Change (IPCC) and are also engaged in the United

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[242] https://www.eea.europa.eu/data-and-maps/daviz/percentage-sealing-by-country-1/download.table
[243] European Commission- Environment- Soil https://ec.europa.eu/environment/soil/sealing_guidelines.htm
[244] (2015) Sustainable Healthy Agri-Research Plan (SHARP) https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/research/whatsnew/SustainableHealthyAgriFoodResearchPlan300315.pdf
[245]AGRI-I Initiative Ireland (http://agri-i.ie/portfolio-items/)
[246] https://www.teagasc.ie/about/research--innovation/

Nations expert panel for Mitigating Agricultural Nitrogen.[247] Innovation and research has supported significant investment in new knowledge, new technologies and new decision support tools in e.g. Genomics, Agri-Digitalisation, One Health, Multi-Species grasslands.

Obj4.S9: Established beef, dairy and sheep breeding programmes

The Irish Cattle Breeding Federation (ICBF) is a non-profit organisation responsible for providing cattle breeding information services to the Irish dairy and beef industries.[248] The Dairy Economic Breeding Index (EBI), Beef Eurostar and Dairy Beef Index (DBI) are all established databases relating to beef and dairy genetics, which utilise multi-trait analysis and focus on enhancing genetics associated with Irish grass based system of production. The implementation of breeding indices can be used to enhance genetic traits relating to productivity, health and methane emissions, and thereby reduce GHG emissions per unit of output.[249] This data can be used to breed animals that have lower emissions and to alter slaughter profiles, which also reduces emissions as older animals have higher emissions. The utilisation of the dairy Economic Breeding Index (EBI) and beef equivalents could reduce emissions annually by 0.43, 0.025 and 0.061 Mt CO2eq respectively.[250] Current research suggests that there is a 20% methane difference between high and low efficiency animals, and it appears that this could be heritable.[251] Therefore, once sufficient evidence is collated and a national database established, it will be possible to include methane as a trait in our national breeding strategies. In addition, Sheep Ireland, a genetic breeding programme for the Irish sheep industry focused on genetic improvement, was established in 2008.[252] Recent pilot studies conducted by Sheep Ireland also show the use of breeding indices to have a positive impact on environmental outputs in sheep farming . These studies found that

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[247] Lanigan, G., Donnellan, T., Hanrahan, K., Paul, C., Shalloo, L., Krol, D., Forrestal, P., Farrelly, N., O'Brien, D., Ryan, M., Murphy, P., Spink, J., Finnan, J., Boland, A., Upton, J., and Richards, K. (2018), *An Analysis of Abatement Potential of Greenhouse Gas Emissions in Irish Agriculture 2021-2030* [online] https://www.teagasc.ie/media/website/publications/2018/An-Analysis-of-Abatement-Potential-of-Greenhouse-Gas-Emissions-in-Irish-Agriculture-2021-2030.pdf

[248] Irish Cattle Breeding Federation (ICBF) https://www.icbf.com

[249] Schils, R.L.M., Eriksen, J., Ledgard, S.F. Vellinga, Th.V., Kuikman, P.J., Luo, J., Peterson, S.O. and Velthof, G.L. (2013), Strategies to mitigate nitrous oxide emissions from herbivore production systems. *Animal*, 7, pp. 29–40.

[250] Climate Change Advisory Council Annual Review 2019 http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

[251] Rumenpredict *https://www.eragas.eu/en/eragas/Research-projects/RumenPredict.htm*

[252] https://www.sheep.ie/wp/wp-content/uploads/2014/02/Sheep-Breeding-in-Ireland-The-next-5-years.pdf

consistent use of sheep with higher genetic merit provided a reduction of up to 4.62 tonnes of CO2 per €1,000 net profit.[253]

Obj4.S10: High level of carbon auditing on beef and dairy farms

Teagasc, in association with Bord Bia, developed a carbon navigator tool to help improve carbon efficiency on Irish farms. Farms are measured against six efficiency measures that reduces GHG emissions, including longer grazing season, lower age at first calving, increased calving rate, improved growth rate, improved nitrogen use of efficiency and improved slurry management.[254] Over 200,00 carbon audits have been completed on Irish dairy and beef farms through Origin Green and the Beef Data and Genomics Programme. Origin Green is Ireland's food and drink sustainability programme and is implemented at farm level through Bord Bia's Sustainability and Quality Assurance Schemes. At farm level, 92% of beef, 95% of milk, 70% of horticulture and 95% of eggs are produced by members of Bord Bia's Sustainable Assurance Schemes. These farms are audited by an independent auditor every 18 months to ensure compliance with respective standards, including the environmental management and carbon footprinting of Irish farms.[255]

Obj4.S11: Robust ensemble of regional climate model projections for Ireland in place

Ireland's adaptation planning framework is underpinned by climate projections[256] which provide analysis of the impacts of global climate change on the mid-21st century climate of Ireland. The Regional Climate Modelling (RCM) method is used to assess the impacts of a warming climate on the mid-21st-century climate of Ireland. The RCM simulations were run at high spatial resolution, up to 4 km, thus allowing a better evaluation of the local effects of climate change. Simulations were run for a reference period 1981–2000 and future period 2041–2060. The difference between the two periods provides a measure of climate change.

To address the issue of uncertainty, a multi-model ensemble approach was employed. Through the ensemble approach, the uncertainty in the RCM projections were partially

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[253] Unpublished Presentation by Sheep Ireland

[254] Teagasc and Bord Bia "The Beef Carbon Navigator- Improving Carbon Efficiency on Irish Beef Farms"
https://www.teagasc.ie/media/website/publications/2019/Bord-Bia-Beef-Carbon-Navigator-LR4.pdf

[255] Origin Green Ireland https://www.origingreen.ie/what-is-origin-green/behind-the-programme/accreditation-and-verification/

[256] EPA Report No. 159.
EPA 159_Ensemble of regional climate model projections for Ireland.pdf

quantified, thus providing a measure of confidence in the predictions. Most recent climate projections were found to be in broad agreement with previous research.[257]

Obj4.S12: Carbon efficient protected crop sector

Following public consultation on the Draft Climate Change Adaptation Sectoral Plan for the Agriculture, Forest and Seafood Sector, it was noted that the protected crop sector has made considerable strides towards the use of renewable energy such as biomass and photovoltaics in meeting its heating requirements, with many producers and growers now using biomass rather than peat. Within the mushroom industry over 50% of total output is produced using biomass as an energy source, with some producers achieving over 50% of their total energy requirements from renewable sources, in the form of biomass and photovoltaics. Producers of tomatoes and soft fruit are achieving significant decarbonisation through the capture of CO2 emissions from heating systems and re-use of this CO2 back into the production system to optimise plant growth. Other producers are harnessing greater energy efficiency through the adoption of energy efficiency technologies such as thermal screens and using sophisticated environmental control systems that help optimise water and energy usage.[258]

Obj4.S13: Low levels of direct use of energy in primary agriculture and forestry sector

Ireland's direct use of energy in the agriculture and forestry sector was 42.4kg of oil equivalent per hectare in 2018;[259] decreasing from 42.6 kg/ha in 2017 and remaining well below the EU-28 average of 75.2 kg/ha in 2017.[260] This reflects our grass-based production system, enterprise type and our temperate climate. With a temperate climate that favours grass growth, Ireland has a distinct natural advantage in being able

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[257] https://www.epa.ie/pubs/reports/research/climate/researchreport339/

[258] Public Consultation on the Draft Climate Change Adaptation Sectoral Plan for Agriculture, Forest and Seafood Sector- Submission by the Horticulture Industry Forum https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/ruralenvironment/climatechange/bio-energy/climatechangesectoraladaptationplan/submissions/22HorticultureIndustryForum311019.pdf [Answer to question 4]

[259] Common Context Indicator C.44 'Energy use in agriculture, forestry and food industry' (2019 update) https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[260] Common Context Indicator C.44 'Energy use in agriculture, forestry and food industry' (2018 update) https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-indicators-doc-c44_2017_en.pdf

to produce meat and dairy products in a low energy system, which utilises outdoor grazing over a more energy intensive indoor feeding regime.

Obj4.S14: Ireland has a large availability of feedstock and agricultural residues for bio-based product and bio-energy production

The agricultural sector is a key supplier of bio-energy and bio-economy feedstock. By-products (wastes and residues) from farming can be used to create bio-based products, generate renewable energy sources and contribute to GHG emission reductions.[261] In 2018, 40% of roundwood used in the Republic of Ireland was used for energy generation- with output of the forest-based biomass energy sector growing by 12% from 2016.[262] There was 880,000 tonnes of CO2 emission savings in 2018 in heat and electrical energy output from forest-based biomass. The national bio-economy policy statement outlines a guiding principle for sustainable and cascading use of residual biological resources, whereby, lifecycle analysis must accompany product or service generation and higher value applications are preferentially derived from biological resources prior to use in energy generation. [263]

Obj4.S15: Well established co-operatives and rural/community networks with potential to deliver on agriculturally based renewable energy products

Cooperatives are a well-established mechanism for partnership in Ireland.[264] Ireland also has an extensive and strong network of local development companies.[265] Ireland's cooperatives and local development companies could be leveraged to encourage collaboration between the industry and the farming and rural communities to produce agricultural based renewable energy products.

Obj4.S16: Farm Advisory System which can quickly disseminate new innovations

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[261] Ward, S. E., Smart, S.M., Quirk, H., Tallowin, J.R.B., Mortimer, S.R., Wilby, A., and Bardgett. R.D. (2016), Legacy effects of grassland management on soil carbon to depth, *Global Change Biology*, 22, 2929–2938.

[262] Coford Connects, Woodflow and forest-based biomass energy use on the Island of Ireland (2018) http://www.coford.ie/media/coford/content/publications/2018/00900CCNPP51Woodflow%20-%20We.pdf

[263] National Policy Statement on the Bioeconomy (Feb 2018) https://assets.gov.ie/2244/241018115730-41d795e366bf4000a6bc0b69a136bda4.pdf

[264] http://icos.ie/about/who-we-are/

[265] https://ildn.ie/about/

In the European Commissions "Evaluation of the Impact of the CAP on Climate Change and Greenhouse Gas Emissions," it was noted that in Ireland, farmers have access to a strong publicly-funded farm advisory service.[266] Over many years Ireland has developed a country wide network of trained agricultural professionals, including through public and private funded services [267] The Department of Agriculture, Food and the Marine (DAFM) provides the Farm Advisory System with Continuous Professional Development (CPD) to maintain a high standard of knowledge and innovation transfer to FAS advisors.[268] Central to the economic and environmental sustainability of Irish agriculture is the adoption of new research recommendations and improved farming practices. Ireland's extensive Farm Advisory System will be instrumental in assisting farmers to meet new climate related challenges and opportunities in the next CSP.

[266] European Commission (2018) "Evaluation study of the impact of the CAP on climate change and greenhouse gas emissions (Final Report)" (https://op.europa.eu/en/publication-detail/-/publication/29eee93e-9ed0-11e9-9d01-01aa75ed71a1

[267] https://www.teagasc.ie/about/farm-advisory/, https://aca.ie/login-welcome-page/about-aca/ and other independent advisors.

[268] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/farmerschemespayments/farmadvisorysystem/

Weaknesses

Obj4.W1: Highest share of GHG emissions comes from agriculture

According to the Environmental Protection Agency (EPA), agriculture accounted for 35.3% of all GHG emissions in Ireland in 2019; making it the largest contributor to GHG emissions nationally.[269] According to the European Environmental Agency (EEA), the share of agriculture (including soils) in total net emissions with LULUCF is 40.2% in Ireland, This compares to an EU-27 average of 12.7%.[270] The two main drivers of emissions in agriculture are biogenic methane from livestock and nitrous oxide. In total, biogenic methane accounts for 65% of total agricultural emissions; and nitrous oxide accounts for 30% of total agricultural emissions.[271] This level of contribution from agriculture reflects both the importance of the agricultural sector in an Irish context and the absence of heavy industry in Ireland.

Obj4.W2: Agricultural GHG emissions are increasing

GHG emissions from agriculture fell during the period 2005 to 2011 but have since increased. Agricultural emissions increased by 2.9% in 2017 compared to 2016, and by 6.9% relative to 2014 due primarily to an increase in nitrogen fertiliser use and in dairy cow numbers. Between 2015 and 2017 total national emissions increased by 6.4%.[272] While emissions per output have decreased, the main driver for the increased emissions in 2017 was higher dairy cow numbers.

Obj4.W3: Ammonia emissions in breach of targets set

Agriculture accounts for virtually all (99.1 per cent) of ammonia emissions in Ireland. Ireland exceeded its emission ceilings of 116 kilotonnes (kt) ammonia (NH3) in 2016

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[269] Irelands Greenhouse Gas Emissions Projections 2019-2040 (July 2020) https://www.epa.ie/pubs/reports/air/airemissions/ghgprojections2019-2040/2020-EPA-Greenhouse-Gas-Emissions-Projections_final.pdf

[270] Common Context Indicator C.45 'Emissions from agriculture' (2019 update) https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[271] Ag Climatise https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/

[272] Irelands Greenhouse Gas Emissions Projections 1990-2017 (April 2019) https://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/Report_GHG%201990-2017%20April%202019_Website.pdf

and 2017; and the EPA predicts this trend will continue, projecting a figure of 121.743 kt ammonia for 2020. At the same time, Ireland's ammonia targets under the NEC Directive are tightening for 2020 (112. kt) and 2030 (107 kt). EPA projections indicate a distance to target of 20.56 kt under the *With Additional Measures* scenario.[273] Persistent breach of NEC Directive carries the prospect of enforcement proceedings from the Commission.

Obj4.W4: Dairy herd expansion is faster than mitigation capacity

The total number of dairy cows increased by 2.5% between 2016 and 2017; 3.4% between 2017 and 2018; 1.6% between 2018 and 2019[274]; and 4% in 2020, amounting to 1.57 million in June of 2020.[275][276] Since 2010, they have increased by just over 40%[277], largely in response to the economic opportunity arising from the abolition of milk quotas. In the EPA's latest National Inventory Report (2020), it shows that dairy cows emit more methane per head (116.05 kg/head) than suckler cows (73.85 kg/head).[278] The expanding dairy herd is a major contributor to increasing emissions. While technological advances provide potential for some methane abatement, most emissions in the agriculture sector come from biogenic sources, which are more challenging to reduce.[279]

Obj4.W5: Ireland has one of the lowest levels of forest cover in Europe

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[273] Irelands Transboundary Gas Emissions 1990-2030 (May 2019) https://www.epa.ie/pubs/reports/air/airemissions/irelandsairpollutantemissions2017/Irelands%20Air%20Pollutant%20Emissions%202017.pdf

[274] AAA10: Number of Cattle in June by Type of Cattle, Region and County and Year https://statbank.cso.ie/px/pxeirestat/Statire/SelectVarVal/Define.asp?maintable=AAA10&PLanguage=0

[275] Teagasc Outlook 2021, Economic Prospects for Agriculture https://www.teagasc.ie/media/website/publications/2020/Outlook-2021.pdf

[276] Table AAA09- Number of Livestock in June (CSO)

[277] AAA08: Number of Cattle in June (000 Head) by Type of Cattle, Region and County and Year (Year 2010) https://statbank.cso.ie/px/pxeirestat/Database/eirestat/Livestock/Livestock_statbank.asp?sp=Livestock&Planguage=0&ProductID=DB_AA compared to Numbers as seen in AAA10.

[278] EPA 2020 National Inventory Report http://www.epa.ie/pubs/reports/air/airemissions/ghg/nir2020/

[279] Climate Action Plan 2019- To Tackle Climate Breakdown https://assets.gov.ie/10206/d042e174c1654c6ca14f39242fb07d22.pdf

Ireland has a forest cover of 11.5%, or 801,200 ha, compared to the EU-27 average of 42.4% with only two other countries, Malta and the Netherlands ranking lower.[280] The Government target is to reach 18% forest cover by 2046, up from the current rate of 11%; a target rate of 8,000 hectares per year.[281] As noted in the Climate Action Plan, under the current National Forestry Programme 2014-2020, afforestation rates have been on average about 5,500 hectares per year[282], with only 3,550 hectares planted in 2019 and 2,434 hectares planted in 2020.[283] Research has suggested that attitudes and social barriers to forestry are preventing uptake of afforestation.[284] Ireland's National Forestry Programme 2014-2020 is nationally funded and not funded through the Common Agricultural Policy. During consultation, some stakeholders highlighted a number of historical concerns regarding the Forestry Programme 2014-2020, including the overreliance on conifers and inappropriate afforestation in Ireland previously which has led to several biodiversity losses, especially in peatlands. Measures implemented in 2018, following the mid-term review of the Forestry Programme have addressed the mains concerns, including increasing broadleaf planting rates.[285] In 2020, broadleaves made up 34% of all new planting, exceeding the 30% broadleaf planting target set out in the Forestry Programme 2014-2020. Lessons learned from native woodland establishment and low impact silviculture have also gradually migrated into mainstream forestry practice.

Obj4.W6: Ongoing drainage of organic soils (grasslands and wetlands)

The land use, land-use change and forestry sector (LULUCF) was a net source of emissions in all years between 1990 and 2017, due predominantly to the impact of drainage of organic soils in grasslands and wetlands.[286] Currently, Irish grasslands are a net source of CO2 emissions as a result of an estimated 300,000 ha of permanent

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[280] Common Context Indicator C.29 'Forest and wooded land' (2019 update) https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[281] https://assets.gov.ie/10206/d042e174c1654c6ca14f39242fb07d22.pdf

[282] Climate Action Plan 2019- To Tackle Climate Breakdown https://assets.gov.ie/10206/d042e174c1654c6ca14f39242fb07d22.pdf

[283] Forest Statistics Ireland 2020 https://www.gov.ie/en/collection/15b56-forest-statistics-and-mapping/#annual-forest-sector-statistics

[284] Ryan, M. And O'Donoghue, C. (2016), Socio-economic drivers of farm afforestation decision-making. *Irish Forestry*, 73, pp. 96–121

[285] DAFM (2018) Forestry Programme 2014 – 2020 (Midterm Review) https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/forestry/forestservicegeneralinformation/2014-2020midtermreview/MidTermReview210218.pdf

[286] EPA Irelands National Inventory Report 2020 http://www.epa.ie/pubs/reports/air/airemissions/ghg/nir2020/

grassland being on drained carbon rich soils where the carbon pool is very vulnerable. When soils with high organic matter are drained, air is allowed into the soil, which breaks down the organic matter, allowing for a release of CO2 into the atmosphere.[287] According to Teagasc, soil organic matter in Irish grasslands is estimated to equal 1,800 million tonnes of carbon dioxide equivalent in the top 1 m of mineral soils. Grasslands on drained organic (peat) soils generally release carbon at rates of up to 20 tonnes CO2 per hectare per year. Upon draining, the organic matter in organic (peat) soils is rapidly decomposed and released as carbon dioxide (CO2) gas.[288] Therefore, it is important to reduce the ongoing drainage of these soils in order to reduce the amount of CO2 released into the air. Over 80% of peatlands in Ireland are already considered degraded due to the drainage of organic soil in order to facilitate peat extraction, agricultural activities and afforestation.[289] Draining and peat extraction stops the carbon sequestration function and reduces the carbon stock and therefore has negative effects on climate mitigation.[290] In 2017, approximately 56,000 hectares of peatlands was estimated to be subject to active drainage and peat extraction.[291] It should be noted that current afforestation is predominately on non-organic soils and active and designated peatlands are no longer planted. [292]

Obj4.W7: High % of non-CO2 emissions in Ireland due to agriculture

In Ireland, Methane (CH4), nitrous oxide (N2O) and carbon dioxide (CO2) represent approximately 66%, 32% and 2% of agricultural emissions.[293] Methane is the second largest contributor to GHG emissions in Ireland due to the large number of cattle. The sectoral methane emissions from agriculture increased by 1.6% between 1990 (12,763

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[287] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/

[288] Teagasc (2020) "Protecting soil carbon stocks and enhancing Carbon Sequestration" https://www.teagasc.ie/publications/2020/protecting-soil-carbon-stocks-and-enhancing-carbon-sequestration.php

[289] Renou-Wilson, F. and Wilson, D. (2018), Vulnerability assessment of peatlands: exploration of impacts and adaptation options in relation to climate change and extreme events (VAPOR). Report No. 250. Environmental Protection Agency.

[290] NPWS National Peatland Strategy 2015 https://www.npws.ie/sites/default/files/publications/pdf/NationalPeatlandsStrategy2015EnglishVers.pdf

[291] Climate Change Advisory Council Annual Review 2019 http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

[292] https://www.epa.ie/pubs/reports/air/airemissions/ghg/nir2019/Ireland%20NIR%202019_Final.pdf

[293] Climate Change Advisory Council Annual Review 2019 http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

kt CO2 equivalent) and 2018 (12,970.1 kt CO2 equivalent); and in 2018 the sector accounted for 92.6% of the total methane emissions. The agriculture sector also contributed 92.6% of the total nitrous oxide emissions released in Ireland (6,437.6 kt CO2 equivalent) in 2018, as a result of the use of synthetic fertilisers (chemical nitrogen) and animal manures.[294] In 2018, chemical nitrogen use on farms peaked at 408,000 tonnes.[295] Agriculture is also the major source of ammonia emissions in Ireland, with agriculture representing 99% of overall ammonia emissions; the highest in Europe, with 92.3% being the EU average.[296]

Obj4.W8: Nitrates derogation farms have become a very significant intensive farming cohort over recent years.

Total area farmed under nitrates derogation (i.e. farms stocked at up to 250 kg livestock manure N/ ha) increased by 34% from 2014 to 2018.[297] Derogation farms have to be more efficient to ensure optimum use of inputs in order to reduce their risk of nutrient losses to water, air and ecosystems. In Ireland, the terms and condition of the current Nitrates Derogation for 2020 now require derogation farmers to use low emission slurry spreading (LESS) equipment for all slurry spread after April 15th, 2020. Derogation farmers are now also required to reduce the crude protein in concentrate feed for grazing livestock with a maximum of 16% crude protein permissible between April 1st and September 15th, 2020.[298]

Obj4.W9: Sub-optimal soil fertility

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[294] EPA Ireland's National Inventory Report 2020 http://www.epa.ie/pubs/reports/air/airemissions/ghg/nir2020/

[295] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/

[296] Irelands Transboundary Gas Emissions 1990-2030 (May 2019) https://www.epa.ie/pubs/reports/air/airemissions/irelandsairpollutantemissions2017/Irelands%20Air%20Pollutant%20Emissions%202017.pdf

[297] https://wayback.archive-it.org/org-1444/20201125093327/

https://www.agriculture.gov.ie/media/migration/ruralenvironment/environment/nitrates/2019/PublicConsultation2019NitratesDerogationReview290319.pdf

[298] DAFM 2020 Nitrates Terms and Conditions https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/ruralenvironment/environment/nitrates/2020/NitratesDerogation2020TermsConditions260320.pdf

Research shows that 88% of Irish grasslands have sub-optimal soil fertility,[299] despite soil fertility management techniques being well established. These low adoption rates suggest that behavioural barriers on the part of farmers and the fertiliser industry need to be addressed. The application of lime as a soil conditioner and specifically to neutralise soil acidity and raise pH to an agronomic optimum level confers many benefits in terms of soil nutrient availability and fertiliser efficiency and grass crop productivity. However, only 21% of farmers used lime in 2015.[300] Since the mid 1980's lime use has only exceeded 1 million tonnes on four occasions, well below the levels required to address soil fertility.[301] Low soil fertility is problematic as it encourages farmers to apply more nitrogen fertiliser to the soil.[302] An increase in the use of synthetic fertilisers leads to an increase in nitrous oxide emissions. Emissions of N2O from the Agriculture sector are determined by the amount of nitrogen inputs to agricultural soils from synthetic fertiliser and animal manures, which combined produced the bulk of N2O emissions in 2018 (92.6 per cent of total N2O emissions in 2018).[303]

Obj4.W10: Limited investment in sectoral research (horticulture)

The horticultural sector is one of the most carbon efficient sectors of Irish agriculture, alongside the tillage sector. Action 11 of Ag Climatise commits to further enhancing carbon credentials of the horticulture sector.[304] In order to achieve this, the horticulture industry will have to build on the opportunities offered by changing lifestyle trends, such as an increase in plant based diets[305]; and the increased concern among consumers regarding food provenance, healthy eating and sustainable food production. Greater investment in research and innovation by producers will be critical, to take advantage of new opportunities around improved production methods,

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[299] Teagasc Soil Fertility Conference 2018 'Optimising Soil and Fertiliser Management for Sustainable Grassland Production' https://www.teagasc.ie/media/website/publications/2018/Teagasc-Soil-Fertility-Conference-2018.pdf

[300] Teagasc: Fertiliser Use in Ireland 2005-2015 https://www.teagasc.ie/media/website/crops/soil-and-soil-fertility/Wall-Dillon-et-al-Fert-Use-Survey_FAI-Kildalton-2017.pdf

[301] https://www.teagasc.ie/crops/soil--soil-fertility/soil-ph--liming/

[302] Climate Change Advisory Council Annual Review 2019 http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

[303] EPA Ireland's National Inventory Report 2020 http://www.epa.ie/pubs/reports/air/airemissions/ghg/nir2020/

[304] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/

[305] https://data.oireachtas.ie/ie/oireachtas/committee/dail/32/joint_committee_on_climate_action/reports/2019/2019-03-28_report-climate-change-a-cross-party-consensus-for-action_en.pdf

developing new products and sustainable packaging. Such investments would ultimately improve the success rate of translating research outputs into commercial products for the domestic and export market.

Obj4.W11: Reliance on peat in horticultural sector

Peat is used in horticulture as both a soil improver and as the basis for growing media (or 'composts' as they are known). Peat is the principal ingredient used in professional growing media. Bord na Móna and other horticultural peat producers extract 2.6 million cubic metres (2006 estimate) of peat for horticultural use annually;[306] Peat used for compost decomposes over time and hence releases its stored carbon to the atmosphere.[307] Research on diversifying the range of inputs for growing media continues, although peat remains an essential component for some horticultural industries.[308]

Obj4.W12: Increasing annual supply gap for forestry biomass in Ireland

According to '*The Wood Supply and Demand on the Island of Ireland to 2025'* report, published in 2018, substantial increases in demand are predicted for the wood-based panel sector and wood energy sectors. It is predicted that demand by the wood-based panel sector will be met in full by indigenous supply in the period up to 2025. Based on the demand side and work undertaken by the Sustainable Energy Authority of Ireland (SEAI), and by COFORD, the wood energy supply gap in Ireland could be upwards of 1.4 million cubic metres by 2020, increasing to over 2 million cubic metres by 2025. And while an increase in the level of harvest to meet wood energy demand is forecast, there is likely to be a need for sizeable wood energy imports to fill the anticipated supply gap. This report also predicts that there will be a continuation of a shortage of sawlog and stakewood supply up to 2020, reaching 0.73 million cubic metres per annum. Looking to the sawmilling sector, demand is forecast to outstrip indigenous

[306] NPWS National Peatland Strategy 2015 https://www.npws.ie/sites/default/files/publications/pdf/NationalPeatlandsStrategy2015EnglishVers.pdf

[307] Government of Ireland "REVIEW OF THE USE OF PEAT IN THE HORTICULTURAL INDUSTRY- Key Issues Consultation Paper" https://www.npws.ie/sites/default/files/general/peat-horticultural-industry-consultation-paper-en.pdf

[308] https://www.teagasc.ie/media/website/publications/2016/Road-map-2025-Horticulture.pdf

supply by 0.7 million cubic metres by 2020, but is expected to come into balance by 2025, on foot of the increasing level of supply.[309]

Obj4.W13: Some forests are not managed to their productive potential

Some forests are not managed to their productive potential due to lack of knowledge and awareness among forest owners regarding the management and value of forests. The 2017 National Forest Inventory shows that 66% of private forests available for thinning have not yet been thinned. This is due to limited road access to these sites and as a result of the small fragmented nature of private forest, which makes it economically unviable to thin forest stands.[310] If forests are not thinned, this reduces the amount of wood available for biomass and in the manufacture of harvested wood products. While a reduction in the levels of thinning won't necessarily have significant impacts on overall carbon pools in the forest, thinning of woods and the production of harvested wood products and biomass do contribute to overall reduction in CO2 emissions in other sectors e.g. reduction or replacement of fossil fuels.

Obj4.W14: Economics of anaerobic digestion (AD) plants are challenging

AD development is not financially viable without a range of supply and demand supports. A cost/benefit analysis undertaken by the Sustainable Energy Authority of Ireland (SEAI), in which the financial viability of a wide range of biogas and bio-methane plants were analysed, indicated that almost all energy produced in these plants was done so at a higher cost than the fossil fuel alternative and therefore, some form of direct subsidy or support would be needed to encourage their development. Without this support, it would be unlikely that more than a few AD plants would be developed. Furthermore, following stakeholder consultation, the SEAI found that the capital cost of setting up a biogas/bio-methane plant was high, with almost all stakeholders predicting a weighted average cost of capital of 6-15%. Additionally, it was found that the cost of an electrical grid connection was high, depending on the proximity of the AD plant to an electrical substation; and its capacity. [311]

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[309] COFORD (2018) Wood Supply and Demand on the Island of Ireland to 2025 http://www.coford.ie/media/coford/content/publications/2018/3COFORDWoodSupplyandDemand121218.pdf

[310] DAFM Ireland's National Forestry Inventory https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/nfi/

[311] SEAI (2017) Assessment of Costs and Benefits of Biogas and Biomethane in Ireland https://www.seai.ie/publications/Assessment-of-Cost-and-Benefits-of-Biogas-and-Biomethane-in-Ireland.pdf

The Support Scheme for Renewable Heat (SSRH) provides an operational tariff for production of biogas for heat purposes. It is anticipated that the Renewable Electricity Support Scheme (RESS) auction in 2020 will deliver 'shovel ready' projects, mainly through solar and onshore wind, with high efficiency biomass projects also eligible to compete in RESS auctions. Provisional results, announced in August 2020, showed 114 projects applied with 63 solar and 19 onshore wind provisionally successful projects equating to a potential saving of approximately 671kt of CO2 per year.[312] During stakeholder consultations, it was also suggested that ammonia can act as an inhibitor in anaerobic digesters.

Obj4.W15: Difficulties in accessing the national grid

The transformation of the national power grid to accommodate distributed power generation is ongoing. The national grid evolved over the years in the context of fossil fuelled generation which was sourced from large centralised generators. As a result, new and distributed plants now find the national grid difficult to access. Currently, there is a lack of heat distribution infrastructure; and the current frameworks designed to govern access to the gas and power grids pose barriers to timely and cost-effective access to energy markets. Additionally, there is a need to update grid access protocols as under current protocols the large backlog of applications can excessively delay connection offers.[313] It should be noted that there has been continual reform of access to the Grid through CRU Enduring Policy and Connections including community and smaller scale projects.[314] The 2019 All-of-Government Climate Action Plan to tackle climate breakdown includes actions in developing an enabling framework for micro-generation, which tackles existing barriers and establishes suitable supports within relevant market segments, including appropriate grid connection policy that will ease grid access into the future.

Obj4.W16: Production of renewable energy at farm level and from forestry is quite low

Ireland produced 2.6% of renewable energy from agriculture in 2018. This equated to 34,900 tonnes of oil equivalent, which falls well below the EU-27 average of 12.1%, or 26,385,000 tonnes of oil equivalent. Ireland ranked 23rd out of all EU-27 countries.

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[312] SEAI http://www.eirgridgroup.com/site-files/library/EirGrid/RESS-1-Provisional-Auction-Results-(R1PAR).pdf

[313] Rebiogen (2017) Community Sustainable Energy Centres: A model for Ireland https://www.seai.ie/publications/RDD_RebioGen.pdf

[314] https://www.cru.ie/document_group/electricity-connection-policy-2/

Ireland produced 18.6% of renewable energy from forestry in 2018; 247,000 tonnes of oil equivalent, which is below the EU average of 41.4%. Ireland ranks 25th out of the EU-27.[315]

The biogas and bio-methane sector in Ireland is at the initial stage of development with just 38 biogas plants in 2018, one biogas upgrading plant with grid injection. Twelve anaerobic digestion plants are regulated by the Department of Agriculture, Food and the Marine under the use of Animal-By-Product regulations. In 2017, primary production of biogas in Ireland was 54.6 ktoe, more than 80% of which was utilised as transformation input in electricity and heat generation.[316]

Obj4.W17: Enterprise specialisation which makes Irish farms more vulnerable to climate events

Increased enterprise specialisation by Irish farmers has made those systems more vulnerable to economic and environmental events. While specialisation does offer benefits, such as the streamlining of knowledge and resources, it is a high-risk strategy in a world of climate change and economic uncertainty. The occurrence of extreme weather events such as storms, snow, heatwave and drought highlights the vulnerability of agriculture to climate change and demonstrates the need for adaptation.[317] Research conducted by Teagasc found that most farmers (63%) were not interested in diversifying on farm; and that age and level of education had an impact on that decision.[318]

Obj4.W18: Polluter Pays Principle (PPP) not applied to agricultural systems

Market-based instruments create incentives that encourage people, acting in their own self-interest, simultaneously to treat the environment in a way that is in the best interests of society. As these instruments are lacking in an agricultural context, preventing pollution from agricultural systems is not adequately rewarded or penalised

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[315] Common Context Indicator C.43 'Production of renewable energy from agriculture and forestry' (2019 update) https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[316] ESRI. Promoting biogas and biomethane production: Lessons from cross country studies http://aei.pitt.edu/102241/1/WP630.pdf

[317] https://data.oireachtas.ie/ie/oireachtas/committee/dail/32/joint_committee_on_climate_action/reports/2019/2019-03-28_report-climate-change-a-cross-party-consensus-for-action_en.pdf

[318] https://www.teagasc.ie/media/website/publications/2013/5912_Farm_Diversification_Technology_Update_Final_.pdf

as would occur under a PPP framework.[319] A carbon tax on chemical fertilisers or agro-chemical inputs may be one way of addressing this.

Obj4.W19: Perceived inconsistent enforcement of policy and governance framework

During stakeholder consultation, a number of stakeholders highlighted what they perceived as inconsistent enforcement of policies and governance framework in the agri-food and forestry sector. They felt that the ongoing rise in GHG emissions; the reduction in water quality; and the continuing loss of biodiversity was proof of this.

[319] https://www.ejcl.org/113/article113-15.pdf

Opportunities

Obj4.O1: Introduce the measures outlined in Ag Climatise to achieve the targets outlined in the Climate Action Plan

The Climate Action Plan[320] sets ambitious targets for the agriculture, forestry and land use sector, including:

- Total GHG emissions arising from agricultural sector in 2030 to be between 17.5 – 19.0 Mt CO2 eq. This is to be achieved by delivering 16.5 -18.5 Mt CO2 eq cumulative methane and nitrous oxide abatement over the period 2021 – 2030;
- Achieve 26.8 Mt CO2 eq abatement through LULUCF actions, including 8,000 ha of newly planted forest per annum (21 MtCO2eq. cumulative abatement);
- 40,000 ha per annum of reduced management intensity of grasslands on drained organic soils (4.4 MtCO2eq. cumulative abatement);
- Better land management (grasslands, tillage lands and non-agricultural wetlands) (1.4 MtCO2eq. cumulative abatement);
- Set a target for the level of energy to be supplied by indigenous bio-methane injection in 2030.

In order to reach these targets and achieve a climate neutral economy by the end of 2050, the Ag Climatise- Roadmap towards Climate Neutrality[321] outlines six key tasks that must be achieved through a series of actions based on the Teagasc Marginal Abatement Cost Curves (MACCs) for GHG and ammonia emissions that can be acted on immediately; and through the delivery of other actions which require further consideration due to the path to delivery being unclear. These tasks include:

- A reduction in GHG emissions from the sector, particularly methane and nitrous oxide;
- An increase in the carbon sequestration and storage potential of the land-use sector;
- A reduction in nutrient losses and an improvement in water quality and biodiversity;
- A reduction in ammonia emissions in line with National Emissions Ceiling Directive;
- The development and maintenance of production and land-use management systems that are sustainable and resilient; and that meet climate and environmental obligations while also maintaining an efficient market;

[320] https://www.dccae.gov.ie/documents/Climate%20Action%20Plan%202019.pdf
[321] https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/

- The maintenance of open and transparent communication links to keep stakeholders up to date on progress made.

During stakeholder consultation, the role of the advisory services and the introduction of a system of Continuous Professional Development for all advisors on issues relating to climate change and the environment (biodiversity, air, soil and water quality) was highlighted.

Obj4.O2: Reduce nitrogen emissions

Calcium Ammonium Nitrate (CAN) is the predominant nitrogen fertiliser used in Ireland.[322] It's substitution with protected urea has been shown to reduce nitrous oxide emissions by 70% while maintaining yield.[323] In order to reduce emissions arising from agriculture, Ag Climatise recommends taking measures which include replacing 65% of CAN fertilisers with protected urea products and improving nitrogen-use efficiency through increasing soil pH. Ag Climatise further outlines Ireland's ambition to reduce nitrous oxide emissions arising from the use of chemical fertilisers by 50%. This is to be achieved by reducing chemical nitrogen use on farms to a target level of 350,000 tonnes by 2025, with a further reduction to an absolute maximum of 325,000 tonnes by 2030, equivalent to the usage in 2013; and by promoting the use of protected urea products as alternatives to chemical fertilisers.[324]

Additionally, nitrous oxide (N2O) is emitted via the nitrification of NH4+ and partial denitrification of NO3 during storage of solid manure and soil application of both solid and liquid manures.[325] Therefore, the Climate Action Plan further recommends improving manure management by changing 50% of slurry spreading technology and timing to low-emission trailing-shoe slurry spreading.

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[322] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

[323] Harty, M.A., Forrestal, P.J. Watson, C.J. McGeogh, K.L. Carolan R., Elliott, C., Krol, D., Laughlin, R.J., Richards, K.G. and Lanigan, G.J. (2016), Reducing nitrous oxide emissions by changing N fertiliser use from calcium ammonium nitrate (CAN) to urea based formulations. *Science of the Total Environment*, 563–564, 576–586.

[324] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/

[325] Buckley, C. Moran, B. Donnellon, C. (2020) Teagasc National Farm Survey: A Report on Bovine Manure Management, Application and Storage Practices in Ireland https://www.teagasc.ie/media/website/publications/2020/Manure-Management-Practices-Report.pdf

Obj4.O3: Improve animal breeding and animal health

There are inherent challenges effecting climate emission reductions in the livestock sector. It must be recognised the challenge Ireland faces as a food producing country, while at the same time acknowledging that the sector should be seen as part of the solution. Improving animal breeding by utilizing breeding indices; and improving animal health, can lead to a reduction in GHG emissions. The implementation of breeding indices can be used to enhance genetic traits relating to herd efficiency and methane emissions, thereby reducing GHG emissions per unit of output.[326] Teagasc found that the dairy Economic Breeding Index (EBI) and beef equivalents have the potential of reducing emissions annually by 0.43, 0.025 and 0.061 Mt CO2eq respectively.[327] The Teagasc Sustainability Survey shows that there is huge variability in carbon efficiency with the top performing third of farms emitting, on average, 9.6 kg CO2 equivalent per kg beef, compared with 14.9 kg for the bottom performing third of cattle farms. Reducing this variability is a real opportunity to make progress in reducing emissions from cattle production in Ireland. Animal Breeding has been identified under Ag Climatise as a concrete action that will lead to the reduction in environmental footprints on farm. Under Action 3 of Ag-Climatise, the government commits to genotyping the entire national herd by 2030 in order to underpin the development of enhanced dairy and beef breeding programmes with the aim of reducing GHG emissions at a national level.[328]

In addition, improving animal health can also lead to a reduction in emissions. Poor animal health and welfare negatively impacts production efficiency and increases absolute emissions. Improvements in herd health are estimated to reduce emissions by 0.131 Mt CO2eq annually.[329] The Climate Action Plan includes measures to improve animal health, and notes its potential to deliver abatement in agriculture.[330] Improving animal health has also been identified under Ag Climatise as a way of increasing productivity and reducing emissions per unit of product. Under Action 5 of Ag-Climatise, the government commits to further enhancing animal health strategies

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[326] Schils, R.L.M., Eriksen, J., Ledgard, S.F. Vellinga, Th.V., Kuikman, P.J., Luo, J., Peterson, S.O. and Velthof, G.L. (2013), Strategies to mitigate nitrous oxide emissions from herbivore production systems. *Animal*, 7, pp. 29–40.

[327] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

[328] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/

[329] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

[330] https://www.dccae.gov.ie/en-ie/climateaction/publications/Documents/16/Climate_Action_Plan_2019.pdf

through the promotion of sustainable animal health and welfare practices; and by enhancing food safety and authenticity.[331]

Obj4.O4: Improve livestock and grassland management

Improving livestock management by extending the grazing season will also reduce GHG emissions. An extension of the grazing season increases the level of fresh grass consumed, which generates less methane compared to conserved grass; and reduces the quantity of manure stored during housing of animals; therefore mitigating GHG emissions.[332] It is estimated that extending the grazing season could potentially reduce emissions by 0.065 Mt CO2eq annually.[333] Improving grazing management will also lead to an increase in grass production and utilisation without needing to increase the use of nitrogen fertilisers.[334] However, extended grazing should only be implemented where soil conditions allow, as trampling of soil in wet conditions may cause soil compaction; reducing air permeability and pore continuity, and increasing average cumulative N2O emissions.[335] Sward diversification and multi sward systems can also have an effect on emission levels. Improving grassland management has been identified under Ag-climatise as a way of reducing GHG emissions; and action 4 of Ag Climatise commits to maximising the production of grazed grass.[336]

Obj4.O5: Improve on-farm slurry storage and management; including energy production

Animal manure emits methane, nitrous oxide and ammonia into the atmosphere. Therefore, improvements in storage conditions and length of time stored; as well as

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[331] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/

[332] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

[333] Lanigan, G., Donnellan, T., Hanrahan, K., Paul, C., Shalloo, L., Krol, D., Forrestal, P., Farrelly, N., O'Brien, D., Ryan, M., Murphy, P., Spink, J., Finnan, J., Boland, A., Upton, J., and Richards, K. (2018), *An Analysis of Abatement Potential of Greenhouse Gas Emissions in Irish Agriculture 2021-2030* [online] https://www.teagasc.ie/media/website/publications/2018/An-Analysis-of-Abatement-Potential-of-Greenhouse-Gas-Emissions-in-Irish-Agriculture-2021-2030.pdf

[334] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/

[335] Ball, B.C., Cameron, K.C., Di, H.J. and Moore, S. (2012), Effects of trampling of a wet dairy pasture soil on soil prosody and on mitigation of nitrous oxide emissions by a nitrification inhibitor, dicyandiamide. Soil Use and Management, 28, pp. 194–201.

[336] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/

the type of treatment of the manure; can all lead to decreases in emissions.[337] Splash-plate spreading is the most common animal slurry spreading system used in Ireland and is associated with high emissions. The type of technology used to apply slurry; and the conditions at time of spreading, greatly influence emissions and the fertiliser replacement value of the slurry.[338] Teagasc research found that slurry broadcast by splash-plate tankers can lose up to 83% of the readily available nitrogen.[339] Teagasc further estimate that the use of low-emission slurry spreader (LESS) equipment for 50% of the slurry spread would mitigate 0.117 Mt CO2eq per year.[340] The Climate Action Plan includes changing 50% of slurry spreading technology and timing to low-emission trailing-shoe slurry spreading as a potential metric to deliver abatement in agriculture.[341] In Ireland, the terms and condition of the current Nitrates Derogation for 2020 require derogation farmers to use low emission slurry spreading (LESS) equipment for all slurry spread after April 15th, 2020.

Obj4.O6: Reduce the crude protein content of animal feeding stuffs and support research into diet quality and the use of novel feed additives

Under the 2020 Nitrates Derogation farmers are now required to reduce the crude protein in concentrate feed for grazing livestock with a maximum of 16% crude protein permissible between April 1st and September 15th, 2020.[342] This coincides with Action 6 of Ag Climatise which commits to reducing the crude protein content of livestock feeding stuffs. Under this action, crude protein in pig feeds is to be reduced by 16% and crude protein in feeds for grazing ruminants is to be reduced to a maximum of 15% (apart from in some limited situations where animals require higher protein contents, as determined by nutritional science). In addition, feed manufacturers and co-operatives are encouraged to increase the content of native grains and proteins in compound rations. Overall, decreasing the level of crude protein in animal feeding stuff

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[337] http://www.epa.ie/pubs/reports/air/airemissions/ghg/nir2020/

[338] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

[339] Forrestal, P. Burchill, W. Improving Farm Efficiency Using Low Ammonia-N Emission Technology https://www.teagasc.ie/media/website/publications/2019/Improving-farm-efficiency-using-low-Ammonia-N-emission-technologies.pdf

[340] *An Analysis of Abatement Potential of Greenhouse Gas Emissions in Irish Agriculture 2021-2030* https://www.teagasc.ie/publications/2018/an-analysis-of-abatement-potential-of-greenhouse-gas-emissions-in-irish-agriculture-2021-2030.php

[341] https://www.dccae.gov.ie/en-ie/climate-action/publications/Documents/16/Climate_Action_Plan_2019.pdf

[342] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/ruralenvironment/environment/nitrates/2020/NitratesDerogation2020TermsConditions260320.pdf

will decrease ammonia losses coming from manure produced by livestock.[343] Under Action 7 of Ag-Climatise, the government commits to investing in novel feed additives in pasture based production systems, which provide enhanced digestibility of feed material[344], potentially leading to a reduction in methane production in the rumen of an animal.

Obj4.O7: Better manage peatlands to allow for rehabilitation

Drained peat soils are a significant source of GHG emissions. Rewetting peat soils is considered an important climate change mitigation tool; ultimately reducing overall emissions and creating suitable conditions for carbon sequestration.[345] Land management activities, which provide soil cover for all or most of the time; and also maintain moisture levels on peat-rich soils, are important measures which should be taken to protect existing carbon stores in the soil from oxidation (loss as CO2).[346] As outlined in Ag Climatise, reducing emissions through water table manipulation and reduced management intensity is recognised as having potential to reduce GHG emissions. Action 15 and 16 of Ag Climatise is concerned with reducing the management intensity of at least 40,000 ha of peat based agricultural soils by identifying and determining the drainage status of grasslands on carbon rich soils that are suitable for water table manipulation; and by implementing a pilot scheme on reduced management intensity to act as a "proof of concept" for scaling up to a larger agri-environmental scheme.[347]

An open call for a locally led European Innovation Partnership pilot project on rewetting carbon rich soils was advertised by the Department of Agriculture, Food and the Marine in August 2020. It will focus on reduced management intensity of farmed peatland with the objective of protecting the carbon pool and restoring sequestration where possible and therefore, contribute to meeting our commitments as part the

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[343] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/

[344] https://ec.europa.eu/food/safety/animal-feed/feed-additives_en

[345] Wilson, D., C. Farrell, G. Fallon, F. Moser, Müller, and Renou-Wilson. "Multiyear Greenhouse Gas Balances at a Rewetted Temperate Peatland." *Global Change Biology* 22.12 (2016): 4080-095. Web.

[346] http://www.europarl.europa.eu/RegData/etudes/STUD/2017/585914/IPOL_STU(2017)585914_EN.pdf

[347] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/

Government Climate Action Plan. It will also enhance the protection of biodiversity and water quality.[348]

Obj4.O8: Improve soil management and fertility

There are approximately 300,000 ha of agriculturally managed drained organic soils where blocking drains, raising the water table and reducing the management intensity can result in a higher retention of soil carbon by reducing losses of CO2 and in some cases aid sequestration of carbon. A high proportion of grasslands in Ireland are on wet mineral soils and improved drainage of 10% of this area is estimated to reduce emission by 0.2 Mt CO2eq per year.[349] Furthermore, increasing soil pH through methods such as liming can increase nitrogen use efficiency. The application of lime has an influence on the availability of stored nutrients in the soil. The optimum pH of soil for grassland is pH 6.3. The aim of applying lime to the soil is to maintain optimum pH in order to optimise soil fertility.[350] Potential emission reductions of 0.112 Mt CO2eq per year were estimated as a result of soil pH optimisation by liming.[351]

Furthermore, the extension of clover in pasture swards can also increase soil pH. Teagasc found that improving nitrogen-use efficiency by optimizing soil pH and extending clover in pasture swards, could abate an extra 181 kilotonnes of CO2 equivalent a year, and would result in an 8% reduction in fertiliser use between 2021 and 2030. [352] The Climate Action Plan includes LULUCF measures aimed at increasing carbon sequestration, such as rewetting 40,000 ha of organic grassland soils; and better management of 450,000 ha of grassland, as potential metrics to deliver abatement in agriculture.[353]

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[348] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/press/pressreleases/2020/august/title,147198,en.html

[349] *An Analysis of Abatement Potential of Greenhouse Gas Emissions in Irish Agriculture 2021-2030* https://www.teagasc.ie/publications/2018/an-analysis-of-abatement-potential-of-greenhouse-gas-emissions-in-irish-agriculture-2021-2030.php

[350] https://www.teagasc.ie/publications/2019/soil-fertility-is-the-key-for-increased-profits.php

[351] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

[352] https://www.teagasc.ie/media/website/publications/2018/An-Analysis-of-Abatement-Potential-of-Greenhouse-Gas-Emissions-in-Irish-Agriculture-2021-2030.pdf

[353] https://www.dccae.gov.ie/en-ie/climate-action/publications/Documents/16/Climate_Action_Plan_2019.pdf

Obj4.O9: Increase relatively low level of forest cover, including native and/or broadleaf species

Forestry has been identified as an extremely effective climate change mitigation tool; one that has the potential to deliver very high climate related benefits.[354] Teagasc estimates that afforestation of 7,000 hectares per annum would sustain an average carbon sink of 2.1 Mt CO2eq annually.[355] The Climate Action Plan includes increasing afforestation rates as a potential metric to deliver abatement in agriculture.[356] Under the new Forestry Programme, the Government has allocated €100 million to the forestry sector for 2021, which reflects their ambition to establish 8,000 ha of new forests. However, in order to increase planting rates towards this target levels, there will need to be an increase in afforestation approvals; and an increased ambition to actively communicate with farmers with regards the merits of farm forestry and afforestation as a complementary land use.[357] One of the main ambitions of Ag Climatise is to deliver 26.8 Mt CO2eq abatement through LULUCF actions up to 2030. Increasing afforestation levels to 8,000 ha per year is seen as one way of achieving this. Action 14 of Ag Climatise includes a number of sub-actions to encourage greater afforestation. These sub-actions include encouraging the planting of a range of different species, both native and broadleaf; expanding initiatives such as the Native Woodland Scheme and the Woodland Environmental Fund, as well as supporting the existing forest estate; determining the availability of public lands for afforestation; and continuing funding the provision of knowledge transfer groups which promote sustainable forest management.[358]

Obj4.O10: Support opportunities for on-farm diversification to lower carbon intensity farming and to meet bio-energy demands

The potential of land use diversification, away from bovine production systems, may open up opportunities in terms of organic production, agroforestry and innovations such as small scale biorefining, which can all result in lower carbon intensity farming.[359]

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[354] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/publications/2011/annualreviewandoutlookforagriculturefisheriesandfood20102011/forestry/forestryandclimatechange/

[355] *An Analysis of Abatement Potential of Greenhouse Gas Emissions in Irish Agriculture 2021-2030* https://www.teagasc.ie/publications/2018/an-analysis-of-abatement-potential-of-greenhouse-gas-emissions-in-irish-agriculture-2021-2030.php

[356] https://www.dccae.gov.ie/documents/Climate%20Action%20Plan%202019.pdf

[357] Teagasc: Outlook 2021, Economic Prospects for Agriculture https://www.teagasc.ie/media/website/publications/2020/Outlook-2021.pdf

[358] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/

[359] https://www.dccae.gov.ie/documents/Climate%20Action%20Plan%202019.pdf

Exploring all options relating to land use diversification is one of the 29 actions outlined in Ag Climatse. This involves engaging with Teagasc and other stakeholders to analyse and consider alternative land-use options in order to assist in a just transition towards a more climate neutral economy; and supporting the development of supply chains where new market opportunities emerge.[360] Organic production, as per the governing Council Regulation (EC) No. 834/2007, is defined as "an overall system of farm management and food production that combines best environmental practices, a high level of biodiversity, the preservation of natural resources, the application of high animal welfare standards and a production method in line with the preference of certain consumers for products produced using natural substances and processes."[361] According to the FAO and the United Nations Inter Departmental Working Group on Organic Agriculture, "Organic agriculture reduces non-renewable energy use by decreasing agrochemical needs (these require high quantities of fossil fuel to be produced).Organic agriculture also contributes to mitigating the greenhouse effect and global warming through its ability to sequester carbon in the soil. Many management practices used by organic agriculture (minimum tillage, returning crop residues to the soil, the use of cover crops and rotations, and the greater integration of nitrogen-fixing legumes), increase the return of carbon to the soil, raising productivity and favouring carbon storage. The more organic carbon is retained in the soil, the more the mitigation potential of agriculture against climate change is higher."[362] Action 9 of Ag Climatise is concerned with increasing organic production to 350,000 hectares by 2030.[363]

Agroforestry refers to the low-density planting of trees within livestock or crop production systems.[364] The carbon sequestration capacity of agroforestry on temperate grasslands is estimated at about 7.2 t CO2eq per hectare per year.[365] Agroforestry may also promote more stable forms of soil organic carbon.[366] Agroforestry could provide an opportunity to increase afforestation rates while allowing farmers to maintain livestock levels while converting to forestry.

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[360] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/

[361] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32007R0834

[362] http://www.fao.org/organicag/oa-faq/oa-faq6/en/

[363] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/

[364] https://assets.gov.ie/10206/d042e174c1654c6ca14f39242fb07d22.pdf

[365] Aertsens, J., De Nocker, L. and Gobin, A. (2013), Valuing the carbon sequestration potential for European agriculture. *Land Use Policy*, 31, pp. 584–594.

[366] Fornara, D.D., Olave, R., Burgess, P., Delmer, A., Upson, M. and McAdam, J. (2017), Land use change and soil carbon pools: evidence from a long-term silvopastoral experiment. Agroforestry Systems, 92, pp. 1035–1046.

Furthermore, there is potential for farmers to diversify their land use into the production of energy crops for bio-energy demands.[367] As Ireland is almost completely dependent on energy imports, energy crops will have an important role to play in moving Ireland towards energy security and a low carbon economy.[368] Teagasc estimates that the use of short-rotation coppice (SRC) willow and miscanthus for heat generation and willow for electricity production could annually displace 0.179 and 0.187 Mt CO2eq respectively.[369]

Obj4.O11: Increase the use of forest products and biomass

The output of the forest-based biomass energy sector grew by 22% in 2016 compared to 2015, driven largely by an increase in demand for wood biomass by Bord na Mona. This increase resulted in an estimated GHG emission saving of 0.76 million tonnes of CO2.[370] This figure is likely to further increase with an increase in afforestation rates. The COFORD All Ireland roundwood forecast 2016 - 2035 estimates that annual production will increase from around 4 million cubic metres in 2016 to almost 8 million cubic metres by 2035. This increase in production will mean an increase in the supply of wood biomass for energy.[371] Under Action 19 of Ag Climatise, the Department of Agriculture, Food and the Marine aims to double the sustainable production of biomass from forests by 2030; and aims to ensure biomass mobilisation for heat production. This is to be achieved by increasing forest access; using forest-based biomass that is not suitable for harvested wood products for heat generation and exploring the possibility of replacing construction and packaging materials which are inherently unsustainable with bio-based materials, polymers, fibres, and composites.[372]The increased production of sawn wood and wood-based panels will continue to act as an increase store of CO2. Increased production of volume also means an increase in the supply of wood biomass for energy. The majority of wood fibre used for energy is mainly used within the forest products sector by using heat to dry timber ready for market.[373] Promotion of coppice management of small woods and hedgerows also has

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[367] https://www.teagasc.ie/media/website/publications/2017/WP1-Deliverable---Final-Jan-2017.pdf
[368] https://www.teagasc.ie/media/website/publications/2010/Manual_Final_10feb10.pdf
[369] *An Analysis of Abatement Potential of Greenhouse Gas Emissions in Irish Agriculture 2021-2030* https://www.teagasc.ie/publications/2018/an-analysis-of-abatement-potential-of-greenhouse-gas-emissions-in-irish-agriculture-2021-2030.php
[370] https://www.iffpa.ie/Sectors/IFFPA/IFFPA.nsf/vPages/Press_and_Publications~an-overview-of-the-irish-forestry-and-forest-products-sector-2017-09-05-2018/$file/IFFPA%20Annual%20Review%202017%20web.pdf
[371] http://www.coford.ie/toolsservices/allirelandroundwoodproductionforecast2016-2035/
[372] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/
[373] https://www.gov.ie/en/collection/15b56-forest-statistics-and-mapping/#annual-forest-sector-statistics

the potential to deliver on farm and local CHP biomass. Teagasc forecasts an increase in net realisable volume (NRV) from private forests in 2021, increasing from 1.25 million m3 in 2020 to 1.36 million m3 in 2021. The supply and harvesting of timber are projected to increase as a result of predicted improvements in the approval of felling and roading licenses. Ensuring the continued sustainable management of forests and the timely thinning of forests as appropriate will ensure the ongoing supply and mobilisation of timber resources.[374]

Obj4.O12: Increase efficiency through the roll-out of agri-digitalisation, smart farming and precision farming technology

Agri-digitalisation, smart farming and precision farming technologies generate a higher-yield per animal and hectare through data-driven herd and crop management.[375] Engagement of the wider industry to deliver mutually beneficial objectives, such as the EU funded Smart Agri-Hubs project, as well as the Smart Farming initiative developed by the Environmental Protection Agency in conjunction with the Irish Farmers' Association, could enable farmers to save on inputs costs, e.g. fertiliser and energy costs, while also protecting the environment.

Obj4.O13: Increase the area under tillage production

Currently, the area under tillage production in Ireland amounts to approximately 300,000 hectares. Despite there being competition from other sector, it is important that tillage production is given an opportunity to expand because the tillage sector is one of Ireland's most carbon efficient sectors. Action 10 of Ag Climatise[376] is concerned with increasing the area under tillage production while enhancing the environmental credentials of the sector. This is to be achieved by:

- Encouraging the use of winter grown cereals in order to increase nitrogen use efficiency at farm level;
- Encouraging the development of buffer strips in order to minimise soil erosion and sediment loss and therefore the loss of soil organic matter; and potentially improve soil carbon levels and increase biodiversity;

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[374] Teagasc: Outlook 2021, Economic Prospects for Agriculture https://www.teagasc.ie/media/website/publications/2020/Outlook-2021.pdf
[375] https://assets.gov.ie/10206/d042e174c1654c6ca14f39242fb07d22.pdf
[376] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/

- Encouraging the use of leguminous crops as break crops in order to reduce the need for fertilisers;
- Encouraging the adoption of minimum tillage on farms in order to protect soil carbon pools.

Obj4.O14: Advance crop breeding and plant genetics

Advances in crop breeding and plant genetics offer the potential for new production methods and inherent disease resistance. With the reduction in the use of Plant Protection Products (PPP's) stemming from Directive 2009/128/EC (establishing a framework for Community action to achieve the sustainable use of pesticides), the emphasis on plant breeding has never been more important. However, legislative barriers preventing the use of New Breeding Technologies (NBT's) have significantly slowed down the development and introduction of disease resistant varieties and this will inevitably lead to yield and quality losses in the intervening period as only traditional breeding methods that are much slower to get to market can be employed.[377] The Virtual Irish Centre for Crop Improvement (VICCI), funded by the DAFM Research Stimulus Fund, was established as a research body focused on crop breeding and plant genetics. VICCI researchers are currently testing approaches based on novel breeding techniques to develop low grain-N cereals that provide high energy grain suited to pig and chicken feed, that have low nitrogen fertiliser requirements combined with reduced emissions of nitrate, ammonia and nitrous oxide.[378]

Obj4.O15: Reduce energy consumption on farms through energy efficiency and deployment of renewables, including through uptake of capital investments

According to Teagasc, the deployment of plate coolers, variable speed drives, solar photovoltaics and heat recovery systems on farms are all measures which could either reduce energy consumption on farm; or in the case of solar PV, generate energy. Altogether, Teagasc estimates a 29.5 ktCO2-e reduction between 2021 and 2030 assuming linear uptake of measures by 2030. [379] The focus of Action 18 of Ag Climatise is to reduce agricultural energy use by 20% across all farms by 2030; and to deploy at least 20% renewable energy technologies focusing primarily on energy intensive

[377] https://www.independent.ie/business/farming/agri-business/agri-food/irish-farmers-miss-out-on-gene-editing-potential-37519987.html
[378] http://vicci.ie/research/nutrient-use-efficiency/
[379] *An Analysis of Abatement Potential of Greenhouse Gas Emissions in Irish Agriculture 2021-2030* https://www.teagasc.ie/publications/2018/an-analysis-of-abatement-potential-of-greenhouse-gas-emissions-in-irish-agriculture-2021-2030.php

farming systems. In order to achieve this action, the Department of Agriculture, Food and the Marine plans to maximise the uptake of energy efficiency and renewable energy deployment on farms by reviewing the terms and conditions of programmes that support sustainable energy; increasing awareness the benefits associated with greater energy efficiency on farm and the deployment of renewable energies at farm level; and lastly, collaborating with the Department of Environment, Climate and Communications to ensure that microgeneration opportunities are available to the agri-food sector and rural communities.[380]

Obj4.O16: Continue the development of a sustainable circular bio-economy within the agri-food sector

According to Ag Climatise[381], developing the bio-economy is essential if we are to reduce our dependence on non-renewable sources of energy and tackle climate change. Action 12 of the Ag Climatise roadmap is concerned with promoting the development of a sustainable circular bio-economy that ensures resource efficiency and circularity. This is to be achieved by addressing a number of key issues including food loss and organic waste, pasture valorisation; by-product valorisation, recycling of nutrients and water; and recycling of plastic.

Obj4.O17: Use renewable biological resources to create value added bio-based products

Forests provide a source of renewable raw materials for fuel, wood products and higher value bio-based products such as carbon fibres, ultimately replacing the need for materials and energy produced from fossil fuels, and therefore reducing GHG emissions. The use of wood fuels is increasing due to renewable energy policies and as a result of young plantations entering the production stage. In 2018, 40% of roundwood harvested was used for energy generation, mainly within the forest products sector. The usage of forest-based biomass in the energy sector abated 88,000

[380] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/
[381] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/

million tonnes of CO2 emissions in 2018.[382] Innovation is now identifying potential use of lignin for bio-based materials in the renewable energy, automotive and aviation sectors.

Agricultural wastes, residues and by-products can also be transformed into bio-based products, supporting bio-energy, protein and bio-based chemical and material production.[383] Bio-refineries and anaerobic digestion (AD) plants can utilise a wide variety of feedstocks ranging from food wastes, to animal slurries to specifically grown energy crops such as grass silage. Ireland has a large availability of feedstock and agricultural residues for bio-based product and bio-energy production and has significant potential to expand between now and 2035.[384] The production of biogas and bio-methane from agricultural wastes has the potential to deliver substantial carbon savings; and overall AD could reduce the dependence on energy imports and improve energy security.[385] Ag Climatise recognises the potential opportunities arising from AD for the agricultural sector and the need to engage with stakeholders in order to maximise these potential opportunities. This includes working with stakeholders to set a target level of energy to be supplied by bio-methane injections (all the while considering the necessary supports that must be implemented to achieve that target); and working with stakeholders to develop the necessary policy framework, governance structures and business models to allow for the development of the Anaerobic Digestion industry in Ireland.[386]

The Support Scheme for Renewable Heat is a government funded initiative designed to increase the energy generated from renewable sources in the heat sector. The scheme is open to commercial, industrial, agricultural, district heating, public sector and other nondomestic heat users; and establishes a route to market for bio-based materials that was not previously there.[387] However, this may be dependent on sufficient indigenous biomass availability.

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[382] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/forestry/forestservicegeneralinformation/ForestStatisticsIreland211218.pdf

[383] https://www.teagasc.ie/media/website/publications/2017/WP1-Deliverable---Final-Jan-2017.pdf

[384] SEAI, Bio-energy Supply in Ireland 2015 – 20135: An Update of Potential Resource Quantities and Costs https://www.seai.ie/resources/publications/Bio-energy-Supply-in-Ireland-2015-2035.pdf

[385] SEAI, Assessment of Cost and Benefits of Biogas and Biomethane in Ireland https://www.seai.ie/resources/publications/Assessment-of-Cost-and-Benefits-of-Biogas-and-Biomethane-in-Ireland.pdf

[386] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/

[387] https://www.seai.ie/business-and-public-sector/business-grants-and-supports/support-scheme-renewable-heat/

Obj4.O18: Utilise the Network of Agricultural Colleges to educate the next generation of farmers in environmentally efficient farming methods

The network of agricultural colleges across the country provides a wide array of specialised and general agricultural education and practical training. This education and training provides the next generation of farmers with opportunities to understand the principals of best management practices, new innovations, precision farming, and practical farm skills, before embarking on their own agricultural/ farming career. These colleges also provide an alternative pathway into third level education for students wishing to pursue a higher academic qualification relative to their future career pathway. During consultation, stakeholders asked for courses offered to include options for diversification of farm enterprises, including the addition of organics as a core subject. Core subjects should also equip students with the knowledge necessary to deal with new climate change challenges and opportunities; and to increase their understanding of climate mitigation and climate adaptation.

Obj4.O19: Plant multi species swards (including legumes)

Research on productive grassland areas, demonstrates that using multispecies swards (e.g. SmartGrass, SmartSward) have multiple environmental benefits for climate, biodiversity and animal health, as the inclusion of different plant species, such as clover, and diverse grass species within swards has the potential to enhance livestock health, improve sward drought resistance, and reduce nitrogen leaching and the requirement for nitrogen fertiliser application.[388] Sward species diversification can have a significant effect on the quantity of chemical fertilisers used, thus reducing emissions and increasing the level of biodiversity within the sward. The benefits also include improved dry matter yields. According to Teagasc, there are multiple benefits to planting multi-species swards. Firstly, multi-species swards maintain a steady growth rate at reduced fertiliser application. During the Summer season it is possible to cut mineral fertiliser application by more than half, so long as the sward contains a well managed clover content of between 20-50%.[389] The inclusion of legumes (i.e. white or red clover) in seed mixes can increase herbage yields while also reducing input of inorganic nitrogen as a result of the fixation of atmospheric nitrogen by these plants.[390] Additionally, certain species (plantain and chicory) have further been found to reduce nitrogen losses

[388] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

[389] https://www.teagasc.ie/publications/2020/grassland-re-seeding-how-to-establish-multi-species-swards.php

[390] https://www.teagasc.ie/media/website/publications/2018/6456_Multi-species_grassland_swards_POKiely_AGRIP.pdf

on farm through reduced leaching, better N use by animals, and a decrease in emissions from urine patches.[391] The Climate Action Plan highlights the benefits of reducing fertiliser usage on emissions.

Obj4.O20: Improve fertiliser blending

Increasing the availability at local level of blended compound fertilisers, blended based on an individual farmer's soil results, could reduce the under or over supply of nutrients such as Potassium and Phosphorous to crops.

Obj4.O21: Encourage straw incorporation by tillage farmers in order to increase the carbon sequestration potential of the Irish tillage sector

According to Teagasc, the incorporation of straw in tillage soils allows for organic matter to be directly inputted back into soils, therefore increasing its Soil Organic Carbon (SOC) content. Teagasc found that for every 4 tonnes of straw incorporated over a period of 15-20 years, there was a corresponding 7-17% increase in SOC in the top 15cm of that soil (depending on whether reduced tillage was also applied). They further found that re-incoprorating straw in 25% of the tillage area in Ireland would offset 0.109 Mt CO2-e yr-1 at a cost of €101 t -1 CO2-e abated. Although straw incorporation allows for an offset in CO2 emissions, it is worth noting that this measure is expensive due to the high price of straw (circa €35 t -1) and low N replacement value (circa 20 kg Nha-1).[392]

Obj4.O22: Increase productivity and resilience of the national forest estate

Warmer temperatures could lead to changes in the spatial and temporal dynamics of pest species and lead to increased periods of summer droughts which will ultimately affect the establishment of forests where roots are not fully developed. However, increased temperatures are also expected to increase the length of the growing season,

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[391] https://www.teagasc.ie/publications/2020/grassland-re-seeding-how-to-establish-multi-species-swards.php

[392] Teagasc (2019) 'An Analysis of Abatement Potential of Greenhouse Gas Emissions in Irish Agriculture 2021-2030'
https://www.teagasc.ie/media/website/publications/2018/An-Analysis-of-Abatement-Potential-of-Greenhouse-Gas-Emissions-in-Irish-Agriculture-2021-2030.pdf

resulting in increased tree growth.[393] To improve adaptation to climate change and to deliver cumulative additional sequestration potential, as outlined in the Climate Action Plan, Ireland will continue to implement tree breeding programmes for key species that take note of the challenges and opportunities arising from warmer temperatures. Adaptation actions, including choosing tree species and forestry practices less vulnerable to storms will increase productivity and the resilience of the national forest estate, while also increasing species diversity. Both, the Climate Action Plan[394] and the Agriculture, Forest and Seafood Climate Change Sectoral Adaptation Plan[395] recognise the importance of increasing the range and diversity of trees species to improve resilience to climate change.

Obj4.O23: Introduce a database for farm carbon measurement / trading

The Climate Action Plan states its intention to improve the accuracy of carbon accounting and existing yield models in order to optimise carbon sequestration benefits; and investigate the effect of different forest management scenarios on carbon within the context of carbon accounting.[396] During townhall meetings and public consultation meeting, stakeholders also requested the introduction of an effective carbon accounting database to underpin a payment system for 'carbon farming'.

Obj4.O24: Improve hedgerow management and increase the number of hedgerows on farm

The third National Forest Inventory report (2017) estimates that national hedgerow and non-forest other wooded land covers around 347,690 ha, or 4.9%. Since the emergence of agri-environmental schemes in 1994, 6,605 kilometres of new hedgerows and more than 3.7 million trees have been established on non-forest land.[397] According to the EPA (2014), hedgerow and non-forest woodlands could potentially sequester 0.66–3.3t CO2/ha/year; and based on national estimates for

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[393] National Adaptation Framework (2018) https://www.dccae.gov.ie/documents/National%20Adaptation%20Framework.pdf

[394] https://assets.gov.ie/10206/d042e174c1654c6ca14f39242fb07d22.pdf

[395] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/ruralenvironment/climatechange/bio-energy/climatechangesectoraladaptationplan/1AgricultureForestandSeafoodClimateChangeSectoralAdaptationPlanEnglishVersion311019.pdf

[396] https://assets.gov.ie/10206/d042e174c1654c6ca14f39242fb07d22.pdf

[397] https://www.gov.ie/en/collection/15b56-forest-statistics-and-mapping/#annual-forest-sector-statistics

hedgerow and non-forest woodland and scrub cover, this could result in a net removal of 0.27-1.4 Mt CO2/year.[398] However, currently there is very limited long term monitoring data as to the conditions/extent of these features and methodological issues still exist with regards their mapping; and therefore additional work will be required in order to accurately quantify change over time in hedgerows.[399] There is potential to use LiDAR (an active remote sensing technology) to measure vegetation height across wide areas, which could allow for accurate mapping of these features. [400] Action 16 of Ag Climatise is concerned with protecting, enhancing and increasing the number of hedgerows on farm. The Department of Agriculture, Food and the Marine aims to achieve this by increasing awareness of Good Agricultural and Environmental Conditions (GAEC); collaborating with local authorities to assist in the completion of county-based hedgerow surveys; and examining whether it is possible to plant trees in conjunction with hedgerows in order to improve landscape and shelters, in particular for farms which have no or very little trees planted.[401] During stakeholder consultation, some stakeholders raised concerns regarding the current EIA regulations on thresholds for the removal of hedgerows.

Obj4.O25: Enhance adaptation to climate change through nature-based solutions

Nature-based climate adaptation activities seek to prepare ecosystems for climate change so that they can continue to provide humans with the services they require to survive; as well as to buffer the negative impacts of climate change. Typical measures of this approach identified in other EU Member States include for example: the renaturation of rivers and other water bodies, the relocation of dikes to recreate natural floodplains to react to increased flood risks, the use of drought-resistant varieties in agriculture, and the rewetting of peatlands.[402] Existing natural and semi-natural habitats including grasslands, heathlands, peatlands, hedgerows and scrub are examples of existing features on farmland that are important in enhancing adaptation

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[398] https://www.epa.ie/pubs/reports/research/climate/ccrp-32-for-webFINAL.pdf
[399] http://www.epa.ie/pubs/reports/air/airemissions/ghg/nir2020/
[400] Denmark's 2019 National Inventory Report https://dce2.au.dk/mwg-internal/de5fs23hu73ds/progress?id=725kKPXnvflxz_7hxZj-8KQZUJaZ-GAbO3QIA7fcb1E,
[401] Ag Climatise (2020) https://www.gov.ie/en/publication/07fbe-ag-climatise-a-roadmap-towards-climate-neutrality/
[402] Naumann, Sandra; Timo Kaphengst; Keighley McFarland and Jutta Stadler 2014: Nature-based approaches for climate change mitigation and adaptation. The challenges of climate change - partnering with nature. German Federal Agency for Nature Conservation (BfN), Ecologic Institute, Bonn

to climate change. The existing features (and associated species) are also beneficial for biodiversity, food production, resilience, water and much more.[403]

[403] Biodiversity Climate Change Sectoral Adaptation Plan (2019) https://www.npws.ie/sites/default/files/publications/pdf/Biodiversity-Climate-Change-Sectoral-Adaptation-Plan.pdf

Threats

Obj4.T1: Continued increase in agriculture emissions

According to the EPA's (2020) Greenhouse Gas Emissions Projections 2019-2040[404], there will be an increase of 2.5% in total GHG emissions arising from agriculture up to 2030 under the "With Existing Measures" scenario. This is mainly due to an increase in dairy cow numbers of 15% relative to 2018. As dairy production systems operate at a high stocking rate, this higher stocking rate results in greater use of nitrogen fertiliser per hectare, therefore increasing the total aggregate nitrogen fertiliser use by the Irish agricultural sector. Under "Scenario 3," which predicts stronger growth in agricultural activity levels than those under the "With Existing Measures" scenario, both dairy and beef cow herds are predicted to increase; with dairy herd numbers reaching 1.738 million representing a 22% increase relative to 2018. Total GHG emissions from "Scenario 3" result in 8.5 Mt CO2 eq more emissions over the 2021-2030 period compared to that of "With Existing Measures."

Obj4.T2: Livestock production and emissions of GHG's remain strongly coupled

Ruminant livestock (e.g., cattle, sheep) are major sources of methane emissions, with moderate amounts produced from non-ruminant livestock (e.g., pigs, horses) through a process of enteric fermentation. Another source of methane emissions (and nitrous oxide emissions) is manure coming from livestock.[405] In 2018, enteric fermentation accounted for 58% and manure management accounted for 10% of agricultural non-CO2 GHG emissions.[406] As livestock production increases, the amount of manure produced increases too and this leads to increased GHG emissions. A decrease in livestock production would decrease the amount of methane produced from enteric fermentation and decrease the amount of methane and nitrous oxide emitted from livestock manure. Agriculture emissions are projected to increase by 0.5%-1.5%, or 0.1 MtCO2 eq-0.3Mt Co2 eq by 2020, relative to 2017 levels, largely as a result of increased milk production.[407] It should be noted that much of Ireland's climate and

[404] https://www.epa.ie/pubs/reports/air/airemissions/ghgprojections2019-2040/2020-EPA-Greenhouse-Gas-Emissions-Projections_final.pdf
[405] http://www.epa.ie/pubs/reports/air/airemissions/ghg/nir2020/
[406] https://ec.europa.eu/info/publications/staff-working-document-com-2020-846-recommendations-member-states-regards-their-strategic-plan-cap_en
[407] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

landscape, particularly in the western half of the country, is not suited to forms of food production other than those involving livestock.[408]

Obj4.T3: Continuing failure to meet Ammonia emissions targets

Agriculture accounts for 99% of ammonia emissions in Ireland. This is mainly a result of grasslands receiving the majority of animal manures produced annually (40 million tonnes (Mt)); as well as nitrogen fertilisers (369,000 tonnes in 2017). A proportion of the nitrogen in these inputs is volatilised into the air as ammonia. It is estimated that around 15% of the nitrogen present in animal manures is lost to the atmosphere as NH3; and 2% of the nitrogen contained in chemical fertilisers is lost too. Ireland's national emission ceiling for ammonia (NH3) under the NEC Directive was 116 kilotonnes for the years 2010 to 2019. NH3 emissions increased in 2017 by 2.4 kt, primarily as a result of a 3.1% increase in dairy cattle numbers and an 8.8% increase from synthetic fertiliser use. As a consequence, Ireland exceeded its emission ceilings for ammonia (NH3) for 2016 and 2017, and the emissions trend is increasing, with EPA projecting a figure of 121.743 kt for 2020; and 128,112 kt for 2030. At the same time, Ireland's ammonia targets under the NEC Directive are tightening for 2020 (112.077 kt) and 2030 (107.549 kt). EPA projections indicate a distance to target of 20.56 kt under the With Additional Measures scenario. [409] Persistent breach of NEC Directive carries the prospect of enforcement proceedings from the Commission.

Obj4.T4: Inappropriate land-use/soil management

Land use in Ireland is a net source of emissions, primarily due to the ongoing drainage of organic soils for different uses, including peat extraction, grazing and to a lesser extent forestry. The longer rewetting is delayed, the greater is the potential risk to long-term viability of the peatland to re-establish a carbon sink function.[410] However, the impact of rewetting forest and grassland organic soils is highly variable and requires site-specific assessment, which may limit the appropriateness of any potential

[408] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/ruralenvironment/climatechange/bio-energy/ClimateandAirRoadmapfortheAgriculturalSector141119.pdf

[409] http://epa.ie/pubs/reports/air/airemissions/irelandsairpollutantemissions2017/Irelands%20Air%20Pollutant%20Emissions%202017.pdf

[410] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

rewetting.[411] Furthermore, in Ireland, knowledge of rewetted and restored peatlands is limited to site and discipline-specific studies, which suggests an ongoing need to increase our understanding of its potential.[412]

Obj4.T5: Lack of awareness among farmers in relation to climate change could reduce the adoption of climate appropriate practices

A survey designed to assess/understand farmers' awareness of, and attitudes to, climate change was undertaken by 746 Irish farmers in 2014. This survey identified a general uncertainty amongst farmers towards a number of questions related to agricultural GHG emissions. The survey further found that farmers were insufficiently aware of the impact of their activities on climate change; with a quarter of farmers believing that climate change was a long-term issue, that would not affect them in the short-term - an attitude that could potentially lead to a reluctance amongst these farmers to adopt management practices that reduce GHG emissions.[413]

Obj4.T6: Slowdown in generational renewal could affect uptake of climate appropriate practices

In Ireland, only 5% of farmers are under 35 years of age whereas 30% of farmers are 65 years and over.[414] A report undertaken by Macra na Feirme in 2014 found that only 52% of farmers had a farming successor identified.[415] Research conducted in 2014 suggests that there is a lack of awareness and understanding of climate change among farmers.[416] There is a lack of new education, skills, training amongst older farmers. Young farmers are well-educated and informed on issues of environmental and agricultural sustainability and are technologically-inclined and innovation-ready.[417] According to 'European Young Farmers: Building a Sustainable Sector report,

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[411] Renou-Wilson, F. and Wilson, D. (2018), Vulnerability assessment of peatlands: exploration of impacts and adaptation options in relation to climate change and extreme events (VAPOR). Report No. 250. Environmental Protection Agency.

[412] Renou-Wilson, F. et al. (2018) Network Monitoring Rewetted and Restored Peatlands/Organic Soils for Climate and Biodiversity Benefits (NEROS) Report No. 236. Environmental Protection Agency

[413] Tzemi, D. and Breen, J. (2018), Climate change and the agricultural sector in Ireland: examining farmer awareness and willingness to adopt new advisory mitigation tools. Climate Policy

[414] https://www.cso.ie/en/releasesandpublications/ep/p-fss/farmstructuresurvey2016/

[415] Bogue, P. (2014) Land Mobility and Succession in Ireland. Macra na Feirme https://www.ifa.ie/wp-content/uploads/2014/01/Land-Mobility-and-Succession-in-Ireland-Report.pdf

[416] Tzemi, D. and Breen, J. (2018), Climate change and the agricultural sector in Ireland: examining farmer awareness and willingness to adopt new advisory mitigation tools. *Climate Policy*.

[417] http://www.ceja.eu/wp-content/uploads/2015/09/Annex-3-Soils.pdf

undertaken by the European Council of Young Farmers (CEJA), 89.78% of young farmers feel responsible for ensuring a sustainable agricultural sector and are concerned with preserving the natural environment.[418] Young farmers are also particularly conscious of environmental protection, biodiversity conservation and climate change mitigation, as well as being better informed on how to take these issues into account in everyday land management.[419] Therefore, a slowdown in generational renewal could affect the uptake of climate appropriate practices.

Obj4.T7: Increased frequency and intensity of some extreme climatic events

The National Adaptation Framework recognises the effects that climate change will have on agriculture in Ireland, noting that the main impacts will result in changes in soil/air temperatures, changes in rainfall patterns, and an increase in extreme events. These changes could lead result in water stress for crops, heat stress for animals and plant diseases occurring more frequently.[420] As global temperatures rise, climatic change will have negative effects on the production of certain crops in Ireland. Cereal production will be affected substantially in all regions of the country, e.g. yields for winter wheat decreasing up to -11 % in the South East region.[421] Furthermore, according to a report published by the Intergovernmental Panel on Climate Change, the frequency and intensity of extreme weather and climate events have increased because of global warming and these are predicted to continue increasing under medium and high emission scenarios.[422] Ireland has experienced several extreme weather events in recent years, such as droughts and floods and is expected to continue to experience extreme weather events.[423] The most recent climate projection report identifies changes to our climate such as increases in temperature, heatwaves, heavy precipitation, droughts and decreases in frost and ice days will have direct and substantial effects on agriculture in Ireland by the middle of the century.[424]

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[418] http://int.masseyferguson.com/ceja-column-40.aspx
[419] http://www.ceja.eu/wp-content/uploads/2015/09/Annex-3-Soils.pdf
[420] Department of Communications, Climate Action and the Environment, National Adaptation Framework - Planning for a Climate Resilient Ireland, January 2018, p.29
[421] https://www.teagasc.ie/media/website/publications/2010/the_impact_of_climate_change_on_irish_farming_5623.pdf
[422] https://www.ipcc.ch/site/assets/uploads/2019/08/2c.-Chapter-2_FINAL.pdf
[423] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf [and] Desmond, M. et al. (2018), *State of Knowledge on Climate Change Impacts for Ireland* [online] http://www.epa.ie/pubs/reports/research/climate/EPA%20RR%20223_web.pdf
[424] https://www.epa.ie/pubs/reports/research/climate/researchreport339/Research_Report_339_Part1.pdf

Obj4.T8: Increased disease and pest pressures

As a result of Ireland's temperate climate, crop production in Ireland faces the consistent challenge of managing high incidences of disease. In order to control diseases, chemical pesticides are used, but the use of these products is decreasing due to the ability of plant diseases to adapt to the toxic effects of these chemicals, and as a result of tighter EU rules.[425] There is a chance that changes in temperatures and growing seasons, and the reduced use of chemical pesticides, could affect the proliferation and the spreading of some species, such as insects, invasive weeds, or diseases, all of which could potentially effect yields.[426] Rainfall can influence the transport and dissemination of infectious agents, while temperature affects their growth and survival, and therefore, changes in infectious disease transmission patterns are a likely major consequence of climate change.[427] A rise in temperature may induce heat stress in animals that can lower productivity by decreasing appetite and increase susceptibility to parasitic diseases.[428]

The incidence of disease may also increase in forest crops. Climate change can dramatically modify tree physiology and tree defense mechanisms, while also shifting the current boundaries of insects and pathogens. Climate change is already being accredited for the spread of pathogens such as *Chalara fraxinea* ash dieback disease and *Phytophthora* species across Europe. Similarly invasive exotic alien species are finding favourable ecological conditions in areas that at one time would not have been suitable; and this trend is likely to continue into the future.[429] Ash die back, for example, has had a negative impact on forest cover figures, with 384 forestry plantations infected in Ireland in 2017, distributed over 24 counties.[430] Any disease that negatively impacts forest cover also impacts the national forest estates carbon sequestration potential as infected trees must be removed. The danger of over reliance on single species such as sitka spruce was also highlighted by stakeholders in this context.

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[425] Submission by Science Foundation Ireland https://data.oireachtas.ie/ie/oireachtas/committee/dail/32/joint_committee_on_agriculture_food_and_the_marine/reports/2018/2018-07-12_climate-change-and-sustainability-in-the-agriculture-and-food-sectors_en.pdf

[426] https://www.eea.europa.eu/signals/signals-2015/articles/agriculture-and-climate-change

[427] https://www.who.int/globalchange/climate/en/chapter6.pdf

[428] https://www.who.int/globalchange/climate/en/chapter6.pdf

[429] https://www.forestryfocus.ie/growing-forests-3/threats-to-forests/climate-change/

[430] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/forestservice/treediseases/ashdiebackchalara/

Obj4.T9: Risk of "carbon leakage" if production in Ireland declines

As demand for beef/dairy increases, any contraction in food production in Ireland in order to meet national GHG reduction targets, may simply displace that production elsewhere. Research investigating the impact of removing the Irish suckler herd found that while it would result in a reduction in emissions in Ireland, this deficit in supply would be filled by countries with a higher beef carbon footprint, resulting in higher total global agriculture emissions. This "carbon leakage" would result in a global net increase in GHG emission if the region to which production is displaced has a higher 'emissions intensity.'[431]

Obj4.T10: Difficulty in ensuring security of supply for biomass feedstocks

Wood biomass is one of the most commonly acknowledged sources of biomass fuel for bio-energy heating applications. COFORD reports that depending on the market response to a renewable heat incentive, current supplies of wood biomass may be insufficient to meet demand. Additionally, the supply of energy from agricultural residues may also be impacted by farm fragmentation, the low energy density of most feedstocks and any reduction in livestock production.[432] Issues also emerge around the production of grass for anaerobic digestion. If high fertiliser inputs are used, this could generate significant emissions[433]; and therefore farmers producing grass for Anaerobic Digestion (AD) should meet the sustainability criteria as outlined by the Sustainable Energy Authority of Ireland (SEAI).[434] Furthermore, the price of grass could undermine the financial sustainability of an AD project.[435]

Obj4.T11: Capital investment costs for Anaerobic Digestors could be prohibitive to uptake

Anaerobic Digestors (AD) are capital intensive and access to private funding is uncertain, especially in immature markets that are not able to demonstrate an operational or investment history. The inability to access capital poses a significant

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[431] https://www.teagasc.ie/media/website/publications/2018/An-Analysis-of-Abatement-Potential-of-Greenhouse-Gas-Emissions-in-Irish-Agriculture-2021-2030.pdf

[432] REBIOGEN; Community Sustainability Energy Centres: A model for Ireland (October 2017) https://www.seai.ie/resources/publications/RDD_RebioGen.pdf

[433] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

[434] SEAI (2019), Sustainability criteria options and impacts for Irish bio-energy resources. Sustainable Energy Authority of Ireland [online] https://www.seai.ie/resources/publications/ Sustainability-Criteria-Options-and-Impacts-for-Irish-Bio-energy-Resources.pdf

[435] https://www.seai.ie/publications/Assessment-of-Cost-and-Benefits-of-Biogas-and-Biomethane-in-Ireland.pdf

barrier to development of community-based projects[436]. Level of feed-in-tariffs is crucial for financial viability as wholesale price of natural gas is very competitive. Public acceptance of the land use change and large AD facilities may be a problem.

[436] https://www.seai.ie/publications/RDD_RebioGen.pdf

Objective 5: foster sustainable development and efficient management of natural resources such as water, soil and air;

Strengths

Obj5.S1: High mean organic carbon under all land cover types

According to the latest data available for 2015, Ireland has the highest mean organic carbon of arable land per kg in the EU, with a mean value per kg ranging from 14.9 in Spain to 82.4g per kg in Ireland. On all land cover types, Ireland has a high level of mean organic carbon at 127g per kg, compared to 47g per kg across the EU.[437] Soil organic carbon, the major component of soil organic matter, is extremely important in all soil processes. Soil organic matter is generally seen to contain 58% organic carbon, and in most cases, it is effectively measured as organic carbon.[438] According to research undertaken by Teagasc, the concentration of soil organic matter (SOM) or soil organic carbon (SOC) is an important determinant of soil function. It appears that increased levels of SOM improve crop nutrition, soil structure, water retention, ease of cultivation and seedbed preparation. Soil organic matter has also been linked to improved soil aeration, aiding in the resistance of a soil to compaction.[439] Therefore a decline in SOM conditions has been highlighted in many legislative reports and scientific literature as contributing to a decline in soil quality/health.[440]

Obj5.S2: High % farms with extensive stocking rate

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[437] Common Context Indicator C.41 'Soil organic matter in arable land' https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[438] Ballabio, C. (2014) A map of the topsoil organic carbon content of Europe generated by a generalized additive model https://onlinelibrary.wiley.com/doi/full/10.1111/ejss.12193

[439] Teagasc (2010) Soil Organic Carbon: A review of 'critical' levels and practices to increase levels in tillage land in Ireland https://www.teagasc.ie/media/website/publications/2010/SoilOrganicCarbon.pdf

[440] Van-Camp. L., Bujarrabal, B., Gentile, A.R., Jones, R.J.A., Montanarella, L., Olazabal, C. & Selvaradjou, S.K. (2004). Reports of the Technical Working Groups Established under the Thematic Strategy for Soil Protection. EUR 21319 EN/4, 872 pp. Office for Official Publications of the European Communities, Luxembourg

Over 60% of farms have an extensive stocking rate under 85kg livestock manure nitrogen per ha. [441] Extensive farming requires the use of few inputs relative to the land area being farmed compared to intensive farming, where large amounts of input are used relative to the land area being farmed.[442] As a result, extensive farming requires less fertiliser use which reduces the negative effects caused by excessive fertiliser use on soil, air and water.

Obj5.S3: Legislative framework and strong policy framework in place

The EU Water Framework Directive (WFD) is a framework designed to protect all waters including rivers, lakes, estuaries, coastal waters and groundwater; and their dependent wildlife/habitats. The WFD was transposed into Irish law by means of a series of binding Statutory Instruments.[443]

Additionally, there are numerous European Union (EU) Directives concerned with air quality that set standards for a wide variety of pollutants.[444] Ireland is a Party to the Convention on Long Range Transboundary Air Pollution (CLRTAP)[445] under which certain transboundary air pollutants, including ammonia, are limited and controlled. As part of the EU Clean air package, the National Emissions Ceilings Directive was transposed into national legislation in 2018 as S.I. No. 232 of 2018 European Union (National Emission Ceiling) Regulations 2018.[446]

Furthermore, sustainability is a core theme of Food Wise 2025, which requires the sector to not only commit to meeting its various obligations set out in the relevant environmental legislation, but also the sector aims to achieve higher standards to underscore its sustainability credentials.[447]

Obj5.S4: Strong engagement of industry and advisors to improve water quality

The Agricultural Sustainability Support and Advisory Programme (ASSAP) is an important targeted measure under the River Basin Management Plan 2018-2021

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[441] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/ruralenvironment/environment/nitrates/2019/PublicConsultation2019NitratesDerogationReview290319.pdf
[442] http://www.ecifm.rdg.ac.uk/intensive&extensive.htm
[443] https://www.epa.ie/water/watmg/wfd/
[444] https://www.epa.ie/air/quality/standards/
[445] http://www.unece.org/fileadmin//DAM/env/lrtap/welcome.html
[446] http://www.irishstatutebook.ie/eli/2018/si/232/made/en/print
[447] https://www.gov.ie/en/publication/a6b0d-food-wise-2025/

(RBMP)[448]. This is an innovative Government/ industry initiative and is a well-structured collaborative initiative involving all stakeholders to facilitate improvements in water quality. It involves a resource of thirty Agricultural Sustainability Advisors, twenty of whom are funded by Government and ten are funded by the Dairy Industry. These advisors will promote on-farm best practice to farmers in 190 'Areas for Action', that have been prioritised through a collaborative and consultative process in the RBMP. Farmers can avail of this service within the 'Areas for Action' on a voluntary basis.[449] The advisory services provided include: improved nutrient management with more targeted use of slurry and fertiliser; new approaches to land management to reduce nutrient losses in critical source areas; and better farmyard management and practice.[450]

Obj5.S5: Ireland typically has ample supply of water

The water exploitation index (WEI), or withdrawal ratio, is defined as the mean annual total abstraction of fresh water divided by the long-term average freshwater resources. The WEI describes how water abstraction puts pressure on water resources and freshwater biodiversity. The Water Exploitation Index+ in Ireland has provided values ranging between 2% and 2.5% for the last 20 years, compared to an EU average of about 12%.[451] As a result, Ireland is not a significant irrigator (0% of total UAA irrigated[452]) and has ample supply of water.

Obj5.S6: High % of land under agri-environment-climate commitments

Ireland has 4.5 million hectares of Utilised Agricultural Area (UAA), of which 1.5 million hectares is managed under agri-environment-climate commitments (AECMs), which represents 33% of Ireland's UAA compared to a 13% average at EU-27 level.[453]

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[448] https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_report_english_web_version_final_0.pdf

[449] https://www.teagasc.ie/media/website/publications/2019/Agricultural-Sustainability-Support-and-Advisory-Programme-(ASSAP).pdf

[450] https://www.teagasc.ie/media/website/environment/assap/Generic-ASSAP-Flyer.pdf

[451] European Environment Agency (EEA). *Use of Freshwater Resources in Europe*. https://www.eea.europa.eu/data-and-maps/indicators/use-of-freshwater-resources-3/assessment-4

[452] Common Context Indicator C.20 'Irrigated Land' https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[453] https://agridata.ec.europa.eu/extensions/DashboardIndicators/Environment.html?select=EU27_FLAG,1

Historically participation in voluntary agri- environment climate measures has been significant since the opening of the REPS1 Scheme in 1994. Peak participant rates in REPS reached 59,200. Over 50,000 farmers participated in the most recent measure, GLAS.

Obj5.S7: Low % of sealed soils (built environment)

Ireland had 1.03% of sealed soils in 2015 – the 16th lowest amount out of all 39 countries recorded.[454] Soil sealing, the covering of the ground by an impermeable material, is one of the main causes of soil degradation in the EU. Soil sealing is usually detrimental for the ecological functions. Exchanges of energy, water and gases are restricted or hampered and there is increasing pressure exerted on adjacent, non-sealed areas. There can be many negative effects including loss of plant production and natural habitats; and an increased risk of flooding.[455] Soil sealing often affects fertile agricultural land, puts biodiversity at risk, increases the risk of flooding and water scarcity and contributes to global warming.[456]

Obj5.S8: Significant national cover of hedgerows and individual trees.

The third National Forest Inventory (2017) estimates national hedgerow and non-forest woodland at 347,690 hectares, or 4.9% cover.[457] In addition, the Teagasc Irish Hedge Map (2011), which includes areas of non-forest woodland and scrub, estimates national cover of hedgerows, individual trees and non-forest woodland and scrub at approximately 450,000 hectares or 6.4% cover.[458] Hedgerows are multi-functional; their root systems regulate water movement, help prevent flooding and help maintain good water quality.[459]

Obj5.S9: Peatlands cover over 20% of Ireland's area

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[454] https://www.eea.europa.eu/data-and-maps/daviz/percentage-sealing-by-country-1/download.table

[455] Scalenghe, R. Marsan, FA (2009) "The anthropogenic sealing of soils in urban areas," Landscape and Urban Planning, Volume 90

[456] https://www.sciencedirect.com/science/article/pii/S0169204608001710

[457] https://www.gov.ie/en/collection/15b56-forest-statistics-and-mapping/#annual-forest-sector-statisticsf

[458] https://www.teagasc.ie/media/website/publications/2010/The-Irish-hedge-map-version1_5690.pdf

[459] https://www.teagasc.ie/environment/biodiversity--countryside/farmland-habitats/value-of-hedgerows/

Peat soils cover 20.6% of Irelands land area, with the greater part of this in the form of blanket bog in upland areas.[460] Peatlands provide a range of ecosystem services and are considered amongst the most important ecosystems of the world, because of their key value for biodiversity, regulation of climate, water filtration and supply. Peatlands maintain water quality. Mosses, which are the main vegetation component of a healthy peatland help to filter contaminants and release "clean" water. If peatlands are damaged, the amount and speed of unfiltered water leaving the bog may increase. Peatlands can also regulate flows into water courses and can mitigate flooding and drought.[461] However, it is worth noting that peatlands are damaged through practices such as drainage and peat extraction and the conservation status of many of these habitats is unfavourable.[462]

Obj5.S10: Limited soil erosion by water

In 2016, the estimated rate of soil loss by water erosion in Ireland was 1 tonne per hectare per year. This compared to the European-27 average of 2.5 tonnes per hectare per year. According to Eurostat, only 16.8 ha of total agricultural area in Ireland was affected by moderate to severe water erosion (i.e. greater than 11 tonnes per hectare per year), which amounted to only 0.4% of total agricultural area. Only nine other countries across the EU-27 experienced less soil erosion by water. In relation to total arable and permanent crop area, only 0.7% was affected by moderate to severe water erosion; and in relation to permanent meadows and pastures, only 0.5% were affected.[463]

Weaknesses

Obj5.W1: Increase in livestock numbers

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[460] https://www.npws.ie/sites/default/files/publications/pdf/NationalPeatlandsStrategy2015EnglishVers.pdf

[461] https://www.npws.ie/sites/default/files/publications/pdf/NationalPeatlandsStrategy2015EnglishVers.pdf

[462] https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf

[463] Common Context Indicator C.42 'Soil erosion by water' https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

In 2016, Ireland had the 7th highest number of livestock units (LSU) in holdings across the EU-27.[464] At national level, livestock density (1.3) is considerably higher than the EU average (0.8), including grazing livestock density (1.2 compared to 1).[465] The national cattle herd in June 2019 stood at approximately 7.2 million, an increase of 0.24 million since 2015. The growth has been predominantly driven by growth in dairy cow numbers. In 2019, total dairy cow numbers stood at 1.5 million, an increase of 0.2 million since 2015.[466] However, there have also been increases in sheep (+22%) and pig (+7.3%) numbers. Livestock production is associated with environmental damage, in particular the degradation of land, water and biodiversity. Additionally, increases in livestock numbers will result in increases in ammonia emissions from manure and fertiliser use which impacts negatively on air, water and soil quality. One of the main causes of high nitrate levels in surface water in OECD countries is excessive use of nitrogen fertilizer on dairy farms. Furthermore, large manure runoff and leaching from large-scale dairy operations may also contaminate soil and water.[467]

Obj5.W2: Increase in chemical fertiliser sales

Over the last decade fertiliser use has been subject to considerable fluctuation due to both changes in fertiliser prices and variability in agronomic conditions. In line with increasing livestock numbers in recent years, chemical fertiliser sales increased by over 10% year-on-year in 2018, which followed a similar increase in 2017. Nitrogen sales in 2018 were up 10% with Phosphorous and Potassium sales both up by more than 11%. Sales of stabilised urea also increased but were only 1% of the straight nitrogen sold.[468] According to the EPA, fertiliser nitrogen use is projected to increase by 6% between 2020 and 2030. Excess fertiliser use can negatively impact air and downstream water quality. Excess nitrogen can cause eutrophication and acidification effects on semi-natural ecosystems, which in turn can lead to species composition changes and other deleterious effects.[469]

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[464] Common Context Indicator C.21 'Livestock units' https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[465] Agri-environmental indicator - livestock patterns - Statistics Explained (europa.eu)

[466] https://statbank.cso.ie/px/pxeirestat/Database/eirestat/Livestock/Livestock_statbank.asp?SP=Livestock&Planguage=0

[467] http://www.fao.org/3/i0680e/i0680e04.pdf

[468] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/ruralenvironment/environment/nitrates/2019/PublicConsultation2019NitratesDerogationReview290319.pdf

[469] Bobbink et al (2010) Global Assessment of Nitrogen Deposition Effects on Terrestrial Plant Diversity: a synthesis. http://nora.nerc.ac.uk/id/eprint/5887/1/BobbinkN005887PP.pdf

Obj5.W3: Agricultural activity and forestry negatively impacting on water quality

In 2016, Ireland had a high share of surface water bodies failing good ecological status (30%). Although only 1% of surface water bodies were noted as having bad chemical status; over 90% of surface water bodies are not yet classified. More than half (54%) of Ireland's coastal and transitional waters were in less than good ecological status. For groundwater, 9% failed in 2016 good chemical status and 2 water bodies failed to meet the quantitative status objective.[470] Some 52.8% of Ireland's river water bodies are at high or good quality ecological status, compared to 55.4% at satisfactory status for the last assessment period of 2010 – 2015, which represents a decrease of 2.6%. The remaining 47% of river water bodies are at moderate, poor, or bad ecological status.[471]

Agriculture is a significant source of nutrients (phosphorus and nitrogen) that continue to cause eutrophication of waters. According to the EPA, nitrogen emissions to water have increased since 2013 as a result of an increase in both cattle numbers and fertiliser use. The main problem to arise from farming is a loss of excess nutrients and sediment to water which originate either from point sources, such as farmyards; or from diffuse sources, such as spreading of fertilisers and manures.[472] Pollution by nitrates and phosphates is assessed through two main indicators, namely the Gross Nutrient Balance and nitrates in freshwater. Between 2014 and 2015, Ireland had a potential surplus of nitrogen on agricultural land of 41 kg-N/ha in its water; and a potential surplus of phosphorous on agricultural land of 4.5 kg-P/ha. Although Ireland's nitrogen surplus is below the EU-27 average of 46.5kg N/ha for the period 2014-2015, nitrogen is still having negative effects on Irish water and has been on an upward trend since 2011. In the case of phosphorous, Ireland is well above the EU average of 0.5 kg P/ha for that same period also, indicating phosphorous is having negative effects on Irish waters also.[473] Nitrogen emissions to water are a particular concern in the south and south-east of the country. Phosphorus concentrations are a concern in various parts of the country including parts of the north west, north east, east coast, south east and south of the Shannon Estuary.[474]

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[470] https://www.eea.europa.eu/data-and-maps/data/wise-wfd-4

[471] EPA "Water Quality in Ireland, 2013-2018" https://www.epa.ie/pubs/reports/water/waterqua/Water%20Quality%20in%20Ireland%202013-2018%20(web).pdf

[472] EPA: Water Quality in Ireland 2013-2018 [https://www.epa.ie/pubs/reports/water/waterqua/Water%20Quality%20in%20Ireland%202013-2018%20(web).pdf]

[473] Common Context Indicator C.40- Water quality (https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf)

[474] http://www.epa.ie/pubs/reports/water/waterqua/Water%20Quality%20in%20Ireland%202013-2018%20(web).pdf

The River Basin Management Plan (RBMP) identifies 1,460 individual water bodies as being at risk of not achieving their water quality objectives under the WFD; and identifies agriculture as the most significant activity impacting these *"at risk"* water bodies in Ireland.[475] According to the EPA's water quality indicators report, river biological quality fell by 3% (72 water bodies) between 2013–2015. Furthermore, there was a decline in high-quality sites; and the number of river sites with phosphorus concentrations needed to support high-quality rivers dropped from 58% in 2014–2016 to just over 48% in 2015–2017. There was also an increase in the percentage of sites with higher phosphorus concentrations that are likely to lead to water quality issues.[476]

Forestry is also a significant pressure in 16% water bodies identified as at risk[477]. The pressure is largely associated with sediment from clear felling, drainage, planting and establishment. The significant pressure is predominantly located in catchment headwaters and is often coincident with catchment boundaries.[478]

Obj5.W4: Increasing area under Nitrates derogation

The area in Ireland farmed under derogation, i.e. farms with stocking rates above 170 kg livestock manure nitrogen/ha up to 250 nitrogen/ha, increased by 34% from 2014 to 2018.[479] Derogation farms have to be more efficient to ensure optimum use of inputs in order to reduce their risk of nutrient losses to water, air and ecosystems. Recent EPA reports have highlighted a decrease in water quality across Ireland[480]; and an increase in both greenhouse gas emissions and ammonia emissions.[481] This corresponds with the increase in fertiliser sales of over 10% in 2018.[482] EPA reports previously referred to have indicated that Agriculture is placing increasing pressure on

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[475] https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_report_english_web_version_final_0.pdf

[476] https://www.epa.ie/pubs/reports/water/waterqua/Water%20Quality%20in%202017%20-%20an%20indicators%20report.pdf

[477] http://www.epa.ie/pubs/reports/water/waterqua/Water%20Quality%20in%20Ireland%202013-2018%20(web).pdf pg. 20

[478] https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_report_english_web_version_final_0.pdf

[479] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/ruralenvironment/environment/nitrates/2019/PublicConsultation2019NitratesDerogationReview290319.pdf

[480] http://www.epa.ie/pubs/reports/water/waterqua/Water%20Quality%20in%202017%20-%20an%20indicators%20report.pdf

[481] http://www.epa.ie/pubs/reports/air/airemissions/ghg/nir2020/

[482] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/ruralenvironment/environment/nitrates/2019/PublicConsultation2019NitratesDerogationReview290319.pdf

water quality and that the increase in intensive farming just increases pressure on natural resources.

Obj5.W5: Sub-optimal soil fertility

88% of Irish grasslands have sub-optimal soil fertility. Almost 50% of soil samples taken by Teagasc from grassland farms have a sub-optimal pH level of less than 6.3; and only 15% of soil samples taken by Teagasc from dairy farms had optimal soil fertility levels.[483] As a result of low soil fertility levels, farmers tend to use high levels of fertilizer in order to increase soil nutrient levels. Inorganic fertilisation practices which impair soil structure can limit the cycling of some crop nutrients, and accelerate the loss of others; and chemical impacts of inorganic fertilisation tend to enhance nutrient losses from the soil.[484] Although soil fertility management techniques are well established, low adoption rates suggest that behavioural barriers on the part of farmers and the fertiliser industry would also need to be addressed.[485] The application of lime as a soil conditioner and specifically to neutralise soil acidity and raise pH to an agronomic optimum level confers many benefits in terms of soil nutrient availability and fertiliser efficiency and grass crop productivity. However, only 21% of farmers used lime in 2015.[486] Since the mid 1980's lime use has only exceeded 1 million tonnes on four occasions, well below the levels required to address soil fertility thereby reducing nutrient use efficiency. However, sales of lime have increased over 5-year period from 2013 to 2018.[487]

Obj5.W6: Ongoing drainage of organic soils (grasslands and wetlands)

Soil Organic Matter (SOM) is a major contributor to soil fertility. Firstly, it binds nutrients to the soil, storing them and making them available to plants. Secondly, it is home to many soil organisms, from bacteria to worms and insects, and allows them to

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[483]David Wall/ Plunkett, M. (2018), Grassland P and K advice. Teagasc Johnstown Castle https://www.teagasc.ie/media/website/publications/2018/Teagasc-Soil-Fertility-Conference-2018.pdf

[484] C. Arden-Clarke & R. D. Hodges (1988) The Environmental Effects of Conventional and Organic/Biological Farming systems. II. Soil Ecology, Soil Fertility and Nutrient Cycles, Biological Agriculture & Horticulture, 5:3,(https://www.tandfonline.com/doi/abs/10.1080/01448765.1988.9755147)

[485]http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

[486]https://www.teagasc.ie/media/website/crops/soil-and-soil-fertility/Wall-Dillon-et-al-Fert-Use-Survey_FAI-Kildalton-2017.pdf

[487] https://www.teagasc.ie/crops/soil--soil-fertility/soil-ph--liming/

transform plant residues, and hold on to nutrients that can be taken up by plants and crops. It also maintains soil structure, thereby improving water infiltration, decreasing evaporation, increasing water-holding capacity and avoiding soil compaction. In addition, soil organic matter accelerates the breakdown of pollutants and can bind them to its particles, so reducing the risk of run-off.[488] Both grasslands[489] and wetlands[490] contain high contents of soil organic matter; and therefore, soil hydrology (drainage), which reduces soil organic matter,[491] should be avoided. Wetland areas are defined as areas commercially exploited for public and private extraction of peat and areas used for domestic harvesting of peat. Over 80% of peatlands are considered degraded due to drainage of the peatlands to facilitate peat extraction, agricultural activities and afforestation[492]. It should be noted that current afforestation is predominately on non-organic soils and active and designated peat lands are no longer planted. In 2017, approximately 56,000 hectares of peatlands was estimated to be subject to active drainage and peat extraction.[493]

Obj5.W7: Ongoing degradation of peatlands

Over 80% of peatlands in Ireland are considered degraded due to the ongoing drainage of peatlands to facilitate anthropogenic activities including peat extraction, agricultural activities and afforestation[494]. In 2017, approximately 56,000 hectares of peatlands was estimated to be subject to active drainage and peat extraction[495]. As previously mentioned, peatlands play an important role in maintaining water quality. Mosses, which are the main vegetation component of a healthy peatland help to filter

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[488] European Environmental Agency (2010) Soil- the forgotten resource (https://www.eea.europa.eu/signals/signals-2010/soil)

[489] Conant, R., Paustian, K., & Elliott, E. (2001). Grassland Management and Conversion into Grassland: Effects on Soil Carbon. *Ecological Applications, 11*(2), 343-355. doi:10.2307/3060893

[490] https://www.npws.ie/sites/default/files/publications/pdf/NationalPeatlandsStrategy2015EnglishVers.pd

[491] 'Organic matter decline' Sustainable agriculture and soil conservation- Soil degradation processes EN Fact sheet no.3 (https://esdac.jrc.ec.europa.eu/projects/SOCO/FactSheets/ENFactSheet-03.pdf)

[492] Renou-Wilson, F. and Wilson, D. (2018), Vulnerability assessment of peatlands: exploration of impacts and adaptation options in relation to climate change and extreme events (VAPOR). Report No. 250. Environmental Protection Agency.

[493] https://www.epa.ie/pubs/reports/air/airemissions/ghg/nir2019/Ireland%20NIR%202019_Final.pdf

[494] Renou-Wilson, F. and Wilson, D. (2018), Vulnerability assessment of peatlands: exploration of impacts and adaptation options in relation to climate change and extreme events (VAPOR). Report No. 250. Environmental Protection Agency.

[495] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

contaminants and release "clean" water. Damage to peatlands, especially where channels have been created from cutting, drainage and loss of vegetation can increase the amount and speed of unfiltered water leaving the bog. Peatlands can also be important in regulating flows into water courses and can mitigate flooding and drought. When peatlands are damaged or inappropriately managed, these services can be degraded or lost entirely, resulting in additional costs arising from flooding of properties and land, damage to rivers and lakes, losses of fish spawning and nursery grounds, increased cost of water treatment and increased emissions of carbon dioxide to the atmosphere.[496]

Obj5.W8: Low level of sustainably managed forest cover

Ireland has the third lowest level of forest cover (forest and other wooded land) across the EU-27 at 11.5%, or 801,200 ha, compared to the EU-27 average of 42.4%.[497] Forests are important for maintaining good water quality. Forests have the ability to minimize soil erosion as they stabilize the soil; and this stabilization further reduces sedimentation run-off, which can negatively affect water quality. Additionally, woodlands have the ability to protect water bodies and watercourses by trapping sediments and pollutants from other up-slope land use and activities. Furthermore, forests maintain and can improve soil infiltration and soil's water storage capacity; and can influence the amount of water available through soil infiltration, as well as by intercepting precipitation, evaporating moisture from vegetative surfaces, transpiring soil moisture and capturing fog water. [498]

Obj5.W9: Ammonia emissions in breach of targets set

Agriculture is the major source of ammonia emissions in Ireland, altogether emitting 106,900 tonnes of ammonia in 2015, representing 99% of overall ammonia emissions in Ireland; the highest amount in Europe, with 93.6% being the EU-28 average.[499] Ireland exceeded its emission ceilings for ammonia (NH3) for 2016 and 2017, and the

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[496] https://www.npws.ie/sites/default/files/publications/pdf/NationalPeatlandsStrategy2015EnglishVers.pdf

[497] Common Context Indicator C.29 'Forest and other wooded land (FOWL)' https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[498] https://www.forestryfocus.ie/social-environmental-aspects/forests-and-water/

[499] Common Context Indicator C.44 'Energy use in agriculture, forestry and food industry' https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-indicators-doc-c44_2017_en.pdf

emissions trend is increasing, with EPA projecting a figure of 121.743 kt for 2020.[500] At the same time, Ireland's ammonia targets under the NEC Directive are tightening for 2020 (112.077 kt) and 2030 (107 kt). The European Commission has found Ireland to be at high-risk of non-compliance with the emission reduction commitment for ammonia.[501] EPA projections indicate a distance to target of 20.56 kt under the *With Additional Measures* scenario. Ammonia is also one of the five main pollutants contributing to poor air quality. Poor air quality has been identified as leading to approximately 400,000 premature deaths across the EU annually, and 1,300 premature deaths in Ireland annually.[502]

Obj5.W10: Lack of appropriate mechanisms and indicators to monitor impacts of agri-environment schemes

There is currently a lack of appropriate mechanisms and indicators which can be used to adequately monitor the impact of the implementation of the suite of agri-environment measures available under the current RDP. This poses a challenge in terms of setting policy and highlighting the benefits or otherwise of the different schemes. During consultation, some stakeholders also highlighted the importance of using scientific evidence when designing interventions, to ensure the most appropriate interventions are selected. However, it should be noted that Ireland has good knowledge and experience of delivery of results-based agri-environmental schemes, which do collect comprehensive baseline and monitoring data.

[500] https://www.epa.ie/pubs/reports/air/airemissions/irelandsairpollutantemissions2017/Irelands%20Air%20Pollutant%20Emissions%202017.pdf

[501] European Commission (2019). Communication from the Commissions to the European Parliament, the Council, the European Economic and Social Committee of the Regions – Environmental Implementation Review 2019: A Europe that protects its citizens and enhances their quality of life. COM (2019) 149 final.

[502] https://www.epa.ie/media/Chapter2_Air.pdf

Opportunities

Obj5.O1: Improve water quality and implement catchment-based approach

The second cycle River Basin Management Plan 2018-2021 (RBMP), established under the WFD identifies key threats to water quality on a catchment basis and is developing evidence-based measures for their mitigation. A catchment approach has been adopted to ensure consideration of both water and flooding issues within land use planning and a total of 726 waterbodies have been identified within 190 Priority Areas for Action. Water quality can be improved by addressing pressures from rural diffuse and point sources. Primary agricultural production is a key source of rural diffuse and point-source pollution of waters in certain areas. Excess nutrients, chemicals (including those used in pesticides) and sediment loss due to poor land management have all been identified as likely pressures in certain water bodies.[503]

The new measures included in the 4th NAP (Nitrates Action Programme), which came into operation in 2017, aim to strengthen the protection of waters and prevent pollution of surface waters and ground water coming from agricultural sources.[504] The new measures — which include fencing off cattle to protect watercourses, distancing of drinking points from watercourses and prohibiting direct discharges to watercourses from farm roadways — also focus on intercepting and breaking nutrient-transport pathways and preventing sediment and nutrient losses to waters. Additional requirements placing limits on the application of fertiliser on high-organic-content soils are also aimed at affording additional protection to sensitive areas, particularly Natura 2000 sites.[505] Data from the current Agriculture Catchments Programme (ACP)[506] and the EPA can also assist in providing guidance to improve water quality. The Agricultural Catchments Programme is an intensive monitoring programme of farming impacts on water quality. The ACP is in place since 2008 and is used to evaluate the impact of Irelands Nitrates Action Programme (NAP) and the Nitrates Derogation which are implemented under the Nitrates Directive. The ACP works in partnership with 300 farmers across six catchments. Lessons learned from the ACP along with localised scientific guidance from the EPA could be used to inform future programmes in this area.

Compliance with these measures and collaboration with ASSAP will allow for improvements in water quality. There may also be lessons learned from pilot results-

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[503] https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_report_english_web_version_final_0.pdf

[504] https://www.housing.gov.ie/water/water-quality/nitrates/nitrates-directive

[505] https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_report_english_web_version_final_0.pdf

[506] https://www.teagasc.ie/environment/water-quality/agricultural-catchments/

based schemes such as the EIP AGRI – Freshwater Pearl Mussel Project which is carried out at catchment level and involves local farmers, researchers, and advisors all working together to develop a programme that ensures the long term coexistence of farming and freshwater pearl mussel in eight priority catchment areas in the west of Ireland.[507]

Obj5.O2: Build on strong engagement of industry and advisors to improve water quality

The ASSAP is an important targeted measure in the second River Basin Management Plan published in April 2018.[508] This is an innovative Government/ industry initiative running from 2018 to 2021 and is a well-structured collaborative initiative involving all stakeholders to facilitate improvements in water quality. It involves a resource of thirty Agricultural Sustainability Advisors, twenty of whom are funded by Government and ten by the Dairy Industry. These Advisors will promote on-farm best practice to farmers in 190 'Areas for Action', which have been identified by the EPA where the status of the water is at risk of regressing. Farmers can avail of this service within the 'Areas for Action' on a voluntary basis.[509] Lessons learned from other initiatives such as the IFA / EPA Smart farming initiative[510] and Macra na Feirme LEAN programme[511] could also be included. There may also be the potential to highlight the role that group water schemes can play in the protection of sources and water conservation.[512]

Obj5.O3: Improve land management including grassland management and soil fertility

The foundation of any successful farming system is the abundance of good productive soils which are key for growing sufficient high-quality grass to feed herds and grow crops. A review of soils undertaken by Teagasc indicates that the majority of grassland soils in Ireland are below the optimum levels for pH (pH 6.3), P and K and therefore, would be extremely responsive to the application of lime.[513] Increasing soil pH through methods such as liming can increase nitrogen use efficiency. The application of lime

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[507] https://pearlmusselproject.ie/
[508] https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_report_english_web_version_final_0.pdf
[509] https://www.teagasc.ie/environment/water-quality/farming-for-water-quality-assap/assap-in-detail/
[510] https://smartfarming.ie/
[511] https://www.macra.ie/webfiles/downloads-1555434143-macra-agricultural-skillnet-training-2019-pdf.
[512] https://nfgws.ie/wp-content/uploads/2019/03/NFGWS-6page-brochure-web.pdf
[513] https://www.teagasc.ie/crops/grassland/grass10/soil-fertility/

has an influence on the availability of stored nutrients in the soil. The target is to have the soil at the optimum pH in order to optimise soil fertility.[514]

The extension of clover in pasture swards can also increase soil pH.[515] The Climate Action Plan includes rewetting 40,000 ha of organic grassland soils and better management of 450,000 ha of grassland as potential metrics to deliver abatement in agriculture. Soil sampling, including biological analysis, will have a role to play and lessons learned from EIP-AGRI schemes such as the Danú project could be considered. The Danú project focuses on biological farming and is a holistic approach to soil, crop and pasture management that accounts for the agronomic, environmental, nutritional, physical, chemical and biological components of what constitutes a healthy soil. The purpose of biological farming is to combine best practices of conventional and organic farming while also attaining productive soils that display high levels of biological activity.[516]

Obj5.O4: Encourage straw incorporation by tillage farmers in order to increase soil quality

According to Tegasc, straw incorporation increases Soil Organic Carbon (SOC). This is because organic matter is directly inputted back into the soil. Soil Organic Carbon provides an energy source for soil microbes and biota and is therefore good for soil fertility.[517] The impact on microbial biomass can be large, and in turn influences soil nutrient cycling as well as the formation of stable aggregates. Additionally, Straw incorporation returns valuable nutrients back into the soil, particularly P and K, which reduces the need to apply organic or inorganic fertilisers to soils. Moreover, straw contains potash (K2O), phosphate (P2O5) and magnesium oxide (MgO) and the incorporation of straw therefore increases the quantity of these nutrients in soil, further reducing the requirement for inorganic fertilisers.[518]

Obj5.O5: Increase numbers in sustainable farming systems such as organic farming

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[514] https://www.teagasc.ie/publications/2019/soil-fertility-is-the-key-for-increased-profits.php

[515] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

[516] https://63273-649646-raikfcquaxqncofqfm.stackpathdns.com/wp-content/uploads/2019/10/EIP-AGRI-Irelands-Operational-Groups-Booklet-NRN-Website-Version-October-2019.pdf

[517] teagasc.ie/media/website/publications/2017/8_Improving-soil-organic-carbon.pdf

[518] Nicholson. F et al., 'Research Review No.81 - Straw Incorporation Review' (2014) https://projectblue.blob.core.windows.net/media/Default/Research%20Papers/Cereals%20and%20Oilseed/rr81-web.pdf

Organic production as defined under Council Regulation (EC) No. 834/2007 is "an overall system of farm management and food production that combines best environmental practices, a high level of biodiversity, the preservation of natural resources, the application of high animal welfare standards and a production method in line with the preference of certain consumers for products produced using natural substances and processes".[519] While the Organic Sector in Ireland is a small component of the agri-food sector, it is experiencing considerable growth at present.[520] The area of land under organic production has expanded significantly, with latest figures indicating that there is now c.74,000 hectares under organic production in Ireland, which corresponds to around 2% of total agricultural area.[521] The total area under organic farming in the EU-28 in 2018 was 13.4 million hectares, which is an average of 7.5% of agricultural area.[522]

Obj5.O6: More efficient use of fertilisers thereby reducing nitrogen and ammonia emissions

The availability of new fertiliser application technology for the precise application of fertilisers such as VRT (Variable Rate Technology), sensors, drone technology and weight cells, offers opportunity to reduce fertiliser and nitrogen application.[523] New fertiliser formulations such as Plant Biostimulants offer improved nutrient use efficiency also. According to the proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL laying down rules on the making available on the market of CE marked fertilising products; and amending Regulations (EC) No 1069/2009 and (EC) No 1107/2009 COM/2016/0157 final - 2016/084 (COD)[524], there is the potential to replace up to 30% high carbon mineral fertilisers with recycled nutrients, in the form or organo-mineral fertilisers, digestates, and recycled nutrients. Calcium Ammonium Nitrate (CAN) is the predominant nitrogen fertiliser used in Ireland. Its substitution with protected urea has been shown to reduce nitrous oxide emissions by 70%.[525] The Climate Change Action Plan includes the replacement of

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[519] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32007R0834&from=EN

[520] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/farmingsectors/organicfarming/organicsscheme/ReviewofOrganicFoodSector290119.pdf

[521] DAFM figures

[522] https://ec.europa.eu/eurostat/statistics-explained/index.php/Organic_farming_statistics

[523] https://www.europarl.europa.eu/RegData/etudes/note/join/2014/529049/IPOL-AGRI_NT%282014%29529049_EN.pdf

[524] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52016PC0157&from=EN

[525] Harty, M.A., Forrestal, P.J. Watson, C.J. McGeogh, K.L. Carolan R., Elliott, C., Krol, D., Laughlin, R.J., Richards, K.G. and Lanigan, G.J. (2016), Reducing nitrous oxide emissions by changing N fertiliser use from calcium ammonium nitrate (CAN) to urea based formulations. *Science of the Total Environment*, 563–564, 576–586.

50% of CAN fertilisers with protected urea products and aims to increase nitrogen-use efficiency through increasing soil pH as a potential measure for reducing nitrogen and ammonia emissions. [526] Agriculture is the major source of ammonia emissions in Ireland and reducing emissions should be a priority, in order to ensure better air and water quality.

Obj5.O7: Improve on-farm slurry storage and management

Splash-plate spreading is the most common animal slurry spreading system used in Ireland.[527] Splash-plate spreading is associated with high emissions to air and run-off affecting water quality.[528] The type of technology used and conditions at time of spreading greatly influence emissions and the fertiliser replacement value of the slurry.[529] The Climate Action Plan includes changing 50% of slurry spreading technology and timing to low-emission trailing-shoe slurry spreading as a potential metric to deliver abatement in agriculture, which would also have beneficial impacts for water quality. Some positive steps have been taken and the revised terms and condition of the current Nitrates Derogation for 2020 now requires derogation farmers to use low emission slurry spreading (LESS) equipment for all slurry spread after April 15th, 2020.[530]

Obj5.O8: Better management of peatlands

Peatlands are characterised by the large accumulation of organic matter.[531] Soil organic carbon is a component of soil organic matter and is an important determinant of soil function. Peatlands further provide a range of ecosystem services, particularly the maintenance of water quality. The better management of peatlands is therefore important in order to maintain soil functionality and high water quality. Land management activities, which provide soil cover for all or most of the time, and

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[526] https://assets.gov.ie/10206/d042e174c1654c6ca14f39242fb07d22.pdf
[527] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf
[528] https://t-stor.teagasc.ie/bitstream/handle/11019/1241/EOPR%204783.pdf?sequence=3&isAllowed=y
[529] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf
[530] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/ruralenvironment/environment/nitrates/2019/derogationforms/NitratesExpertGroupDerogationReviewReportMLU240719.pdf
[531] https://www.npws.ie/sites/default/files/publications/pdf/NationalPeatlandsStrategy2015EnglishVers.pdf

maintain moisture levels on peat-rich soils, are important to protect existing carbon stores in the soil from oxidation (loss as CO2).[532] Research into rewetting of carbon rich soils on farms by the Department of Agriculture, Food and the Marine is planned for 2020 and beyond. It intends to focus on reduced management of farmed peatland which is designed to increase carbon sequestration and contribute to meeting our commitments as part the Government Climate Action Plan. It will also enhance the protection of biodiversity and water quality.[533]

Obj5.O9: Make further efficiency gains through the roll-out of agri-digitalisation, smart farming and precision farming technology

Agri-digitalisation and smart/precision farming techniques can generate higher-yields per animal and hectare through data-driven herd and crop management.[534] Engagement of the wider industry to deliver mutual beneficial objectives, such as the EU funded Smart Agri-Hubs project[535] and the Smart Farming initiative[536] developed by the Environmental Protection Agency and the Irish Farmers' Association, could enables farmers to save on inputs costs, e.g. fertiliser and energy costs, while also delivering for the environment. Research undertaken on productive grassland areas using multispecies swards (SmartGrass, SmartSward) can also have multiple environmental benefits for the climate and biodiversity. Key to this research is the identification of more sustainable animal production systems that will reduce reliance on fertiliser N inputs, while maintaining / increasing productivity.[537]

Obj5.O10: Foster a greater understanding of climate change and environmental issues at farm level through education

The provision of education, particularly in relation to the understanding of environmental sensitivities and their interactions with farming, has been shown to result in positive outcomes for the environment and for farmers. There is potential

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[532] http://www.europarl.europa.eu/RegData/etudes/STUD/2017/585914/IPOL_STU(2017)585914_EN.pdf

[533] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/press/pressreleases/2020/august/title,147198,en.html

[534] https://assets.gov.ie/10206/d042e174c1654c6ca14f39242fb07d22.pdf

[535] https://www.smartagrihubs.eu/

[536] https://smartfarming.ie/

[537] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/research/fundedprojects/agriculture/grasscloverforagecropsfoodhorticulture/smartswardfutureproofingirishlivestocksustainability/

under the next CAP to expand training schemes and foster a culture of peer-to-peer learning with a climate change and environmental sustainability focus (including biodiversity) within the farming community. There is now significant research and innovation investment available, and there has been an emergence of new knowledge, new technologies and new decision support tools such as Agro-Ecology, Agri-Digitalisation, One Health and Multi-Species grasslands, all of which can assist farmers in meeting their environmental obligations/ambitions in the next CAP. During consultation, stakeholders highlighted an opportunity to provide adequate coverage of climate and environmental issues through available courses and also through training for advisory services. Measures relating to knowledge transfer and the improvement of advisory services are included in the Climate Action Plan, Adaptation Plan (Agri-food sector) and AgClimatise.

Obj5.O11: Increase afforestation and agroforestry

Forests can remove harmful pollution from the environment. In addition, well-sited, designed and managed woodlands and forests benefit water quality and aquatic ecosystems significantly, by delivering a range of 'ecosystem services' such as the prevention of sediment and nutrient runoff, the protection of banks from erosion, 'food drop' of insects and leaf litter into the aquatic ecosystem, the shading and cooling of water, the overall restoration of riparian habitats, and helping floodwater control. Ireland's approach of using forests to improve water quality is set out in the Ireland's River Basin Management Plan-2018-2021[538] and the Woodland for Water: Creating new native woodlands to protect and enhance Ireland's waters[539]. This plan notes that afforestation and agro-forestry could positively impact the quality of Irelands natural resources. Agroforestry may improve nutrient retention, soil stability and drainage properties, which would improve resilience to extreme rainfall events.[540] It can further mitigate water runoff and soil erosion, ultimately reducing potential losses of silt, organic matter and nutrients that may otherwise enter watercourses.[541] Combining tree planting with other farming activities to actively create buffer zones could help

[538] DAFM, Forests & Water Achieving Objectives under Ireland's River Basin Management Plan-2018-2021 https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/forestry/grantandpremiumschemes/2018/ForestsWaterFINAL26June18LoRes280618.pdf

[539] https://www.teagasc.ie/media/website/crops/forestry/grants/Woodland-for-Water-April18.pdf

[540] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

[541] DAFM, Forests & Water Achieving Objectives under Ireland's River Basin Management Plan-2018-2021 https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/forestry/grantandpremiumschemes/2018/ForestsWaterFINAL26June18LoRes280618.pdf

protect water quality and aquatic ecosystems from possible overland flow of sediment and nutrient runoff; as well as other potential impacts.[542] Furthermore, planting small woodlands or shelterbelts around farmyards may limit the dispersal of ammonia arising from animal housing units. Trees can be used to reduce wind speed, recapture ammonia; and increase the dispersion of ammonia above the tree canopy, thereby decreasing the level of deposition affecting sensitive habitats.[543] [544]

Obj5.O12: Encourage a whole of farm approach to link economic and environmental sustainability

There is potential to encourage farmers to adopt agri-environmental climate measures that complement each other for the enhancement of the whole farm. A farmer could, for example, integrate actions to achieve the following:

- the farmer's business goals, needs and circumstances;
- bespoke nutrient management planning for the farm;
- farm-specific targets and actions for biodiversity, air, climate and water;
- land management planning (including critical source areas, ditches as mitigation measures, smarter buffer design, agro-forestry, shelterbelts).

Having one integrated whole farm plan provides an opportunity to select farm-specific actions that achieve multiple benefits where possible, thus reducing the number of actions needed. It would also encourage a tailoring of actions to suit the biophysical conditions on the farm in the context of the socio-economic aspects and business goals of the enterprise. The possibility for using the whole farm plan as a tool for certification or accreditation could also be further explored. However, it is worth noting that a whole farm approach may have high potential but is also faced with very substantial practical challenges in terms of roll-out and budgetary considerations.

[542] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/forestry/grantandpremiumschemes/2018/WoodlandWaterLoRes06June18270618.pdf
[543] https://www.forestresearch.gov.uk/news/trees-can-help-mitigate-farm-ammonia-emissions/
[544] https://www.farmtreestoair.ceh.ac.uk/sites/default/guidance/index.html

Threats

Obj5.T1: Further deterioration in water quality

The EPA's 'State of the Environment Report 2016' notes that Ireland is still a long way away from meeting the full legal requirements of the WFD, against which water quality is measured, particularly in relation to rivers. Overall, there has been no improvement in water quality over the first river basin planning cycle (2009-2015). Substantial effort is required to protect the few remaining high quality rivers and, where feasible, return impacted ones back to their earlier extremely high quality.[545] The latest EPA water quality report, "Water Quality in Ireland, 2013-2018" indicates that river quality, presented in terms of the proportion of channel length of a satisfactory rating has decreased by 2.7%. If continued deterioration is allowed to occur, this will have a large negative effect on the sustainable management of water.[546] There may be potential for further research into a land use policy particularly for high risk areas. Failure to meet the requirements of the WFD could result in infringement proceedings from the EU and resultant fines which could potentially impact on Ireland's Nitrates Derogation as well as reputational damage.

Obj5.T2: Continuing failure to meet Ammonia emissions targets

Ireland is failing at meeting its ammonia emission targets. This is mainly a result of agriculture (i.e.increases in cattle populations and N-fertiliser use) and due to the emergence of national polcies aimed at boosting the agricultural sector, such as Food Harvest 2020 and Food Wise 2025. The persistent breach of NEC Directive carries the prospect of enforcement proceedings by the Commission. Furthermore, the increase in ammonia emissions is detrimental to air quality and human health, and therefore is a threat to both the natural environment and society.[547]

Obj5.T3: Inappropriate management practices threaten the functionality, fertility and the carbon content of Irish soil

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[545] EPA "State of the Environment Report 2016" Chapter 5 https://www.epa.ie/media/Chapter5_Inland_MarineWaters.pdf

[546] EPA "Water Quality in Ireland, 2013-2018" https://www.epa.ie/pubs/reports/water/waterqua/Water%20Quality%20in%20Ireland%202013-2018%20(web).pdf

[547] https://www.epa.ie/media/Chapter2_Air.pdf

Land use in Ireland is a net source of emissions, primarily due to the ongoing drainage of organic soils for different uses, including peat extraction, grazing and to a lesser extent forestry. The longer rewetting is delayed, the greater is the potential risk to long-term viability of the peatland to re-establish a carbon sink function.[548] Management practices, such as repetitive tillage or burning of vegetation alter the living and nutrient conditions of soil organisms, resulting in the degradation of their microenvironments. This then results in a reduction of soil biota, both in biomass and diversity. If no soil biota exists to decompose soil organic matter and bind soil particles together, then the structure of the soil can become damaged by rain, wind and sun; and can lead to rainwater runoff and soil erosion.[549] Teagasc estimates that 88% of Irish grasslands have sub-optimal soil fertility.[550] This encourages farmers to increase their application of nitrogen fertilisers which threatens soil fertility even more.

Obj5.T4: Low profitability and low average farm size of beef and sheep sectors could reduce the adoption of environmentally friendly practices

The drystock sector, i.e. cattle and sheep farms, are typically characterised by lower profitability and smaller holdings. In 2018, the average income per hectare was lowest on Cattle Rearing farms, where the figure fell to €270, compared to €322 in 2017. This average income per hectare was just one quarter of that of their Dairy farm counterparts. Average income per hectare on Cattle Other farms were €391 in 2018, falling from €460 the previous year. The equivalent figure on Sheep farms was €276, down from €369 in 2017.[551] The cost of adopting environmentally friendly practices, such as Low Emission Slurry Spreaders (LESS); or investing in reductions of on-farm energy consumption through solar photovoltaic panels and heat recovery systems could be a burden or cost prohibitive for these enterprises.

Obj5.T5: Slowdown in generational renewal could affect uptake of climate appropriate practices

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[548] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

[549] Chapter 4 "Practices that influence the amount of organic matter" http://www.fao.org/3/a0100e/a0100e07.htm

[550] Wall, D. (2018), Spring Nutrient Advice for Grassland Farms. Teagasc Johnstown Castle [online] https://www.teagasc.ie/media/website/publications/2018/Teagasc-Soil-Fertility-Conference-2018.pdf

[551] https://www.teagasc.ie/media/website/publications/2019/NFS-2018_final_web.pdf

In Ireland, only 5% of farmers are under 35 years of age whereas 30% of farmers are 65 years and over.[552] A report undertaken by Macra na Feirme in 2014 found that only 52% of farmers had a farming successor identified.[553] According to *'European Young Farmers: Building a Sustainable Sector* report, undertaken by the European Council of Young Farmers (CEJA), 89.78% of young farmers feel responsible for ensuring a sustainable agricultural sector and are concerned with preserving the natural environment.[554] Young farmers are also particularly conscious of environmental protection, biodiversity conservation and climate change mitigation, as well as being better informed on how to take these issues into account in everyday land management.[555] Therefore, a slowdown in generational renewal could affect the uptake of environmentally conscious practices, such as the preservation of natural resources.

Obj5.T6: Changes in soil/air temperatures, rainfall patterns and an increase in extreme climatic events

Climate change will have a major effect on agricultural productivity, limiting Ireland's agri-food sectors ability to sustainably develop. The National Adaptation Framework recognises the effects that climate change will have on agriculture in Ireland, noting that the main impacts will result in changes in soil/air temperatures, changes in rainfall patterns, and an increase in extreme events. These changes could result in water stress for crops, heat stress for animals and plant diseases occurring more frequently.[556] Globally, 2018 was the fourth warmest year on record. In Ireland, official heatwave conditions were recorded at 15 stations at various times between 24th June and 4th July 2018. Drought conditions were recorded across the country from late June onwards.[557] Although temperatures fell back in July 2018, rainfall amounts remained well below average for the summer season and this meant that there was little or no alleviation in the drought conditions. These conditions were reflected by falling water levels in rivers and groundwater, with several rivers reaching their lowest levels on record. These conditions were compounded by the normal seasonal cycle, whereby the driest period usually occurs from August to the end of September, leading to a longer

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[552] https://www.cso.ie/en/releasesandpublications/ep/p-fss/farmstructuresurvey2016/

[553] Bogue, P. (2014) Land Mobility and Succession in Ireland. Macra na Feirme https://www.ifa.ie/wp-content/uploads/2014/01/Land-Mobility-and-Succession-in-Ireland-Report.pdf

[554] http://int.masseyferguson.com/ceja-column-40.aspx

[555] http://www.ceja.eu/wp-content/uploads/2015/09/Annex-3-Soils.pdf

[556] Department of Communications, Climate Action and the Environment, National Adaptation Framework - Planning for a Climate Resilient Ireland, January 2018, p.29

[557] Met Éireann (2018), *2018, A Summer of Heatwaves and Droughts* [online] https://www.met.ie/cms/assets/uploads/2018/09/summerfinal3.pdf

recovery time for normal moisture levels.[558] A reduced grazing season caused by extreme weather conditions and the resulting increased purchase of concentrates and in some cases bulky feeds also impacts negatively on emissions from agriculture. According to Pasturebase Ireland, there was a 30% reduction in grass growth in 2018 compared to the average daily grass growth rate for the years 2013–2017. A shortfall in supply compared to demand resulted in significant supplementation with conserved forages and concentrate feedstuffs – purchased concentrate costs increased by 42% at 1,364kg per cow, on average. Expenditure on purchased bulky feed also increased strongly (by 85%), to €5,966 on average.[559]

Objective 6: contribute to the protection of biodiversity, enhance ecosystem services and preserve habitats and landscapes;

Strengths

Obj6.S1: Ireland has a network of Natura 2000 sites corresponding to 13% of the area of Ireland

Both the EU Habitats Directive and the EU Birds Directive aim to ensure the protection of habitats and species which have been selected for conservation within the EU Natura 2000 network of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). According to the National Biodiversity Plan 2017-2020[560] there are 430 SACs and 154 SPAs in Ireland. This corresponds with 13.1% of the terrestrial area of the State, in comparison to an EU average of 19.8%[561]. This Natura 2000 network of sites (SACs and SPAs) is complemented by the designation of 148 sites of national

[558] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

[559] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

[560] https://www.npws.ie/sites/default/files/publications/pdf/National%20Biodiversity%20Action%20Plan%20English.pdf

[561] Common Context Indicator C.34 'Natura 2000 area' (https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf)

importance known as Natural Heritage Areas (NHAs) under the Wildlife (Amendment) Act 2000, of which 75 are raised bogs and 73 are blanket bogs.[562]

Obj6.S2: High percentage of extensive grazing

Extensive farming, which uses less fertiliser, pesticides and machinery relative to land area, is generally less harmful to biodiversity. In general, biodiversity decreases when the intensity of farming increases.[563] Over 60% of farms in Ireland have an extensive stocking rate of less than 85 kg livestock manure nitrogen per hectare. The western regions have the most extensive farming systems. The percentages of farms with stocking rates of under 85 kg livestock manure N/ ha is very high in counties Leitrim (92%), Sligo (83%) and Mayo (78%).[564] Some 31% of agricultural area is managed by farms with low input intensity per ha in Ireland, compared to an EU average of 27%.Almost 38% of agricultural area in the Northern and Western region is managed by farms with low input intensity.[565]

Obj6.S3: An estimated 1.5 million hectares has the potential to be managed as High Nature Value farmland

In 2015, Ireland had an estimated 1.5 million hectares of Utilised Agricultural Area that had the potential to be managed as High Nature Value farmland (HNV). This amounts to 20% of total UAA, in comparison with an EU average of 32.3%[566]. High Nature Value farming is a method of farming in which the farmland being managed has high biodiversity value, often supporting species of conservation concern. This type of farming is associated with low-intensity farming practises, the presence of semi-natural vegetation and/or landscape mosaics.[567] The existence of many species and habitats associated with HNV farmland is typically dependant on extensive farming practices.

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[562] https://www.npws.ie/protected-sites/nha
[563] EEA, High nature value farmland: Characteristics, trends and policy challenges, p. 5, 2004.
[564] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/ruralenvironment/environment/nitrates/2019/PublicConsultation2019NitratesDerogationReview290319.pdf
[565] Common Context Indicator C.33 'Farming intensity' (https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf
[566] Common Context Indicaot C.37 'HNV farming' https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-indicators-doc-c37_2015_en.pdf
[567] Matin, S. *et al* (2020) "Assessing the distribution and extent of High Nature Value farmland in the Republic of Ireland" https://www.sciencedirect.com/science/article/pii/S1470160X19306934#s0035

Obj6.S4: Significant national cover of hedgerows and individual trees

The third National Forest Inventory (2017) estimates national hedgerow and non-forest woodland at 347,690 hectares.[568] In addition, the Teagasc Irish Hedge Map (2011), which includes areas of non-forest woodland and scrub, estimated that national cover of hedgerows, individual trees and non-forest woodland and scrub was approximately 450,000 hectares.[569]

Hedgerows have many functions which relate to the maintenance of biodiversity; they provide food, shelter, nesting and a place to hibernate; and they act as corridors for movement for many different species of flora and fauna. Mature trees provide roosts for bats, while saplings just above the height of the hedgerow are important perching posts for birds. Of the 110 species regularly recorded in the Countryside Bird Survey in Ireland during the breeding season, 55 of these species use hedgerows. Hedgerows with a dense base provide cover for small birds and mammals, such as the hedgehog; and barn owls hunt along hedgerows for prey such as the field mouse. Hedgerows provide places for many native flora, such as the primrose and flora in turn provides food sources, such as blackberries on the bramble. Many forms of wildlife, such as bats, butterflies and birds travel along hedgerows across the countryside, rather than travel across an open field.[570] Therefore, it is evident that this significant cover of hedgerows and individual trees is essential to maintain high levels of biodiversity across Ireland.

Obj6.S5: Peat soils cover over 20% of Ireland's area

Peatlands provide a range of ecosystem services and are considered amongst the most important ecosystems of the world. Their importance to the environment in terms of the habitats they provide and the value of the biodiversity present in these habitats, is often underestimated. Peatlands tend to be wet, nutrient-poor environments that host an unusual assemblage of habitats and species specially adapted to these conditions.[571] Ireland's mild Atlantic climate has resulted in the widespread development of different bog types across the country, ranging from the blanket bogs of the west and the mountains to the raised bogs of the midlands. Various different species can be found

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[568] Forest Statistics Ireland 2020 https://www.gov.ie/en/collection/15b56-forest-statistics-and-mapping/#annual-forest-sector-statistics

[569] https://www.teagasc.ie/media/website/publications/2010/The-Irish-hedge-map-version1_5690.pdf

[570] https://www.teagasc.ie/environment/biodiversity--countryside/farmland-habitats/value-of-hedgerows/

[571] https://www.antaisce.org/issues/irelands-peatlands

across the different bog types and occur in combinations not found elsewhere in Europe or the world; and the loss of these bogs would result in an irreplaceable loss to global biodiversity.[572] In Ireland, peat soils cover 20.6% of the land area, with the greater part of this in the form of blanket bog in upland areas.[573] However, it should be noted that over 80% of peatlands are considered degraded due to drainage of the peatlands to facilitate peat extraction, agricultural activities and afforestation.[574] However, it is worth noting that peatlands are damaged through practices such as drainage and peat extraction and the conservation status of many of these habitats is unfavourable.[575]

Obj6.S6: Strong policy framework to protect and enhance biodiversity

Ireland has a strong policy framework to protect and enhance biodiversity including:

- Ireland's National Biodiversity Action Plan 2017 – 2021[576];
- The Climate Action Plan;[577]
- The Biodiversity Climate Change Sectoral Adaptation Plan[578];
- The National Implementation Plan (for SDG's)[579];
- The National Planning Framework[580];
- The River Basin Management Plan[581];
- The National Landscape Strategy[582];
- The All Ireland Pollinator Plan[583];

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[572] https://www.npws.ie/peatlands-and-turf-cutting

[573] https://www.npws.ie/sites/default/files/publications/pdf/NationalPeatlandsStrategy2015EnglishVers.pdf

[574] Renou-Wilson, F. and Wilson, D. (2018), Vulnerability assessment of peatlands: exploration of impacts and adaptation options in relation to climate change and extreme events (VAPOR). Report No. 250. Environmental Protection Agency.

[575] https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf

[576] https://www.npws.ie/sites/default/files/publications/pdf/National%20Biodiversity%20Action%20Plan%20English.pdf

[577] https://www.dccae.gov.ie/en-ie/climate-action/publications/Documents/16/Climate_Action_Plan_2019.pdf

[578] https://www.chg.gov.ie/app/uploads/2019/10/doc-7-climate-change-sectoral-adaptation-plan-for-biodiversity.pdf

[579] https://www.dccae.gov.ie/documents/DCCAE-National-Implement-Plan.pdf

[580] http://npf.ie/

[581] https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_report_english_web_version_final_0.pdf

[582] https://www.chg.gov.ie/app/uploads/2015/07/N-Landscape-Strategy-english-Web.pdf

[583] https://www.biodiversityireland.ie/wordpress/wp-content/uploads/All-Ireland%20Pollinator%20Plan%202015-2020.pdf

- Food Wise 2025[584];
- The National Peatlands Strategy[585]; and
- The National Forestry Standard and its associated Guidelines on Biodiversity[586]

Ireland also has a comprehensive agri-food strategy, Food Wise 2025 which has sustainability as one of its main themes. The protection of biodiversity in Ireland is a collaborative multi-agency approach. This collaboration ensures a cohesive response to the maintenance and protection of biodiversity, ecosystem services and the preservation of habitats and landscapes across Ireland. The protection of biodiversity is further supported through EU and national legislation also, in particular the EU Habitats Directive (Directive 92/43/EEC) and the Birds Directive (Directive 79/409/EC). The Wildlife Act, 1976[587] is the principal national legislation providing for the protection of wildlife in Ireland. However, it should be acknowledged that there is a perceived weakness in terms of policy coherence.

Article 17 of the Habitats Directive requires that Member States undertake national assessments, on a 6-year cycle, of the conservation status of habitats and species protected under the Directive. The last national assessment, the Prioritised Action Framework (PAF) for Natura 2000, took place in 2014; and public consultation is currently taking place for the next PAF. This is further strengthened by the National Biodiversity Action Plan 2017-2021, which provides a framework to track and assess progress towards Ireland's Vision for Biodiversity over a five-year timeframe from 2017 to 2021.

Furthermore, the establishment of native woodlands and broadleaf planting are included in the current Forestry Programme 2014-2020[588]. All new forests must include at least 15% open space and retained habitat, known as Areas for Biodiversity Enhancement (ABEs), on plantations greater than 10 hectares. The function of ABEs is to conserve and encourage the development of diverse habitats, native flora and fauna, and biodiversity in Irish forests. In addition, schemes must also contribute to the national broadleaf target of 30%, thereby contributing to a larger range of habitat types

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[584] https://www.gov.ie/en/publication/a6b0d-food-wise-2025/

[585] https://www.npws.ie/sites/default/files/publications/pdf/NationalPeatlandsStrategy2015EnglishVers.pdf

[586] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/forestry/grantandpremiumschemes/2015/ForestryStandManNov15050116.pdf

[587] http://www.irishstatutebook.ie/eli/1976/act/39/enacted/en/html#zza39y1976

[588] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/forestry/forestryprogramme2014-2020/IRELANDForestryProgramme20142020230215.pdf

and therefore a more diverse national species mix, which all contributes to the enhancement of biodiversity.

Obj6.S7: Good knowledge and experience of delivery of results-based agri-environment schemes

Ireland has been leading the way in Europe in the area of results-based agri-environment schemes, which focus on providing support and funding to farmers on the basis of the quality of the environmental outcome that they deliver rather for complying with predetermined conditions. Ireland has established many successful schemes including the RBAPS (Results Based Agri-environment Payments Scheme)[589], the Burren Programme[590], the Hen Harrier Project[591], Freshwater Pearl Mussel Project[592] and other locally led agri-environment schemes launched under the European Innovation Programme (EIP-AGRI).[593] One of the key differences in this programme is the shift to a reward-based system based on the quality of the results, as opposed to the traditional penalty-based schemes, incentivising farmers to produce a higher quality of habitat, for example. The Department of Agriculture, Food and the Marine and the National Parks and Wildlife Service (NPWS) are also leading on the development of results-based approaches for Corncrake in a new Corncrake LIFE project which commenced on 01 January 2020. There has been very positive feedback in relation to this bottom up approach to addressing environment issues locally and in collaboration with farmers, advisors, scientists, communities. Approximately 40% of Irish farmers are engaging with environment or climate related schemes under Pillar II of the current RDP.

Obj6.S8: High plant health status in Ireland

Ireland has the highest number of protected zones within the EU with 22 pests/diseases listed as not present and therefore, Ireland is regarded in the area of Plant Health as having a high biosecurity/plant health status. As noted in the Plant Health and Biosecurity Strategy 2020-2025, Ireland has been successful in excluding many serious pests present in Continental Europe, including the European spruce bark

[589] https://rbaps.eu/
[590] http://burrenprogramme.com
[591] http://www.henharrierproject.ie/
[592] https://www.pearlmusselproject.ie/
[593] https://ec.europa.eu/eip/agriculture/en/about

beetle Ips typographus (Linnaeus); the Erwinia amylovora, cause of Fireblight disease of Rosacea; the Colorado Beetle of Potatoes; and the whitefly Bemesia tabaci- all through the use of Protected Zone legislation.[594] Annually, a comprehensive plant health action programme is implemented by the Department of Agriculture, Food and the Marine in order to maintain Ireland's high plant health status and comply with Irish and EU legislation. This programme includes plant health inspections at our borders (ports and airports), on all regulated and high-risk consignments of plants and plant products imported to Ireland from over 40 third countries each year; and plant health surveys Surveys/inspections are carried out at nurseries, garden centres, public parks, private gardens and the wider environment; with over 10,000 plant health inspections taking place annually.[595] This work carried out by the plant health officers of DAFM together with work undertaken by industry, government agencies, representative bodies and the wider plant health stakeholder network (including the Irish public), plays a significant role in protecting the forests, grasslands, crops, wider environment and the biodiversity of Ireland.

Obj6.S9: Strong knowledge base on organics and biological farming in Ireland

Ireland has a strong knowledge base of both organic and biological farming practices which are concerned with at least maintaining biodiversity on farm. Organic production systems combine best environmental practices, high levels of biodiversity, the preservation of natural resources and high animal welfare standards to produce natural agri-food products.[596] Biological farming is a holistic approach to soil, crop and pasture management that aims to ensure the management of healthy soils that display high levels of biological activity. [597] There are currently a number of EIP projects in Ireland in operation which are using organic farming and biological farming techniques. These include the Danú project, the Enable Conservation Tillage (ECT) project; and the Maximising Organic Production System (MOPS) project.

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[594] Plant Health and Biosecurity Strategy 2020-2025 https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/farmingsectors/planthealthandtrade/dontriskit/planthealthbio-securitystrategy/DAFMPlantHealthandBiosecurityStrategy070220.pdf

[595] Plant Health and Biosecurity Strategy 2020-2025 https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/farmingsectors/planthealthandtrade/dontriskit/planthealthbio-securitystrategy/DAFMPlantHealthandBiosecurityStrategy070220.pdf

[596] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32007R0834&from=EN

[597] https://63273-649646-raikfcquaxqncofqfm.stackpathdns.com/wp-content/uploads/2019/10/EIP-AGRI-Irelands-Operational-Groups-Booklet-NRN-Website-Version-October-2019.pdf

The Danú project aims to educate farmers on the principles and practices of biological farming and how to implement them successfully by developing conventional biological farming transition programme systems. The project aims to identify where weaknesses exist in existing soil, crop and pasture management systems and to develop guidelines based on the sound understanding of the soil structure, chemistry, biology and plant nutrition of individual sites to allow for the successful transition to biological farming; all the while maintaining high levels of soil biological function.[598] The ECT project aims to enable the adoption of conservation agriculture practices on Irish tillage farms so that farmers are provided with the knowledge, skills and capacity to effectively manage grass weeds. Conservation Agriculture (CA) practices can reduce costs and benefit the environment; however, the adoption of this practice is hampered by grass weeds in Ireland.[599] The MOPS project encourages collaborative production by eleven organic farms in Ireland so that they are producing as if they are one farm. The aim of the project is to optimize organic production, ensure continuity of short supply chains and achieve economies of scale.[600] These projects provide a strong knowledge base of organic and biological farming practices in Ireland.

[598] https://ec.europa.eu/eip/agriculture/en/find-connect/projects/dan%C3%BA-farming-group-project-plan-biological-farming

[599] https://ec.europa.eu/eip/agriculture/en/find-connect/projects/enable-conservation-tillage-ect-wider-adoption

[600] https://ec.europa.eu/eip/agriculture/en/find-connect/projects/maximising-organic-production-system-mops

Weaknesses

Obj6.W1: Majority of designated habitats have an unfavourable or declining status

The overall status of designated habitats in Ireland shows that that 85% of habitats are in unfavourable (i.e. Inadequate or bad) status, with 46% of habitats demonstrating ongoing declining trends. Over 70% of habitats are impacted by pressures relating to agricultural practices, and the pressure is ranked as high importance in more than 50% of habitats. Overgrazing is recorded in 39% of habitats, under-grazing in 15% of habitats and diffuse agri-pollution in 14% of habitats. A small number of threatened species listed in the Habitats Directive are in bad status with a declining trend reported for 15% of species, with freshwater species most at risk. The greatest concern continues to be the freshwater pearl mussel, as only a few rivers have populations that show juvenile recruitment.[601] Freshwater habitats due to excess phosphorus in the water are also a concern, with agriculture amongst the significant pressures.[602]

Obj6.W2: Low level of agricultural and forest area under Natura 2000

According to the Natura 2000 spatial dataset (2018), only 3.6% of agriculture area (including semi-natural grassland) and 18.1% of forest area (including transitional woodland-shrub) is under Natura 2000, compared to an EU average of 11% and 30% respectively. The total area under SPA (under the Birds Directive) is 6.1%, compared to the EU-27 average of 14.1%, and the total area under SAC (under the Habitats Directive) is 10.2% compared to the EU-27 average of 14.9%. The share of agricultural area (including natural grassland) under Natura 2000 in Ireland was the second lowest in the EU, after Finland.[603] In addition, it is worth noting the failure to legally designate numerous Special Areas of Conservation (SACs) under the Habitats Directive as well the failure to set Conservation Objectives for these sites together with the necessary measures. It is essential to establish conservation measures in Natura 2000 sites on the basis of clearly defined conservation objectives for the sites.

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[601] https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf

[602] EPA "Water Quality in Ireland, 2013-2018" https://www.epa.ie/pubs/reports/water/waterqua/Water%20Quality%20in%20Ireland%202013-2018%20(web).pdf

[603] Common Context Indicator C.34 'Natura 2000 area' (https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf)

Obj6.W3: Some farmland bird species are in significant decline

The Countryside and Farmland Birds (CBS) survey suggests that a quarter of farmland birds, such as Stock Dove, Swift, Greenfinch, Stonechat and Kestrel are exhibiting serious declines. Species associated with farmland, woodland and shrubland and peatland experienced decreases of 8%, 0.2% and 8.7% respectively from 2005-2014.[604] According to the Irish PAF[605], some of the other most notable breeding bird species relevant to agro-ecosystems have also undergone severe breeding range declines including:

- Grey Partridge (Perdix perdix) – Breeding: long- term range decline of 74
- Yellowhammer (Emberiza citrinella) – Breeding: long- term range decline of 62%
- Wite (Carduelis flavirostris) – Breeding: long- term range decline of 96%
- Lapwing (Vanellus vanellus) – Breeding: long-term range decline of 56%

The Bird Atlas (2007–2011) similarly suggests severe declines in most of our breeding waders including Curlew, Lapwing and Snipe; and highlighted two main "new" groups of concern: the breeding waders and upland birds.[606] The Irish Wetland Bird Survey (I-WeBS) found that the number of waterbirds wintering in Ireland has declined by 15% over the past five years and by 40% since the mid-1990s.[607] The 2014 revised Birds of Conservation Concern in Ireland list placed 37 (a high proportion of farmland birds) of the 202 species of bird assessed that regularly occur on the island of Ireland on the Red List and 91 on the Amber List.[608] Red-Listed breeding species include whinchat, yellowhammer, barn owl, corncrake, grey partridge, grey wagtail and red grouse. Red-Listed breeding and wintering species include the curlew, dunlin, golden plover and redshank. Two birds of prey that were recently reintroduced, the white-tailed eagle and the golden eagle are also both Red-Listed. [609] There was a decline in Hen Harrier population recorded in 2016, with only 108-157 breeding pairs present, compared to

[604] Lewis, L. J., Coombes, D., Burke, B., O'Halloran, J., Walsh, A., Tierney, T. D. & Cummins, S. (2019) Countryside Bird Survey: Status and trends of common and widespread breeding birds 1998-2016. Irish Wildlife Manuals, No. 115. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

[605] https://www.npws.ie/sites/default/files/files/Prioritised-Action-Framework-(PAF)-for-Natura%20-2000-in-Ireland.pdf

[606] https://www.epa.ie/mobile/irelandsenvironment/nature/

[607] https://birdwatchireland.ie/irelands-wintering-waterbirds-down-by-40-in-less-than-20-years/

[608] https://birdwatchireland.ie/app/uploads/2019/09/BOCCI.pdf

[609] https://www.epa.ie/irelandsenvironment/nature/

128-172 in 2010.[610] Finally, it should also be noted that the Farmland Bird Index was 107 in 2016 (compared with the reference value of 100 in the year 2000).[611]

Obj6.W4: Woodlands are deemed to be in bad but stable status

Native woodlands are among Ireland's most valuable habitats with a high biodiversity value.[612] However, Ireland's old sessile oak, alluvial and yew woodlands are deemed to be in bad status, since these habitats are small and fragmented and therefore their area is considered insufficient for full ecological functionality. The improving trend in 2013 was downgraded to a deteriorating status for old sessile oak and alluvial woodland in 2019 as small-scale habitat loss and fragmentation continued and invasive non-native species and overgrazing by deer remained significant pressures. While measures such as the Native Woodland Scheme are expected to have a positive long-term effect, they are as yet insufficient to outweigh the pressures. A substantial increase in the uptake of the Native Woodland Scheme is needed, and development of good quality woodland habitat will take decades.[613]

Obj6.W5: Lowest share of forest under protection to preserve biodiversity and safeguard landscapes and specific natural elements in the EU

In 2015, Ireland had the lowest share of forest under protection to conserve biodiversity, landscapes and specific natural elements in the EU, at less than 1%. The protection provided in Ireland is 'conservation through active management' and therefore no forest in Ireland can be considered free from human interference.[614] This contrasts with other EU countries who also provide protection through 'no active intervention' or 'minimum intervention' to allow biodiversity to flourish.

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[610] https://www.npws.ie/sites/default/files/publications/pdf/IWM93.pdf

[611] Common Context Indicator C.35 'Farmland bird index (FBI)' https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[612] http://www.coford.ie/media/coford/content/publications/projectreports/FORECON%20Final%20report%20lowres.pdf

[613] https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf

[614] Common Context Indicator C.38 'Protected Forest' (2019 update) https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

Obj6.W6: Grassland habitats have undergone significant losses over last 10-15 years and most Annex I grasslands are all in unfavourable-bad status

The maintenance of a number of species and ecosystems depends on the continuation of appropriate land management practices because many bird species nest and feed on farmland. According to the State of Nature Report (2013-2018)[615], none of the 6 grassland habitats currently have a favourable conservation status. Grasslands habitats, such as orchid-rich grasslands and hay meadows, have undergone significant losses over the last 10-15 years, with 31% and 28% of the area monitored by the NPWS reported as being lost. These habitats are threatened either by intensification of farming or insufficient grazing and abandonment.[616] 16.7% of agricultural habitats (grassland) have an unfavourable – inadequate status and 83.3% have an unfavourable – bad status, compared to the EU average of 34.6% and 42.6% respectively.[617]

Obj6.W7: Ongoing degradation of peatlands, with most peatland and fen habitats considered to be in bad status

Over 80% of peatlands are considered degraded due to drainage of the peatlands to facilitate peat extraction, agricultural activities and afforestation.[618] In 2017, approximately 56,000 hectares (560km^2) of peatlands was estimated to be subject to active drainage and peat extraction.[619] Additionally, losses of fen habitat are considered to have occurred since the Habitats Directive came into force, though the magnitude of the loss is unknown. The main pressures were identified as peat extraction, wetland reclamation and infilling[620].

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[615] EEA dashboard https://www.eea.europa.eu/themes/biodiversity/state-of-nature-in-the-eu/article-17-national-summary-dashboards/conservation-status-and-trends

[616]https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf

[617] Common Context Indicator 36 'Conservation status of agricultural habitats'https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[618] Renou-Wilson, F. and Wilson, D. (2018), Vulnerability assessment of peatlands: exploration of impacts and adaptation options in relation to climate change and extreme events (VAPOR). Report No. 250. Environmental Protection Agency.

[619]http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf

[620] https://www.npws.ie/sites/default/files/publications/pdf/Art17-Vol1-web.pdf

Obj6.W8: Lack of coherence across a number of policy areas

The retention of existing habitats is clearly of great importance for biodiversity conservation; but is also important with regards climate adaptation services, water purification/regulation and for farming. Sectoral approaches to land management do not always adequately ensure the protection of existing resources, including habitats, and the integration of policy across sectors is currently inadequate. Existing habitats and habitats for species require improved protection under the various policies (eg Pillar 1 of the CAP, afforestation, AECM) and the extensive management of these habitats is currently not adequately supported.[621] During stakeholder consultation concerns were raised regarding the current EIA regulations on thresholds for the removal of hedgerows and the inconsistency of land eligibility rules and the potential negative impact on biodiversity. As a result, certain landscape features are not valued properly and are either removed or there is a reduction in quality with a resultant loss of biodiversity. An independent review conducted by the Biodiversity Forum on the third National Biodiversity Action Plan found that there is a lack of coordination between the NBAP and other national policies, which sometimes amounts to outright conflict, and therefore it is necessary for departments to work together to ensure consistency with, and promotion of, the aims of the NBAP.[622] It is clear that the integration of policy across the agriculture, biodiversity, water and climate areas is challenging, but many of the goals are compatible and must be better aligned in future.

Obj6.W9: More diversity and habitat connectivity needed in forestry planting

Forestry planting in Ireland is overly dependent on a single tree species, Sitka spruce (51.1% of the forest area). According to the National Forest Inventory, only 14% of the national estate comprises mixed forests.[623] The current knowledge and skill levels amongst forestry professionals in Ireland, in relation to the management of species mixtures, the designing of sustainable planting and felling regimes (e.g. continuous cover forestry) and the incorporation of ecological and environmental needs into plans is inadequate.[624] Ancient tree-scapes are relatively scarce across Ireland, whilst half of the native Saproxylic species (beetles of decaying wood) have been assessed as rare,

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[621] https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/key_policies/documents/ext-eval-biodiversity-final-report_2020_en.pdf

[622] https://www.biodiversityimpactplan.ie/1-governance

[623] Forest Statistics Ireland 2020 https://www.gov.ie/en/collection/15b56-forest-statistics-and-mapping/#annual-forest-sector-statistics

[624] http://www.coford.ie/media/coford/content/publications/2018/6COFORDSpeciesMixturesinIrishForestsAReview121218.pdf

reflecting the overall rarity and fragility of saproxylic habitats across Ireland.[625][626] Ireland's native woodland resource amounts to only 178,980 hectares, or 26.6% of the total national forest area.[627] Most native woodlands are isolated and widely dispersed, with poor connectivity. Measures are needed to restore native woodland cover, improve the conservation value of existing woodlands, and reduce fragmentation by increasing woodland size and connectivity.[628]

Obj6.W10: Lack of economic value attributed to wider public goods from landholdings

Land of extremely high environmental value very often generates little or no agricultural income and it is therefore difficult in this case to achieve a level of compensation that both reflects the value of public good provided and is sufficiently attractive to farmers/landowners. The quality of habitats in many cases will correlate to the value of ecosystem services provided by a particular landholding, but at present, there is no mainstream mechanism to reward quality (e.g. a denuded field boundary is paid the same rate as a landscape feature as an excellent field boundary providing many functions and services; or poor quality moorland is paid the same as top quality moorland under the various schemes). Member States, under the current Rural Development Programme, can only compensate Environmental, Climate and Other Management Commitments based on costs incurred and income foregone.

Obj6.W11: Lack of appropriate mechanisms / indicators to monitor areas outside of Natura 2000

There is a lack of monitoring of flora and fauna in the wider countryside i.e. in areas outside of Natura 2000 areas[629], although there are some specialised surveys e.g. semi-natural grasslands and native woodlands. Under the 2014-2020 Rural Development

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[625] https://www.npws.ie/sites/default/files/publications/pdf/IWM65.pdf

[626] Alexander, K. N. A. & Anderson, R. (2012) The beetles of decaying wood in Ireland. A provisional annotated checklist of saproxylic Coleoptera. Irish Wildlife Manuals, No. 65. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin.

[627] Irelands National Forest Inventory 2017 – Results https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/forestry/nationalforestinventory/nationalforestinventoryresultsdata/2018/Results311018.pdf

[628] Perrin, P., Martin, J., Barron, S., O'Neill, F., McNutt, K. & Delaney, A. (2008) National Survey of Native Woodlands 2003-2008. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin. https://www.npws.ie/sites/default/files/general/nsnw-vol-1.pdf

[629] Walsh, A., Finn, J.A., Jebb, M., Waldren, S. and Sullivan, C. (2015) The distribution of vascular plant species of conservation concern in Ireland, and their coincidence with designated areas. Journal for Nature Conservation, 24: 56-62.

Programme, a monitoring and evaluation programme of over 300 Green Low-carbon Agri-environment (GLAS) farms with multiple site assessments and repeat attitudinal surveys was established.[630] There is an opportunity to further improve the monitoring and evaluation of AECMs by establishing a baseline at farm level before commencement of an AECM contract and by extending the timeframe for monitoring across programmes. During consultation, stakeholders identified the lack of a comprehensive monitoring programme, that can assess quantity and quality of habitats, species numbers and AECM action implementation, and is repeated over time to track temporal change.

Obj6.W12: Decline in pollinator species

Six out of the 21 species of bumblebee in Ireland are threatened with extinction. An additional 3 species are near threatened. Current trends within the All-Ireland Bumblebee Monitoring Scheme are based on eight common species for which there is sufficient information to accurately assess changes. The current overall trend from 2012-2019 is a year-on-year decline of 4.6%. Two of the eight individual species show statistically significant declines.[631] There are 77 species of solitary bee, of which 24 are threatened with extinction. An additional 9 species are near threatened. There are 180 species of hoverfly. An official conservation assessment has not yet occurred, but approximately 20% of species are estimated to be under threat. On the island of Ireland, 18% of butterflies and 8% of macro-moths are threatened with extinction. Butterfly populations are monitored by the National Biodiversity Data Centre through the Irish Butterfly Monitoring Scheme, which has been running since 2007. While the conservation status of most other insects is unknown, evidence from elsewhere suggests that many species are in decline.Three bee species that occur in Ireland are also threatened with extinction at the European level and an additional four species are near threatened. The main pressures have been identified as natural or semi-natura; habitat loss, fragmentation and degradation, decline in wildflowers, pests and disease, pesticides and climate change.[632] Although the 2019 census of beekeepers in Ireland recorded 4,462 beekeepers and 27,040 bee colonies,represent a 41% increase in the number of beekeepers since the previous census in 2016, and a

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[630] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/ruralenvironmentsustainability/ruraldevelopmentprogrammerdp2014-2020/

[631] https://biodiversityireland.ie/app/uploads/2021/10/Bumblebee-Monitoring-Scheme_Annual-Report_2012-2020.pdf

[632] https://pollinators.ie/wordpress/wp-content/uploads/2018/05/Pollinator-Plan-2018-WEB.pdf

26% increase in the number of bee colonies, the vast majority of beekeepers in Ireland are hobbyists with small apiaries.[633]

Obj6.W13: Lack of appropriate advisory support on biodiversity related issues

In the European Commissions "Evaluation of the Impact of the CAP on Climate Change and Greenhouse Gas Emissions," it was noted that in Ireland, farmers have access to a strong publicly funded farm advisory service. However, following a number of interviews with farmers, it was found that through this service, farmers are overloaded with information related to biodiversity, but the information provided is not in a format that is understandable to them, therefore limiting their ability to apply this knowledge.

Furthermore, following an open public consultation on the future of the CAP carried out for the Commission in 2017, 21% of farmers identified that the prevention of biodiversity loss was an area in which the CAP should do more.[634] This suggests that there is a lack of appropriate advisory support related to biodiversity issues which could hinder farmers' ability to undertake measures beneficial to biodiversity. Again, this was further reiterated by Teagasc in their assessment of results-based programmes whereby they acknowledged that the ability of land managers to be environmentally innovative is strongly influenced by the availability of appropriate advisory support.[635]

The Results-Based programmes and EIPs consistently highlight the importance of the availability of advisory services with biodiversity expertise. This also extends to the use of demonstration farms, advisory initiatives, national awards and competitions and industry-led initiatives and support for all land types including HNV, and intensively managed systems.[636]

Obj6.W14: No national habitat map

Ireland does not have a dedicated programme for mapping the national landcover or habitats, although a national habitat land cover map is currently in production. While there is a lot of data available on designated habitats (Natura 2000 sites), there is no

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[633] Bord Bia (unpublished)

[634] European Commission (2018) "Evaluation study of the impact of the CAP on climate change and greenhouse gas emissions (Final Report)" (https://op.europa.eu/en/publication-detail/-/publication/29eee93e-9ed0-11e9-9d01-01aa75ed71a1)

[635] https://www.teagasc.ie/media/website/environment/biodiversity-countryside/Ch2_Farming-for-Nature_WEB.pdf

[636] https://ec.europa.eu/agriculture/sites/agriculture/files/evaluation/market-and-income-reports/2019/cap-and-climate-evaluation-report_en.pdf

data available on other habitats. This makes it difficult to accurately assess national landscape characteristics and changes made to the natural environment over time. Furthermore, the absence of a map limits policy makers' abilities to plan for and mitigate against pollution, flooding events and climate change; and also limits their ability to provide for sustainable development, to conserve the natural landscape and to advance the nations knowledge of scientifically important habitats and areas of high biodiversity.[637]

Obj6.W15: Capacity challenge in relation to enforcement of regulations

While there is EU and national legislation in place to protect both biodiversity and sensitive habitats, there are a number of Government Departments and Agencies involved in the enforcement of the legislation; and this can pose challenges in terms of capacity to enforce. The National Biodiversity Action Plan 2017-2021, highlighted that stakeholder participation will be key in reaching the targets set out in the plan; and therefore all relevant sectors, (government, landowners, business, farming, forestry, scientific and conservation communities, etc.) will need enhanced training, communication, cooperation and concerted action in support of biodiversity conservation.[638]

Obj6.W16: Ireland is far from reaching the target of at least 10% UAA under high-biodiversity landscape features.

Around 0.9% of Ireland's UAA is taken up by "linear landscape features" such as hedgerows (2018 estimate). This is somewhat higher than the EU average of 0.6%. However, Ireland has less fallow land (0.1% of UAA), compared to the EU average of 4.1%. The majority of Irelands UAA is managed at high intensity (41.9%) or at medium intensity (27.6%). This ultimately impacts on biodiversity.

[637] https://www.npws.ie/sites/default/files/general/NLCHM%20Newsletter%20May%202017.pdf
[638] https://www.npws.ie/sites/default/files/publications/pdf/National%20Biodiversity%20Action%20Plan%20English.pdf

Opportunities

Obj6.O1: Incentivise the provision of ecosystem services including HNV farming

A substantial proportion of farmland in Ireland has been identified as having HNV potential, particularly along the western seaboard.[639] HNV farming occurs most frequently in areas that are mountainous; or in areas where natural constraints prevent intensification but grazing can be an important component of maintaining some of these habitats. In Ireland, these important farmland habitats primarily fall into two categories: peatland (heath and blanket bog) or semi-natural grassland habitats.[640] Small wooded areas and linear habitats such as hedgerows, treelines, stone walls and drainage ditches all contribute to the biodiversity of HNV farmland. The farmed landscape supports some of our most threatened and declining bird species. The potential for maintaining High Nature Value farming is greatest in areas with high proportions of economically vulnerable farms, which are also the areas at greatest risk of losing HNV areas due to land conversion (e.g. abandonment of appropriate management or conversion to other uses including forestry or intensive agriculture). This would suggest that there is potential for incentivising the provision of other ecosystem services in these areas in addition to production-oriented ones.[641] There is an opportunity to build on some of the lessons learned from the environmental EIP-AGRI groups and other schemes, such as the Burren Programme.

Obj6.O2: Enhance biodiversity by establishing new habitats, as well as maintaining existing habitats on more intensive farms

A better alignment of policies which affect birds in the wider countryside is required to tackle the landscape-scale problems which are driving many of the noted population/range declines. It is estimated that natural and semi-natural habitats constitute over 7% of intensive dairy farm area. Appropriately designed wildlife measures, targeted for intensive dairy systems, could play an important role in halting the decline of biodiversity, along with other environmental and climate objectives. New and carefully designed and applied biodiversity measures could be targeted to appropriate areas of the farm, however these should not replace existing wildlife

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[639] Matin S., Sullivan, C.A., Ó hUallacháin, D. *et al.*, 2016. Predicted distribution of high nature value farmland in the Republic of Ireland. *Journal of Maps*. Available online: https://www.tandfonline.com/doi/pdf/10.1080/17445647.2016.1223761?needAccess=true *www.tandfonline.com/doi/abs/10.1080/17445647.2016.1 223761*.

[640] http://www.high-nature-value-farmland.ie/what-is-hnv-farmland/

[641] http://www.epa.ie/media/Chapter12_Environment_Agriculture.pdf

habitats. [642] Availability of the IDEAL HNV map could potentially be used to enable better targeting of biodiversity measures which are appropriate to land use type and productivity; and this could therefore be used as a policy tool to move towards a holistic approach to biodiversity and overall agriculture sustainability.

A good example of this approach to results-based scheme is the BRIDE Project (Biodiversity Regeneration in a Dairying Environment). This is an innovative agri-environment project (EIP-AGRI) which adopts a landscape-scale approach and is designed to conserve, enhance and restore habitats in lowland intensive farmland. This combined, community-based effort is an entirely new approach to environmental management.[643] During consultation, some stakeholders requested a mandatory provision for biodiversity on intensive farms with a potential figure of 10% of eligible area suggested. Stakeholders also highlighted that the implications of the EU's Farm to Fork and Biodiversity Strategy will need to be considered.

Obj6.O3: Appropriately manage forests and increase afforestation levels (particularly mixed forestry)

When appropriately sited and sustainably managed, forests are healthy, productive, resilient and renewable ecosystems, providing essential goods and services to society.[644] Biodiversity within forests is influenced by a combination of factors including the environmental characteristics of the site, the age of the forest, habitat connectivity, and forest management practices including spacing and thinning.[645] Native woodlands are among Ireland's most valuable habitats with an exceptionally high biodiversity value.[646] The ongoing management and development of forests/woodlands; as well as appropriate increases in afforestation, with or including significant areas of native broadleaf species can allow for increases in biodiversity if appropriately designed and implemented in an environmentally sensitive manner. The establishment of new forests in the countryside can potentially provide habitats for flora and fauna that might not otherwise exist; and the retention of existing hedgerow trees, pockets of native scrub, and old individual trees, can help in providing age

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[642] O hUallachain & Finn (2019) *Increasing biodiversity on intensive farms* in Irish Dairying – Growing Sustainably Conference Proceedings 3rd July 2019. https://www.teagasc.ie/media/website/publications/2019/Increasing-biodiversity-on-intensive-farms.pdf

[643] https://www.thebrideproject.ie

[644] https://www.un.org/development/desa/en/news/forest/forum-on-forests-14th-session.html

[645] http://www.coford.ie/media/coford/content/publications/projectreports/FORECON%20Final%20report%20lowres.pdf

[646] https://www.heritageweek.ie/content/images/Natural-Capital-Value-of-Native-WoodlandsAbbreviated-version-March2014.pdf

diversity, although this is more easily established in existing forests. The retention of over-mature trees and deadwood on the site can also promote biodiversity, especially for insects and birds.[647] By incorporating biodiversity considerations into initial site development plans; a unique opportunity arises in which biodiversity, habitat and nature conservation issues are considered from the outset of the forest development.[648]

Obj6.O4: Incentivise low input farming such as organic and biological approaches

Organic production as defined under Council Regulation (EC) No. 834/2007 as "an overall system of farm management and food production that combines best environmental practices, a high level of biodiversity, the preservation of natural resources, the application of high animal welfare standards and a production method in line with the preference of certain consumers for products produced using natural substances and processes."[649]

Other farming systems such as biological farming can provide various benefits including soil fertility and yields[650], carbon capture[651] and stress resistance[652]. According to the DANÚ Farming Group - Project Plan for a Biological Farming Transition Programme EIP, biological farming is a holistic approach to soil, crop and pasture management that takes into account the agronomic, environmental, nutritional, physical, chemical and biological components of what makes up a healthy soil. It combines the best practices of conventional and organic farming with an emphasis on developing productive soils that display high levels of biological activity.[653] The area of land under organic production in Ireland has expanded since 2008 (where it was 0.9% of UAA), with latest

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[647] http://www.coford.ie/media/coford/content/publications/projectreports/speciesmanual.pdf

[648] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/forestry/publications/biodiversity.pdf

[649] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32007R0834&from=EN

[650] C. Arden-Clarke & R. D. Hodges (1988) The Environmental Effects of Conventional and Organic/Biological Farming systems. II. Soil Ecology, Soil Fertility and Nutrient Cycles, Biological Agriculture & Horticulture, 5:3, 223-287, DOI: 10.1080/01448765.1988.9755147 https://www.tandfonline.com/doi/abs/10.1080/01448765.1988.9755147

[651] McNally, S.R., Laughlin, D.C., Rutledge, S. et al. Plant Soil (2015) 392: 289. https://doi.org/10.1007/s11104-015-2463-z https://link.springer.com/article/10.1007/s11104-015-2463-z

[652] Finn et al. 2013. Ecosystem function enhanced by combining four functional types of plant species in intensively managed grassland mixtures: a 3-year continental-scale field experiment. Journal of Applied Ecology, 50: 365–375. http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12041/abstract

[653] https://ec.europa.eu/eip/agriculture/en/find-connect/projects/dan%C3%BA-farming-group-project-plan-biological-farming

figures indicating that there is now c.74,000 hectares under organic production in Ireland, which corresponds to around 2% of total agricultural area.[654]

One way to encourage the reduction of inputs by farmers is by urging them to create grassland pastures of high species diversity. Grassland farmers face many challenges in pasture management including improving sustainability, reducing inputs of fertilisers and pesticides, and protecting soil resources. Pasture ecosystems can be highly diverse, with a complex array of organisms contributing to ecosystem functioning. Within the broad range of plant and animal biodiversity in pastures, plant species diversity may be the most amenable to manipulation or management. Reported benefits of plant diversity in grasslands include increased forage production, greater ecosystem stability in response to disturbance, and reduced invasion by exotic species such as weeds. Some view diversity as a sort of insurance policy where different species contribute in their own time or can take the place of species that fail from stress or mismanagement. Using mixtures of several forages in pastures, in some instances, can improve forage yield and reduce weed invasions. Pasture management for increased plant species diversity, however, is not simply mixing and planting as many forage species as possible. The kinds and amounts of different forage species along with their arrangement within and among pastures at the farm scale are critical features that must be considered. Tools must be developed to determine the appropriate species mixtures for varying soils, landscapes, climate and purposes to fulfil multiple functions for producers.[655]

Ecological research suggests that natural grasslands of greater species richness are more resistant to stresses, such as drought, then less diverse plant communities[656]. In a small-plot experiment where rainout shelters were used to control moisture availability, a fivespecies mixture containing chicory (*Cichorium intybus* L.), orchardgrass (*Dactylis glomerata* L.), Kentucky bluegrass (*Poa pratensis* L.), perennial ryegrass (*Lolium perenne* L.) and white clover (*Trifolium repens* L.) had 89% greater yield under drought, 61% greater yield with normal moisture, and 43% greater yield in excessively wet treatments compared with a white clover-Kentucky bluegrass mixture[657].

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[654]DAFM figures

[655] Sanderson, Matt & Goslee, Sarah & Soder, K.J. & Skinner, Howard & Tracy, Ben & Deak, Atila. (2007). Plant species diversity, ecosystem function, and pasture Management—A perspective. Canadian Journal of Plant Science. 87. 10.4141/P06-135. (https://www.nrcresearchpress.com/doi/pdf/10.4141/P06-135)

[656] Tilman, D. and Downing, J. A. 1994. Biodiversity and stability in grasslands. Nature (Lond.) 367: 363–365.

[657] Skinner, R. H., Gustine, D. L. and Sanderson, M. A. 2004. Growth, water relations, and nutritive value of pasture species mixtures under moisture stress. Crop Sci. 44:1361–1369. (https://pdfs.semanticscholar.org/a134/e8a643f41774e15479e26ce721d845df1b4e.pdf)

There may also be a role for rare breeds to play in maintaining Ireland's unique biological diversity through conservation grazing. Some of the bovine rare breeds may be an option for conservation grazing in some parts of Ireland.[658]

Obj6.O5: Foster a greater understanding of biodiversity issues at farm level through advisory services

The provision of education, particularly in relation to the understanding of environmental sensitivities and their interactions with farming, has been shown to result in positive outcomes for the environment and for farmers. Environmental policies succeed only if they receive public acceptance and support. Key to this success is the effective dissemination of relevant information to a variety of audiences through education, which highlights the significance of biodiversity in our lives.[659] The lack of appropriate advice that is relevant to low-input farmers and biodiversity conservation has been a limiting factor in conservation success and protection of habitats. Opportunities exist to upskill the advisory services especially regarding ecological challenges and opportunities facing agriculture.

There is potential to expand training schemes and foster a culture of peer-to-peer learning with an environmental focus within the farming community. There has been an emergence of new knowledge, new technologies and new decision support tools e.g. Agro-Ecology, Agri-Digitalisation, One Health and Multi-Species grasslands, all of which can improve farmers knowledge in relation to biodiversity. During stakeholder consultation, the possibility of including biodiversity as a core subject on agricultural courses was also suggested.

Obj6.O6: Engage industry and the wider community on biodiversity related initiatives

This opportunity involves building on the success of EIP-AGRI environmental projects; and where possible, combining elements of different projects in order to combat biodiversity loss. Business impacts and dependencies on biodiversity translate into risks to business including ecological risks to operations; liability risks; and regulatory, reputational, market and financial risks.[660] Comprehending these dependencies and

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[658] https://www.nationalruralnetwork.ie/wp-content/uploads/2019/02/Rare-Breeds-ASPaul21-Send-for-New-WEBSITE.pdf

[659] https://www.epa.ie/pubs/reports/research/biodiversity/EPA_biodiversity_knowledge_programme.pdf

[660] http://www.oecd.org/environment/resources/biodiversity/Annexes-Biodiversity-Finance-and-the-Economic-and-Business-Case-for-Action.pdf

impacts on biodiversity can help farmers and agri-food organisations manage and prevent biodiversity-related risks, while harnessing new business opportunities. Through corporate social responsibility, businesses are showing an increasing interest in contributing to the preservation of biodiversity. One example of this is through the establishment of native woodlands in Ireland as demonstrated by Ireland's Woodland Environmental Fund. The Woodland Environmental Fund (WEF) provides an access point for individual businesses to help expand Ireland's native woodland resource. It does so by providing additional incentives to landowners in order to encourage them to plant new native woodlands that they may not have otherwise planted, had additional support not been provided.[661]

Building on the practical knowledge gained through EIP-AGRI projects and generated by advisors, scientists and innovative farmers, various biodiversity goals can be met. Furthermore, consumer interest and support of sustainable products, e.g. Connemara Hill Lamb, can further encourage industry to provide products which are sustainable and are produced in an environmentally conscious manner which is conscious of its effects on biodiversity.

Obj6.O7: Maximise use of available resources on environmental farm profiling

In the implementation of the 2014 to 2020 Rural Development Programme, Ireland has made significant investment in developing and rolling out an online application system that provides detailed information at LPIS parcel level of priority habitats that must be addressed. This information is available at application stage for AECM's and is an extremely valuable resource where targeting of interventions is required to maximise outcomes._There is also potential for the development of environmental monitoring and metrics with the Teagasc NFS and supplement this with surveys of HNV areas outside of Natura 2000. [662] Further work on a National Habitat Map and LiDAR (Light Detection and Ranging) remote sensing will also assist in designing appropriately targeted measures.

[661] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/forestry/grantandpremiumschemes/2018/DAFMWEFleaflet14Sept18250918.pdf

[662] Kelly et al 2018

Threats

Obj6.T1: Habitat loss due to changes in land uses

One of the leading drivers of biodiversity decline, both in quality and quantity, is inappropriate land use leading to habitat destruction. Habitat fragmentation, the process whereby one continuous area of habitat is separated into two or more areas of habitatby a matrix of human-transformed land, also contributes significantly to biodiversity decline.[663] Ireland ranks 8th highest out of 38 countries based on percentage area covered by high fragmentation pressure class and 13th highest when values for high and very high fragmentation are combined.[664] Based on the Corine Land Cover (CLC) maps, the main land cover type in Ireland is agriculture, followed by peatlands and commercial forestry. In 2018, total land cover was made up of 68% agricultural area, just over 10% forest area, 3% semi-natural area, less than 3% artificial area and lastly, close to 16% wetlands and water bodies. The major changes in land cover from 1990-2006 have been a decrease in the area of peatlands from 18% to 15%, and an increase in commercial forestry from 8% to 10%.[665] Based on the LUCAS land cover and land use classifications, the major changes from 2009-2015 include scrubland increasing by 11.9% in parallel to grassland declining by 12.9% and, in terms of land use, agriculture declining by 18.5% and unused and abandoned areas increasing by 24.2%.[666] Afforestation can come into direct competition with biodiversity, where there is a conflict of interest for the land use of HNV land which is also providing habitat for biodiversity – both inside and outside of designated areas. During consultation, some stakeholders expressed the view that inadequate compensation for designated land was a contributory factor.

Obj6.T2: Overgrazing of habitats

In the 2019 *Status of EU Protected Habitats and Bird species in Ireland* report, trends in the period covered by the report 2012 – 2018 show increasing pressures from agriculture, with 55% of habitats (39% of habitats overall) impacted by intensive grazing or over-grazing.[667] In the EPA's State of the Environment Report 2016, it is

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[663] Haddad, N.M. *et al* (2015) "Habitat fragmentation and its lasting impact on Earth's ecosystems" Science Advances, Vol.1 accessed at https://advances.sciencemag.org/content/1/2/e1500052

[664] https://www.npws.ie/sites/default/files/files/NPWS%20Biological%20Diversity%20web.pdf pg. 110

[665] http://www.epa.ie/media/landcoverchange.pdf

[666] https://indicators.biodiversityireland.ie/index.php?qt=si&id=34 (Background) w

[667] https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf

further noted that one of the key pressures facing Ireland's habitats and species is over grazing.[668] Both species richness and diversity is affected by overgrazing, particularly on grasslands.[669]

Obj6.T3: Under grazing or land abandonment

Land abandonment is a threat to biodiversity, as it can reduce the habitat value for certain species. It could also lead to the encroachment of scrub. In the 2019 *Status of EU Protected Habitats and Bird species in Ireland* report, 21% of habitats (15% of habitats overall) were recorded as being impacted by extensive grazing or under-grazing.[670] Based on the LUCAS land cover and land use classifications, agriculture land use declined by 18.5% and unused/abandoned areas increased by 24.2% between 2009 and 2015.[671]

Obj6.T4: Agriculture intensification

Increased production, particularly the expansion of the dairy sector, will put increased pressure on biodiversity, mainly as a result of increased fertiliser use.[672] Dairy production systems operate at a higher stocking rate than beef production systems and this higher stocking rate is reflected in higher projected use of nitrogen fertiliser per hectare.[673] Intensive livestock farming is claimed to have an undesirable effect on biodiversity.[674] A 2015 study by different scientists, including scientists from the European Commission's Joint Research Centre (JRC), estimated that livestock farming accounted for 78% of agriculture's negative impact on biodiversity.[675] This detrimental

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[668] Ireland's Environment 2016 - An Assessment, Chapter 4- Nature https://www.epa.ie/media/Chapter4_Nature.pdf

[669] Török, P, et al. (2018) 'Vegetation type and grazing intensity jointly shape grazing effects on grassland biodiversity' Ecology and Evolution, Volume 8, Issue 20

[670] https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf

[671] https://indicators.biodiversityireland.ie/index.php?qt=si&id=34%20w (Background)

[672] Clay, N., Garnett, T. & Lorimer, J. (2019) 'Dairy intensification: Drivers, impacts and alternatives' *Ambio* **49**, 35–48 (2020). https://doi.org/10.1007/s13280-019-01177-y

[673] EPA (2020) 'Irelands Greenhouse Gas Emissions Projections 2019-2040' https://www.epa.ie/pubs/reports/air/airemissions/ghgprojections2019-2040/2020-EPA-Greenhouse-Gas-Emissions-Projections_final.pdf

[674] European Court of Auditors (2019) "Biodiversity in farming" https://www.eca.europa.eu/Lists/ECADocuments/AP19_09/AP_BIODIVERSITY_EN.pdf

[675] Leip *et al.*, "Impacts of European livestock production: nitrogen, sulphur, phosphorus and greenhouse gas emissions, land-use, water eutrophication and biodiversity", Environmental Research Letters, 4 November 2015.

impact was further highlighted by the UN Food and Agriculture Organization (FAO).[676] Livestock farming is a major source of surplus nitrogen and phosphorous pollution.[677] Eutrophication, which is caused by nutrient enrichment, remains the most significant issue for surface waters in Ireland.[678] The latest Irish Wetland Bird Survey (2019) noted that eutrophication of freshwater bodies places pressure on a number of waterbird species, namely the Goldeneye, Pochard, Scaup, tufted Duck, Coot and Gadwall.[679]

Obj6.T5: Agricultural activities impacting negatively on the environment

A potential threat to the environment exists from the overuse of fertilisers and pesticides. Agricultural activities generating diffuse pollution to surface or ground waters was the second most frequent agricultural impact affecting 19% of designated habitats where agricultural impacts are noted, or 14% of designated habitats overall. All eight of the habitats affected by diffuse pollution are either lake or groundwater dependent habitats. Quantitative analysis of the proportion of habitat exceeding Nitrogen deposition thresholds arising from agricultural activities generating air pollution has highlighted Blanket bog, Alpine heath and Wet heath as particularly vulnerable to this type of pollution. The impacts of agricultural activities generating marine pollution are reported as High importance in three of the marine habitats.[680] Further threats identified by stakeholders include high stocking rates and potential the risk of soil compaction from use of heavy machinery.

Obj6.T6: Increase in invasive plant and pest species

Invasive alien species can have a devastating impact on native fauna by preying directly on native species or competing with them for resources. Invasive alien species can also rapidly and irreversibly damage native ecosystems.[681] The occurrence and spread of

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[676] UN FAO, "Livestock's long shadow: environmental issues and options", 2006.
[677] UN FAO, LIVESTOCK POLICY BRIEF 02, "Pollution from industrialized livestock production", Livestock Information, Sector Analysis and Policy Branch Animal Production and Health Division.
[678] EPA State of the Environment Report 2016- Chapter 5: Inland and Marine Waters https://www.epa.ie/media/Chapter5_Inland_MarineWaters.pdf
[679] https://www.npws.ie/sites/default/files/publications/pdf/IWM_106_Irelands_Wintering_Waterbirds.pdf
[680] https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf
[681] https://indicators.biodiversityireland.ie/index.php?qt=si&id=19 (Background)

invasive and non-native species in Ireland is increasing.[682] The National Biodiversity Centre's Indicator C.3. *Trends in invasive alien species,* tracks the rate of introductions of both high and medium impact invasive alien species into Ireland. The risk assessments conducted for 377 non-native species recorded in Ireland up to 2012 indicated that 48 species were deemed high risk, 79 species were medium risk and 250 species were low risk.[683] There is a chance that changes in temperatures and growing seasons, and the reduced use of chemical fertilisers could affect the proliferation and the spreading of some species, insects, invasive weeds, or diseases. Some examples of the most threatening invasive species (most high risk) include Japanese Knotweed, Rhododendron and Giant Rhubarb.

Obj6.T7: Climate change negatively affecting species ranges and habitats

Climate change will have significant effects on biodiversity, including significant changes to species ranges and the composition of many of Ireland's protected habitats. The following habitats are likely to be the most vulnerable to climate change impacts in Ireland: upland habitats (siliceous and calcareous scree, siliceous and calcareous rocky slopes, alpine and subalpine heath); peatlands (raised bog, blanket bog); and coastal habitats (fixed dunes – combined with the additional threat of sea-level rise to coastal habitats).[684]

The main observable direct impacts of climate change on species and communities are changes in phenology, species abundance and distribution, community composition, habitat structure and ecosystem processes. Of the 94 ecological processes identified in Ireland, spanning across terrestrial, marine and freshwater ecosystems, 82% showed evidence of impact from climate change.[685] Furthermore, severe weather events have the potential to disrupt biodiversity and supply of ecosystem services. Increases in temperature will change the timing of life cycle events and the distribution of species. The physical impact of more intense storms and increased winter/spring rainfall will accelerate the degradation of habitats that are already compromised by unsustainable

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[682] https://www.chg.gov.ie/speech/minister-for-culture-heritage-and-the-gaeltacht-josepha-madigan-td-statement-to-the-dail-on-the-loss-of-biodiversity-and-the-extinction-of-species-on-29th-may-2019/

[683] Kelly, J., O'Flynn, C., Maguire, C. 2013. Risk analysis and prioritisation for invasive and non-native species in Ireland and Northern Ireland. A report prepared for the Northern Ireland Environment Agency and National Parks and Wildlife Service as part of the Invasive Species Ireland initiative.

[684] https://www.chg.gov.ie/app/uploads/2019/10/doc-7-climate-change-sectoral-adaptation-plan-for-biodiversity.pdf

[685] Department of Culture, Heritage, and the Gaeltacht (2019) 'Biodiversity Climate Change Sectoral Adaptation Plan' Prepared under the National Adaptation Framework https://www.chg.gov.ie/app/uploads/2019/10/doc-7-climate-change-sectoral-adaptation-plan-for-biodiversity.pdf

practices.[686] Drier conditions will make forests more susceptible to fires; and as ground fires become more frequent and intense there are greater chances of these spreading into tree crowns causing serious damage to forest crops and protected habitats.[687] In 2014, 8,000ha of forests were damaged by windblow, demonstrating further threats associated with extreme weather.

Obj6.T8: Slowdown in generational renewal could affect uptake of environmentally friendly practises

In Ireland, only 5% of farmers are under 35 years of age whereas 30% of farmers are 65 years and over.[688] A report undertaken by Macra na Feirme in 2014 found that only 52% of farmers had a farming successor identified.[689] According to *'European Young Farmers: Building a Sustainable Sector'* report, undertaken by the European Council of Young Farmers (CEJA), 89.78% of young farmers feel responsible for ensuring a sustainable agricultural sector and are concerned with preserving the natural environment.[690] Young farmers are also particularly conscious of environmental protection, biodiversity conservation and climate change mitigation, as well as being better informed on how to take these issues into account in everyday land management.[691] Therefore, a slowdown in generational renewal could affect the uptake of biodiversity friendly agricultural practices.

Obj6.T9: Continuing decline in pollinator species and invertebrates with a risk of species loss

Recent research has shown that 30% of bee species are considered threatened with extinction from Ireland, after undergoing a substantial decline in their numbers since the 1980s. Three bee species that occur in Ireland are also threatened with extinction at the European level and an additional four species are near threatened. The main pressures have been identified as habitat loss, fragmentation and degradation, whereby the availability of food plants and nesting sites have been drastically reduced through conversion of low-intensity farmland and semi-natural land to intensive farmland, forestry and urban/industrial use; and a decline in the availability of wildflowers used

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[686] https://www.chg.gov.ie/heritage/climate-change/the-biodiversity-climate-change-sectoral-adaptation-plan/
[687] https://www.forestryfocus.ie/growing-forests-3/threats-to-forests/climate-change/
[688] https://www.cso.ie/en/releasesandpublications/ep/p-fss/farmstructuresurvey2016/
[689] Bogue, P. (2014) Land Mobility and Succession in Ireland. Macra na Feirme https://www.ifa.ie/wp-content/uploads/2014/01/Land-Mobility-and-Succession-in-Ireland-Report.pdf
[690] http://int.masseyferguson.com/ceja-column-40.aspx
[691] http://www.ceja.eu/wp-content/uploads/2015/09/Annex-3-Soils.pdf

as food (nectar and pollen) as a result of increased use of fertiliser applied to agricultural land.[692]

Obj6.T10: Increasing ammonia emissions and their negative impact on habitats

Ammonia is produced by many common farming activities, such as the housing of livestock; the storage and spreading of manure and slurries; and the application of fertiliser. Ireland is currently in breach of its ammonia targets[693]; and further increases in ammonia emissions have been shown to have negative impacts on biodiversity including sensitive habitats.[694] A major effect of ammonia pollution on biodiversity is the impact of nitrogen accumulation on plant species diversity within affected habitats. Species that are adapted to high-nutrient availability tend to thrive in nutrient-rich environments, ultimately out-competing smaller and more sensitive species and therefore leading to lower species diversity. Secondly, ammonia pollution impacts species composition through soil acidification, direct toxic damage to leaves and by altering the susceptibility of plants to frost, drought and pathogens (including insect pests and invasive species). Changes to species composition may result in some species no longer fitting the criteria for a specific habitat type, resulting in the loss of certain sensitive habitats.

Obj6.T11: Failure to meet obligations under national and international legal obligations in relation to habitat protection and biodiversity

Ireland submitted its 3rd assessment on the status of EU-protected habitats and species[695] to the European Commission in 2019. The conclusion of the report that most Irish habitats listed on the Habitats Directive are in Unfavourable Status and almost half are experiencing ongoing declines demonstrates Ireland failure to meet the obligations outlined in the Prioritised Action Framework[696] . While, there are positive actions ongoing to address the decline, the threat of Commission proceedings against

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[692] All-Ireland Pollinator Plan 2015-2020. National Biodiversity Data Centre Series No. 3, Waterford. (https://pollinators.ie/resources/)

[693] EPA (2020) 'Irelands Air Pollutant Emissions 1990-2030' https://www.epa.ie/pubs/reports/air/airemissions/irelandsairpollutantemissions2018/EPA-Air-Pollutant-Emissions-website.pdf

[694] https://www.daera-ni.gov.uk/articles/ammonia-emissions-northern-ireland

[695] Department of Culture, Heritage and the Gaeltacht (2019)The Status of EU Protected Habitats and Species in Ireland https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf

[696] ' Format For A Prioritised Action Framework (PAF) For Natura 2000, For the EU Multiannual Financing Period 2014-2020' https://www.npws.ie/sites/default/files/general/PAF-IE-2014.pdf

Ireland, which could result in fines, as well as reputational damage to our green credentials.

Objective 7: attract and sustain young farmers and facilitate business development in rural areas;

Strengths

Obj7.S1: Irish farmers are highly educated and have high levels of agricultural training

The percentage of famers receiving agricultural education has increased over the period 2014-2019 from between 44% in 2014 to 49% in 2019.[697] In 2016, some 13% of the agricultural workforce in Ireland attained a high level of education in Ireland, which placed Ireland 11th out of the EU-28 countries.[698] Almost 45% of farm managers below 40 years of age had full agricultural training compared to 25% of all farm managers in Ireland and an EU average of 19% of farmers below 40 years of age.[699] The percentage of farmers relying on 'practical experience only' declined from about 90% in 1990 to approximately 50% in 2016, some 35% of young farmers rely on 'practical experience only'.[700] It has also been shown that there is a correlation between participation in formal agricultural education and farm size; with average farm size increasing by almost 20 hectares for those farmers who attained a formal education.[701] The increase in farm size suggests a greater economic return for farmers who attain a formal education; of which a large amount are young farmers.

Obj7.S2: Irish farmers have access to a range of education and training opportunities

A critical component of young farmer development is their ability to access education and training programmes to enhance their skills, competencies and knowledge, to ensure that they are effective at their enterprise. Teagasc provides training courses and structured education programmes for Irish farmer, including: a level 5 Certificate in Agriculture; and a level 6 Advanced Certificate in Agriculture, both known as 'Green Certs'. Both programmes are QQI accredited and both are offered on a full-time and part-time basis. In addition, Teagasc offers a level 7 course in Dairy Farm Management that is validated by University College Dublin. These courses offer a structured

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[697] https://www.teagasc.ie/media/website/publications/2020/NFS-2019-Sustainability-Report.pdf
[698] https://ec.europa.eu/eurostat/statistics-explained/pdfscache/62101.pdf
[699] Common Context Indicator C.24 'Agricultural training of farm managers' https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf
[700] https://www.teagasc.ie/media/website/publications/2018/Teagasc-Education-Vision-Report.pdf
[701] https://www.teagasc.ie/media/website/publications/2014/Teagasc_Impact_of_Education_Report.pdf

pathway towards a career in agriculture.[702] It is worth noting that farmers under the age of 35 (or sometimes 40) who have completed the level 6 course are classified as trained young farmers thereby providing access to certain schemes and tax incentives. During stakeholder consultation, the definition of a young farmer was highlighted as an issue warranting further consideration and potential change.

Participation in Teagasc further education programmes (full-time, part-time and distance education) and in Teagasc-linked higher education programmes has increased in recent years. In the 2013/14 academic year, there were 2,767 full-time participants and 1,011 part time and distance education participants, amounting to a total of 3,778 participant's altogether.[703]This number increased in the 2016/17 academic year to a total of 4,314 full-time participants and 2,899 part-time and distance participants, amounting to a total of 7,212 participant's altogether.[704] This shows an overall increase in farmers participating in full- time, part-time and distance learning courses, which suggests that young farmers are availing of the range of education and training opportunities available to them.

Obj7.S3: Well established and easily accessed knowledge transfer system

Overall, Ireland has a strong Agricultural Knowledge and Information System (AKIS) which has a particular focus on agricultural advisory services; and is unique in being largely composed of a public provider (Teagasc) and through private providers.[705] According to the 2016 EU report on the Needs of young farmers, the knowledge infrastructure in Ireland is well organised.[706] Alongside the various education programmes available, public and private farm advisory services are also provided in Ireland. These services include one-to-one consultations between advisors and farmers, on-farm visits and the organisation of knowledge transfer groups and events which encourage peer learning and the adoption of new technologies/techniques and to address the challenges facing the sector (including for example climate change, the environment and biodiversity). In 2019, both public and private advisory services

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[702] https://www.teagasc.ie/media/website/publications/2018/Teagasc-Education-Vision-Report.pdf

[703] https://www.teagasc.ie/media/website/publications/2014/Launch_ED_ResearchStudy_20Nov14.pdf

[704] https://www.teagasc.ie/media/website/publications/2018/Teagasc-Education-Vision-Report.pdf

[705] AKIS and advisory services in the Republic of Ireland: Report for the AKIS inventory (WP3) of the PRO AKIS project (March 2014) https://proakis.hutton.ac.uk/sites/proakis.hutton.ac.uk/files/Final%20Draft-%20Country%20Report%20Ireland(3).pdf

[706] https://op.europa.eu/en/publication-detail/-/publication/fa9c8e5e-eff8-11e5-8529-01aa75ed71a1

assisted over 98,000 Irish farmers.[707] This therefore indicates that young farmers can avail of advice and support from both advisors and fellow farmers.

According to the 2020 'Annual Review and Outlook for Agriculture, Food and Marine' approximately 18,600 farmers were actively participating in over 1,100 knowledge transfer discussion groups in 2020, facilitated by 460 advisors.[708] In 2020, Teagasc published their National Farm Survey 2019 Sustainability Report which found that being a member of a discussion group led to better economic performance across all farming systems.[709] This coincides with Teagasc's 2017 independent evaluation of dairy discussion groups that found that discussion groups were an effective advisory tool and were successful at encouraging peer to peer learning; and that group members were 20% more likely to adopt new technologies and better management practices, ultimately increasing their farm profits.[710] However, it is worth noting that although Ireland has an overall strong AKIS, there is scope to improve the relationship between public and private advisors.[711]

Obj7.S4: Effective design and implementation of supports for Young Farmers

At both EU and national level there has been an increase in supports for young farmers. These supports are designed to attract young farmers into the agricultural sector in order to ensure its sustainability into the future. Ireland has a strong tradition of supports to young farmers. The supports available through the CAP include:

- The National Reserve, which allocates entitlements for new entrants (predominantly young farmers) at the national average rate for eligible land. This combats a significant barrier to entry as new entrants can access supports that otherwise would not be available.

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[707] https://aca.ie/wp-content/uploads/2019/10/5870-ACA-J.Power-Economist-Report-Print-8.10.19.pdf

[708] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/foodindustrydevelopmenttrademarkets/agri-foodandtheeconomy/publications/aro2020/AnnualReviewandOutlookofDAFM2020Final031120.pdf

[709] https://www.teagasc.ie/media/website/publications/2020/NFS-2019-Sustainability-Report.pdf

[710] https://www.teagasc.ie/media/website/news/2017/Impact_of_Participation_in_Teagasc_Dairy_Discussion_Groups150113.pdf

[711] AKIS and advisory services in the Republic of Ireland: Report for the AKIS inventory (WP3) of the PRO AKIS project (March 2014) https://proakis.hutton.ac.uk/sites/proakis.hutton.ac.uk/files/Final%20Draft-%20Country%20Report%20Ireland(3).pdf

- Young Farmers Scheme provides additional payment to entitlements at 25% of national average capped at 50 entitlements per farmer. The payment is available to participants for a maximum of 5 years as an aid to establishing their farm business.
- TAMS II Young Farmer Capital Investment Scheme, which is co-funded under the 2014-2020 Rural Development Programme, provides higher grant rate of 60% compared to the standard rate of 40%.
- Collaborative Farming Grant Scheme provide support towards the legal costs of setting up farm partnerships.

Obj7.S5: Agri-taxation policy supports young farmers

The Agri-Taxation Review[712] was undertaken in 2014 as a joint initiative of the Department of Agriculture, Food and the Marine and the Department of Finance. The aim of the review was to evaluate the effectiveness of the various tax measures available to the agriculture sector and to determine whether the measures were ultimately beneficial or costly to the exchequer. It further aimed to align tax policy with the objectives set out in the Food Harvest strategy for the agricultural sector at the time. This review provided an evidence-based assessment of agri-taxation policy; and recommended continued assistance to the agriculture sector. It further illustrated that a coherent approach was needed to facilitate the development of younger farmers in Ireland. The review highlighted specific measures that were subsequently introduced in Budgets 2015 and 2016 designed to:

- Increase the mobility and the productive use of land;
- Assist succession; and
- Complement wider agricultural policies and schemes, for example, assisting new entrants and young trained farmers

Some agri-taxation measures are specifically targeted to support young farmers, these include:

100% Stock Relief for Certain Young Trained Farmers[713]

Young trained farmers meeting minimum academic and training requirements can avail of relief on income tax of 100% of the increase in value of trading stock and work-in-

[712] Bell, S (2016) "Ireland and agri-taxation" in *Irish Tax Policy in Perspective* Irish Tax Institute: Dublin.
[713] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/agri-foodindustry/agri-foodandtheeconomy/agri-foodbusiness/agri-taxation/indicativelistofagri-taxmeasures/incometaxmeasures/

progress at the end of the accounting period over and above the opening value. The farmer must be less than 35 years of age before the start of the accounting year. Young farmers in registered farm partnerships are also eligible to claim the 100% stock relief.

Stamp Duty Exemption on Transfers of Land to Young Trained Farmers[714]

Young trained farmers are fully exempt from paying stamp duty on transfers of land. To qualify for the exemption, a farmer must be less than 35 years of age on the date of execution of the deed of transfer. In addition, they must have attained a minimum agricultural education qualification.

Tax Credit under the Succession Farm Partnership Scheme[715]

The 2016 Budget introduced a new scheme designed to encourage earlier succession and the intergenerational transfer of family farms. The scheme encourages farmers and successors to enter into structured partnerships based on appropriate profit-sharing agreements, whereby a farm is eventually transferred to the successor at the end of a specified period, not exceeding ten years. To support this transfer, the partnership can avail of a tax credit of up to €5,000 per annum for five years once the family farm partnership is entered on the appropriate Succession Farm Partnership Register.

Agricultural Relief from Capital Acquisition Tax[716]

Capital Acquisitions Tax relief is available in respect of gifts and inheritances of agricultural property. The relief operates by reducing the market value of "agricultural property" by 90%, so that a gift or inheritance tax is calculated on an amount known as the "agricultural value," which is substantially less than market value.

Farm Restructuring Relief[717]

Farm restructuring is undertaken with the aim of making a farm more efficient. It involves the exchanging of land parcels in order to bring land closer together and to improve the overall operation and viability of the farm. Farmers are provided with full relief from Capital Gains Tax if the purchase price of a land parcel exceeds the sales

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[714] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/agri-foodindustry/agri-foodandtheeconomy/agri-foodbusiness/agri-taxation/indicativelistofagri-taxmeasures/stampdutymeasures/

[715] https://www.revenue.ie/en/tax-professionals/tdm/income-tax-capital-gains-tax-corporation-tax/part-23/23-02-11.pdf

[716] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/agri-foodindustry/agri-foodandtheeconomy/agri-foodbusiness/agri-taxation/indicativelistofagri-taxmeasures/capitalacquisitiontaxmeasures/

[717] https://www.revenue.ie/en/gains-gifts-and-inheritance/cgt-reliefs/farm-restructuring-relief.aspx

price; and partial relief from Capital Gains Tax if the purchase price is lower than the sales price.

Developing a favourable tax climate and providing an array of supports to young farmers assists in attracting young people into the agricultural sector.

Obj7.S6: Well-established collaborative farming arrangements in place to assist young farmers trying to access land and business opportunities

Collaborative farming initiatives, or joint farming ventures, such as farm partnerships, share farming arrangements and contract rearing arrangements are all encouraged within the Irish agricultural sector as appropriate ways in which to assist young farmers in overcoming obstacles to land access. Collaboration through farm partnerships provides many benefits such as smoother intergenerational transfer, reduced investment risk and better decision making, together with more efficient use of land and resources.

The Succession Farm Partnership Scheme also provides a partnership structure that allows farmers and successors to enter into an appropriate profit-sharing agreement, on the understanding that the farm will eventually transfer to the successor at the end of a specified period not exceeding ten years.[718] Other supports include the Collaborative Farming Grant Scheme (under the 2014-2020 Rural Development Programme) which covers part of the legal, advisory and financial services costs incurred in drawing up the Farm Partnership Agreement.[719]

In addition, a 100% stock relief is available for new entrants under 40 who are members of registered farm partnerships; and a 50% stock relief is available to other members of the registered farm partnership. A tax credit of up to €5,000 per annum for five years can also be allocated to partnerships and other specific supports such as stamp duty exemptions on transfers of land to young farmers, agricultural relief and retirement relief can affect those that participate in partnerships.[720] Other schemes such as the Young Farmer Basic Payment top-up, funding under the National Reserve and increased ceilings for TAMS (which can be doubled in a farm partnership to €160,000) also assist young farmers in developing a business and starting a career in agriculture.

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[718] https://www.teagasc.ie/media/website/rural-economy/farm-management/Succession-Farm-Partnerships-TCs-Jan-2020-(2).pdf

[719] https://www.gov.ie/en/publication/cdd0f8-conditions-of-the-collaborative-farming-grant-scheme/

[720] https://www2.deloitte.com/ie/en/pages/deloitte-private/articles/family-and-farming-partnerships.html

Teagasc offer services to inform and encourage collaborative farming arrangements citing the economic, social and skills benefits through these mechanisms. Specifically, Teagasc provide support for all forms of collaborative farming such as through the Succession Farm Partnership, Contract Rearing and Long-Term Leasing Guidelines. Information provided through clinics or events can be followed up with specific tailored advice for interested farmers.[721]

The Land Mobility Service, established by Macra na Feirme[722], is a national support service dedicated to helping farmers and farm families expand, change enterprise, or take a step back from farming; and to assist young farmers in acquiring farm enterprises or land. The service also assists farmers and farm families who do not have an identified farming successor to find one. The confidential service helps farmers, who are interested in entering into long-term leases and collaborative arrangements, to find young farmers interested in the same thing; ultimately assisting in the development of an arrangement that suits everyone's needs.[723]

As noted in the Land Mobility Report 2019, this service has been positively received by farmers and had resulted in the initiation of 521 arrangements since its establishment, resulting in 47,000 acres of land now being farmed by young, trained farmers. The report further found that entering into a collaborative arrangement increased on-farm productivity by 41%, which suggests that collaboration is economically beneficial to all parties involved.[724]

Obj7.S7: Strong agri-food sector providing opportunities for young farmers and business development in rural areas

The agri-food sector in Ireland is the most important indigenous industry. In 2019, exports of agri-food products were valued at over €14.5 billion. This sector, which is classified as primary production (agriculture, fishing and forestry) along with food & beverages and the wood processing sector, accounted for approximately 4.5% of Gross Value Added (GVA) at factor cost in 2019. The agri-food sector plays a key role in the wider rural and local economy, with estimates for output multipliers ranging from around 2.5 for beef, 2.0 for dairy and food processing, compared with an average

[721] https://www.teagasc.ie/rural-economy/farm-management/collaborative-farming/
[722] Macra na Feirme is an interest group that supports young farmers development in Ireland: https://www.macra.ie/
[723] https://www.macra.ie/webfiles/downloads-1523620861-the-land-mobility-service-pdf.pdf
[724] http://landmobility.ie/wp-content/uploads/2019/07/LAND-Mobility-2019-Report.pdf

output multiplier of 1.4 for the rest of the economy and 1.2 for foreign owned firms.[725] According to the Forestry Statistics Ireland 2020, the multiplier effect was 1.78 in the growing and harvesting subsector and 1.66 in the wood processing subsector in 2012. The agri-food sector including forestry and fishing plays a pivotal role in maintaining the rural economy, mainly by providing significant employment opportunities to people living in rural and coastal areas. In 2019, approximately 164,400 people, or 7.1% of the labour force, were employed in the agri-food sector. The agri-food sector makes a significant contribution to employment in rural and coastal areas in particular, i.e. between 10% and 14% of total employment outside of Dublin and the Mid-East regions. The 2016 Farm Structure Survey estimated that there were 137,500 farms in Ireland, with over 90% of farms located outside of Dublin and the Mid-East regions. Food Wise 2025, the ten-year strategy for the agri-food sector, acknowledges the importance of the agri-food sector to the Irish economy and provides a blueprint for businesses looking to develop and grow in this sector. Furthermore, it acknowledges the role young farmers play in assisting its sustainable growth.

Obj7.S8: Strong off-farm employment opportunities allow less profitable farming systems to remain economically sustainable

On-farm income can vary widely depending on region, farming system, size of farm, level of profitability and direct payments. As on-farm income varies greatly, it is common for farmers to avail of off-farm employment opportunities in order to make a sustainable living wage. According to the 2019 Teagasc National Farm Survey (NFS)[726], 34% of farm households were found not to be economically viable, but the farm households had an off-farm income source (either from a job, pension or social welfare) within the household and are thereby considered economically sustainable. 33% of farm households are considered to be economically vulnerable i.e. they are operating a non-viable farm business and neither the farmer nor spouse works off-farm. In 2019, some 44% of cattle rearing, 38% of cattle other and 36% of sheep farm households were considered sustainable due to their off-farm income source. It is also worth noting that the 2019 NFS did not include small farms (defined as having a lower total standard output than €8,000), of which there are some 40,000 farms. However, the 2015 Small Farm Survey did include small farms and found that 50% of the small farms were vulnerable, 33% were considered sustainable and only 17% were viable. In the absence

[725] Grealis, E. and O'Donoghue, C. (2015) *Chapter Five: Employment Multipliers of the Food Wise 2025 Strategy* in Grealis, E., O'Donoghue, C., Donnelan, T., Hennessy, T., Hynes, S., Lennon, J., Thorne, F., Twomey, C., Von Ousch, S. and Vega, A. (2015) *The Economic Impact of the Irish Bio-Economy*

[726] https://www.teagasc.ie/publications/2019/National-Farm-Survey-Preliminary-Results-2018.php pg. 26

of off-farm employment opportunities, some 63% of farm households in the Teagasc NFS sample and over 80% of small farms would be economically vulnerable.

This implies that young farmers hoping to develop a career in agriculture have the option to support their on-farm income with an off-farm income source. This is likely to influence a young farmers' decision to begin or continue farming; and is especially important for maintaining less profitable farming systems that are unlikely to be a viable career on their own. It could also encourage diversification to explore alternative income opportunities on-farm.

Obj7.S9: Government initiatives in place to facilitate business development in rural areas

One of the key targets of Ireland's Action Plan for Rural Development- Realizing Our Rural Potential[727], is to support indigenous businesses by accelerating the roll out of high speed broadband so that all businesses in rural Ireland are connected to the broadband infrastructure as soon as possible. Pillar 2 of the plan focuses solely on supporting enterprise growth and increasing employment opportunities in rural Ireland. The plan outlines a number of key objectives designed to ensure this, including the implementation of the eight regional Action Plans for Jobs and the development of an Atlantic Economic Corridor designed to grow and attract enterprise to rural Ireland and promote balanced regional development. It also supports the implementation of Food Wise 2025 which aims to develop the agri-food sector; and the rolling out of initiatives which support the development of the renewable energy sector and International Financial Services sector, ultimately allowing for sectoral business development in rural Ireland.

In addition, the €60 million Regional Enterprise Development Fund (REDF), established and provided for by the Department of Business, Enterprise and Innovation also aims to support business development in rural Ireland through 'collaborative and innovative initiatives that can make a significant impact on enterprise development in the regions and nationally.' Funding is rewarded under four streams with the maximum level of funding available being €5 million.[728] Furthermore, measures including the Rural Regeneration and Development Fund[729], Town and Village Renewal Scheme[730] and the

[727] https://www.chg.gov.ie/app/uploads/2017/01/162404-rural-ireland-action-plan-web-2-1.pdf
[728] https://dbei.gov.ie/en/Publications/Publication-files/Action-Plan-for-Jobs-2018.pdf
[729] https://www.gov.ie/en/publication/282dd-rural-regeneration-and-development-fund-3rd-call-now-open/
[730] https://www.gov.ie/en/policy-information/01125e-town-and-village-renewal-scheme/

Outdoor Recreation Funding Scheme[731] can all assist business development in rural Ireland.

Weaknesses

Obj7.W1: Agriculture has an ageing workforce with small proportion of young farm managers

The Teagasc National Farm Survey 2019 Sustainability Report indicates that the percentage of all farms with a high age profile[732] increased from 25% to 32%, based on a three year rolling average between 2014 and 2019.[733] In Ireland, 29.1% of farm managers are over 65 years old, compared to an EU average of 32.8%. However, the age profile of farm holders varies widely between EU countries. The share of young farm managers fell from 10.7% (of which 9.8% were men; and 0.9% women) in 2005, to 6.1% in 2016 (of which 5.6% were men; and 0.5% women), compared to an EU average of 5.1% in 2016.[734]Almost 40% of farm managers in 2016 were aged between 35 and 54 years, and the remaining 54% were aged 55 years and over.[735] The number of farmers in Ireland under the age of 35 halved from 2000 to 2010.[736] Since then, there has been a continued decline in the number of young farmers working in the agricultural sector; falling from 8,700 young farmers, which amounted to 6% of all farmers in 2010, to 7,400 young farmers, or 5% of all farmers in 2016.[737] The continued decline in young farmers, must be addressed in order to ensure the future viability and sustainability of the agri-food sector. Macra Na Feirme's Land Mobility and Succession in Ireland report[738] found that 48% of farmers overall did not have a farming successor identified; and 38% of farmers aged over 60 did not have a farming successor identified.

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[731] https://www.gov.ie/en/policy-information/fd0c9f-outdoor-recreation-infrastructure-scheme/

[732] Farms are defined as having a high age profile if the farmer is aged over 60, and there are no members of the farm household younger than 45.

[733] https://www.teagasc.ie/media/website/publications/2020/NFS-2019-Sustainability-Report.pdf

[734] Annual Review and Outlook for Agriculture, Food and the Marine (2019) https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/foodindustrydevelopmenttrademarkets/agri-foodandtheeconomy/publications/DepartmentAgricultureAnnualReviewOutlook2019200919.pdf

[735] Common Context indicator C.23 'Age structure of farm managers'
https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[736] https://enrd.ec.europa.eu/sites/enrd/files/w33_generational-renewal_factsheet_ireland.pdf

[737] https://www.cso.ie/en/releasesandpublications/ep/p-fss/farmstructuresurvey2016/

[738] Source: Macra na Feirme, Land Mobility and Succession in Ireland by Patrick Bogue https://www.ifa.ie/wp-content/uploads/2014/01/Land-Mobility-and-Succession-in-Ireland-Report.pdf

Obj7.W2: Difficulties associated with accessing land for purchase

Access to land is one of the main challenges for young farmers today. The EU report on the Needs of Young Farmers, published in 2015, identified land (to buy and to rent) to be the most important general need amongst young farmers throughout the EU.[739] Livestock farming systems in Ireland rely on outdoor, grass-fed pastures and therefore, land is a core asset for productive agriculture in Ireland. There is a cultural history of passing land down to family members in order to keep land within the family.[740] The Succession in Ireland report[741] highlighted that two-thirds of farmers stated that it was important for the farm to stay in family ownership with 40% stating that it was important that the farm was farmed by the family. Additionally, 18% believed that they would still need to earn an income from the farm even when they could no longer farm it themselves, indicating the inability of farms to support two generations as delaying farm transfer. The report further found that only 40% of farmers without farming successors would like to retire from active farming in the future and only a further 45% would possibly like to retire. Many farmers tend not to retire and instead, enter a stage of semi-retirement where they remain involved in the day-to-day running of the farm.[742]

As a result, there is a disconnect between young farmers' readiness to take over the farm, and their parents lack of preparedness or willingness to hand it over.[743] It appears that senior generations are reluctant to change the existing management and ownership structure of their farms for a number of reasons, including that they feel a loss of their identity, status or power.[744] As a result, senior farmers continually reiterate their need to continue managing the farm, suggesting that any reduction of involvement in the running of the farm would be detrimental to their health and well-

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[739] https://op.europa.eu/en/publication-detail/-/publication/fa9c8e5e-eff8-11e5-8529-01aa75ed71a1

[740] Geoghagan, C (2018) Understanding the economics of land access in Ireland. https://aran.library.nuigalway.ie/bitstream/handle/10379/7256/Thesis_final_corrected%20.pdf?sequence=1&isAllowed=y

[741] Source: Macra na Feirme, Land Mobility and Succession in Ireland by Patrick Bogue https://www.ifa.ie/wp-content/uploads/2014/01/Land-Mobility-and-Succession-in-Ireland-Report.pdf

[742] https://www.teagasc.ie/media/website/publications/2019/TResearch_Autumn2019_farm-succession.pdf

[743] Teagasc (2017) "Uncovering obstacles to intergenerational farm transfer" TRESEARCH, VOLUME 12: NUMBER 3 https://www.teagasc.ie/media/website/publications/2017/13_Intergenerational-farm-transfer.pdf

[744] Teagasc (2019) "The language of farming" TRESEARCH, VOLUME 14: NUMBER 3 https://www.teagasc.ie/media/website/publications/2019/TResearch_Autumn2019_language-of-farming.pdf

being." [745] The reluctance of older generations to transfer ownership and responsibility of their farm to younger generations results in numerous socioeconomic challenges for younger people aspiring to pursue farming as a career and contributes enormously to the limited amount of land available for purchase in Ireland.

The amount of agricultural land sold annually in Ireland represents less than 1% of the total stock of land which is farmed.[746] In 2017, 32,990 acres of agricultural land was sold in Ireland which represents 0.3% of all land available.[747] Furthermore, the national average agricultural land value varies considerably on a provincial basis, reflecting the regional differences in land capacity that is associated with system differences with the more profitable farms located in Leinster and Munster compared to a higher proportion of drystock farmers in Connaught and Ulster.[748]

As a result of the difficulties associated with accessing land for purchase, there is a growing need to lease farmland. This is particularly the case for young farmers and new entrants who face greater difficulties accessing finance. Traditionally, most of the land was made available to rent through the conacre system, which means that land is informally leased on a short-term basis. However, more recent developments through government initiatives into Long Term Leasing have provided an alternative mechanism to access land.

Obj7.W3: Difficulties accessing finance

Difficulties in accessing finance, due to limited credit history and the lack of collateral, is one of the main difficulties faced by young farmers.[749] A fi-compass report found that the main issues hindering farmers' access to finance relate to the economic viability of farms, lack of collateral and the risk associated with farming as an enterprise, which is considered too high for banks. In addition, there is a lack of competition between key financial players, with the financing supply being dominated by two banks. These issues are further compounded for young farmers as a result of their inability to supply appropriate collateral to banks or to demonstrate any credit

[745] Teagasc (2017) "Uncovering obstacles to intergenerational farm transfer" TRESEARCH, VOLUME 12: NUMBER 3

[746] https://www.scsi.ie/documents/get_lob?id=589&field=file Society of Chartered Surveyors Ireland/ Teagasc Land Market Review and Outlook 2015.

[747] Source CSO, Agricultural Land Prices 2017 https://www.cso.ie/en/releasesandpublications/ep/p-alp/agriculturallandprices2017/kni/

[748] https://www.teagasc.ie/media/website/publications/2019/SCSI-Teagasc-Agricultural-Land-Market-Review-and-Outlook-2019.pdf

[749] https://op.europa.eu/en/publication-detail/-/publication/fa9c8e5e-eff8-11e5-8529-01aa75ed71a1

history.[750] It has also been found that has been difficult to get a loan particularly for a young farmer with limited credit history as lenders often require a three-year track record. It was also noted that young farmers were not in a position to borrow sufficient funds to buy a new farm outright for themselves. Rather, young farmers were more likely to seek credit to buy a few acres to expand their parents' business or the business they have inherited from their parents. In addition, the repayment capacity depended on the specific sector with non-dairy farmers experiencing more difficulties in accessing finance given lower income expectations.[751] In general terms, some 23% of young farmers are afraid to apply for loans; 35% of young farmers have no assets for collateral; and 27% of young farmers' applications are rejected by banks.[752] Furthermore, the investment risk being too high (60.2%) and the lack of appropriate collateral (24.2%) were the two most common reasons identified by young farmer respondents as to why banks refused their loan applications.[753] Without access to credit from banks, young farmers will not be able to invest in the necessary factors of production develop a farm enterprise or to increase productivity and profitability on their farms. However, it should be noted that the Future Growth Loan Scheme was designed to address these issues and received high levels of uptake.[754]

Obj7.W4: Farmers receive a lower than average income compared to other sectors of the economy

Income rates vary significantly between sectors, with farmers earning the lowest at just over €19,536 compared to an average of €49,740 in 2016.[755] Furthermore, farm incomes vary greatly across regions and farming systems. In 2019, dairy farms had the highest average farm income at €66,570, while Cattle Rearing farms had the lowest average farm income at €9,188. In terms of geographical spread, the South-East region had the highest average family farm income at €35,622 in 2019 and the Border region had the lowest at just over €11,160. Similarly, the reliance on direct payments is highest

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[750] Fi-compass (2020) "Financial needs in the agriculture and agri-food sectors in Ireland" https://fi-compass.eu/sites/default/files/publications/financial_needs_agriculture_agrifood_sectors_Ireland.pdf

[751] https://ec.europa.eu/agriculture/sites/agriculture/files/external-studies/2015/young-farmers/country-reports/annex-i.14-ireland.pdf Pg. 10

[752] https://www.fi-compass.eu/sites/default/files/publications/Support%20for%20Young%20Farmers%20in%20the%20EU.pdf

[753] https://www.fi-compass.eu/sites/default/files/publications/Joint_initiative_for_improving_access_to_funding_for_European_Union_Young_Farmers.pdf

[754] https://sbci.gov.ie/products/future-growth-loan-scheme

[755] https://www.cso.ie/en/releasesandpublications/ep/p-gpii/geographicalprofilesofincomeinireland2016/occupationsandsector/

in the Border region and lowest in the Southern region at 143% and 55% of average family farm income respectively.[756] In addition, farm incomes are also reliant on yields and prices which vary depending on weather and market conditions. This gap in income between farming and other sectors of the economy and the variability of income depending on farming system and region presents challenges when attracting and sustaining young new entrants to the sector.

Obj7.W5: Lack of diverse employment opportunities and a higher risk of poverty in rural areas

Rural areas tend to become more socioeconomically attractive when young farmers and new businesses are encouraged to set up there.[757] However, rural areas in Ireland tend to have fewer employment opportunities compared to urban areas and tend to be over-reliant on primary industries, such as agriculture or construction; and therefore, many highly-skilled, young people either emigrate or migrate to urban areas where there are greater job opportunities.[758] Furthermore, the risk of poverty in rural areas was 17.2% compared to the risk of poverty in urban areas of 15.1%.[759] The fact that people living in rural Ireland have lower incomes, less diverse employment opportunities and are at a greater risk of poverty could deter young people from considering a career in farming and setting up a business in rural areas.

Obj7.W6: Reduced access to services in rural areas compared to large urban centres

Rural communities face greater challenges with regards accessing basic services compared to their urban counterparts and this can deter young people from staying and working in these areas; and can deter businesses from developing in these areas also. These challenges can range from a declining and ageing population limiting the amount of human capital available; the closure of banks, Post Offices and Garda stations in smaller towns and villages; and a lack of access to quality broadband infrastructure and new technologies. Furthermore, the lack or inadequacy of public

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[756] https://www.teagasc.ie/media/website/publications/2020/TeagascNFS2019-Preliminary-Results.pdf

[757] https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/key_policies/documents/soc_background_final_en.pdf

[758] Irish Rural Link 'Poverty and Social Inclusion' http://www.irishrurallink.ie/wp-content/uploads/2016/10/Poverty-and-Social-Inclusion-The-Case-for-Rural-Ireland.pdf

[759] Social Justice Ireland (2019) Poverty Focus https://www.socialjustice.ie/sites/default/files/attach/publication/5763/2019-04-15-sjipovertyfocus2019final.pdf?cs=true

transport options in rural areas necessitates car ownership in order to access employment, basic services and amenities and this results in people in these areas having to travel greater distances to access basic services, which is both costly and time consuming. All of these issues can deter young people from settling down in rural areas.[760]

[760] Irish Rural Link 'Poverty and Social Inclusion' http://www.irishrurallink.ie/wp-content/uploads/2016/10/Poverty-and-Social-Inclusion-The-Case-for-Rural-Ireland.pdf

Opportunities

Obj7.O1: Continue to increase the level of training and education opportunities available to young farmers

Family farm income is highest in households where the farmer has either gone to agricultural college or has obtained an agricultural certificate. This is likely due to the fact that farmers who have obtained a formal education tend to have larger farms than those who haven't. It also found that educated farmers have increased productivity levels, are more efficient and adapt more successfully to technological change.[761] It is therefore important to increase the level of training and education opportunities available to young farmers in order to ensure they are equipped with the necessary knowledge and capabilities available to allow them to progress and excel in their careers.

Obj7.O2: Build on the range of supports available for Young Farmers including assisting in the mobilisation of land

There is an opportunity to build on the current suite of measures (both at EU and national level) available to Young Farmers in Ireland which provide them with incentives to enter the farming sector and to upgrade their agricultural buildings and equipment. From 2015 to 2019, over 8,000 young farmers participated in each year of the Young Farmers Scheme. From 2015 to 2019, a total of approximately 8,000 young farmers benefitted from the National Reserve.[762] This coupled with the Young Farmer Capital Investment Scheme, agri-taxation measures that favour young farmers, the Succession Farm Partnership Scheme[763] and the Future Growth Loan Scheme[764] offer a range of interventions to assist young farmers in establishing a farm business. Building on these supports in the next CAP period will further encourage young farmers to pursue a career in agriculture.

In Ireland, there are a number of arrangements in place to provide for and encourage the smooth mobilisation of land between young and old farmers; and to assist in the restructuring of land parcels for greater efficiency purposes. Long-term leasing was identified in the Agri-Taxation Review[765] as key to addressing the issue of land mobility

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761 https://www.teagasc.ie/media/website/publications/2014/Teagasc_Impact_of_Education_Report.pdf

762 DAFM figures

763 https://www.gov.ie/en/service/ad6c2-succession-farm-partnership/

764 https://sbci.gov.ie/products/future-growth-loan-scheme

765 https://igees.gov.ie/wp-content/uploads/2014/10/Agritaxation_-Review-_Final_web-pub.pdf

and the productive use of land; and recent data from Revenue shows that the number of long-term land leases in Ireland did increase between 2011 and 2017, from 3,590 to 9,790.[766] However, issues relating to the mobilisation of land and the intergenerational farm transfer process still exist. Any initiatives to encourage land mobilisation should also consider farmers' emotional needs and the possible social consequences of mobilising their land. In addition, the involvement of a certified farm succession facilitator could facilitate communication between the senior farmer and junior farmer. Lastly, there is an opportunity to establish a national organisation that represents older farmers; as is the case with younger farmers being represented by Macra na Feirme.[767]

Obj7.O3: Increase availability and access to digital technologies in agriculture

Educated farmers are more likely to adopt new and innovative technologies and products as a result of their increased ability to distinguish between likely successful or unsuccessful innovations.[768] The fact that more young farmers are being educated implies a greater likelihood to adopt new and innovative technologies and products. As technology continues to advance and increase productivity levels, this in turn leads to a reduction in labour demands on farm. For example, the use of automatic milking machines can reduce the requirement for extra labour units; and the use of automatic guidance systems to apply fertilisers and pesticides can reduce overlapping and therefore reduce costs; while also producing positive environmental implications, such as improved soil structure.[769] The likely reduction in labour demands and costs as a result of the adoption of new innovations has the potential to entice young farmers into the agricultural sector; and therefore it is necessary to increase the availability and access to new and innovative digital technologies; and to encourage their uptake through supports such as the Targeted Agricultural Modernisation Scheme (TAMS).

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[766] Teagasc- Guidelines for Long-term Land Leasing. https://www.teagasc.ie/media/website/publications/2019/Long-Term-Land-Leasing.pdf

[767] Teagasc (2019) "The language of farming" TRESEARCH, VOLUME 14: NUMBER 3 https://www.teagasc.ie/media/website/publications/2019/TResearch_Autumn2019_language-of-farming.pdf

[768] https://www.teagasc.ie/media/website/publications/2014/Teagasc_Impact_of_Education_Report.pdf

[769] https://www.europarl.europa.eu/RegData/etudes/note/join/2014/529049/IPOL-AGRI_NT%282014%29529049_EN.pdf

Obj7.O4: Develop and promote career pathways in agriculture including, for example, into organic farming

Whilst there are weaknesses related to the profitability of some farming systems in Ireland and while there are challenges associated with generational renewal, it is important to note that opportunities do exist to develop a career in the agricultural sector. The demand for food continues to rise globally and therefore there are significant growth opportunities across all sub-sectors of the Irish agri-food industry. Foodwise 2025 projects a growth in exports of €19 billion per annum in value by 2025, driven chiefly by expansion in dairy, beef, seafood and consumer food and drinks exports. The increase in exports is expected to increase direct employment, potentially creating 23,000 additional jobs up to 2025.[770] According to Teagasc research undertaken in 2016, approximately 6,000 people will need to join the Irish dairy industry by 2025.[771] The 'People in Dairy Action Plan' outlines a range of actions and initiatives designed to ensure Irish dairy framing reaches its full potential and delivers a rewarding career to both dairy farmers and farm employees. One of the recommendations included in the plan is to provide Continuous Professional Development (CPD) training to farmers and farm workers in order to ensure they are equipped with the necessary skills to avail of the opportunities that emerge in this industry.[772] As the agri-food industry grows and exports increase, it will be necessary to develop career pathways that entice young farmers into the agri-food industry and promote agriculture as a career path of choice for young school leavers and university graduates.[773] Young farmers should be encouraged to consider lower carbon intensity farming options such as organic production. Organic farm managers tend to be younger than the average conventional farmers. In 2010, farmers younger than 55 years of age represented 61.3% of the total in the organic sector compared to 44.2% in the non-organic sector.[774] Organic farms are also more likely to be associated with on farm processing and adding value.

Obj7.O5: Encourage the continued development of the forestry sector in rural areas

There is scope to further develop the forestry sector in terms of increasing afforestation rates, increasing the rate of timber being harvested for timber products and increasing the supply of forest biomass for the production of renewable energy. In

[770] https://www.gov.ie/en/publication/a6b0d-food-wise-2025/
[771] https://www.teagasc.ie/animals/dairy/dairy-careers/
[772] https://www.teagasc.ie/media/website/publications/2018/People-in-Dairy-Action-Plan.pdf
[773] https://www.gov.ie/en/publication/a6b0d-food-wise-2025/
[774] https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/trade/documents/agri-market-brief-03_en.pdf

2020, afforestation rates were just over 25% of the annual target level of 8,000 hectares, due to a backlog in the issuing of afforestation permits. This means that there will have to be a significant increase in the rate of tree planting from 2021 onwards in order to meet the afforestation target outlined in the Climate Action Plan. This will require both a sustained flow of afforestation approvals and a sustained level of business development to allow for this increase. In relation to timber, harvesting is projected to increase in conjunction with the predicted increase in roading and felling licence approvals from 2021 onwards; and again, businesses will have to develop and expand in order to maintain sufficient harvesting levels.[775] In relation to renewable energy production, only 18.6% of renewable energy in Ireland comes from forestry, compared to an EU average of 41%.[776] Combining the needs of the national wood panelling and wood-based energy sectors suggests that Irish forest supply is unlikely to meet demand for much longer; and that business development in this area will be vital to keep pace.

Obj7.O6: Encourage diversification of the rural economy

Our Rural Future - Rural Development Policy 2021-2025 outlines some key deliverables designed to support job creation in rural areas, including a continued focus by the enterprise development agencies to grow regional employment and diversification of rural economies into new sectors and markets. The Teagasc Options Programme supports diversification in rural areas, in particular at farm level. The aim of the programme is to support individuals to develop their business idea through mentoring, business plan completion and to introduce individuals to agencies/parties, such as the Local Enterprise Office and LEADER Local Action Groups that may be able to offer tangible assistance for their specific business idea.[777] Continuing to support the diversification of rural Ireland, will attract young farmers and encourage generational renewal.

Obj7.O7: Facilitate remote working in rural areas

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[775] Teagasc "Outlook 2021. Economic Prospects for Agriculture" https://www.teagasc.ie/media/website/publications/2020/Outlook-2021.pdf

[776] Common Context Indicator C.43 'Production of renewable energy from agriculture and forestry' (2019 update) https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[777] https://www.teagasc.ie/rural-economy/rural-development/options-programme/about/

Our Rural Future - Rural Development Policy 2021-2025 includes key deliverables relating to remote working, including the implementation of a National Remote Working Strategy and investment in remote working facilities in order to facilitate employees in working from home, or from co-working spaces in rural areas. While remote working is not a new phenomenon, Covid-19 has demonstrated that remote working is a viable option for a number of workers and businesses, ultimately providing an array of employment opportunities 'based' in rural areas. In addition, to facilitate and encourage remote working, particularly in rural areas, it is necessary to develop an adequate broadband infrastructure which can support the increased connectivity. This can be achieved through the delivery of the National Broadband Plan (NBP)[778] which will also develop further opportunities for social cohesion, community empowerment, enterprise, employment, education, innovation and skills development for those who are living and working in rural areas. Providing broadband to rural areas will enable people to pursue their careers in rural areas without needing to relocate and will create a climate whereby new people and businesses will consider relocating to rural locations.

Obj7.O8: Encourage the continued development of the bio-economy in rural areas

Our Rural Future - Rural Development Policy 2021-2025 also includes key deliverables relating maximising of opportunities presented by the Bio-economy, Circular economy, and Green Economy. Ireland's biogas and bio-methane sectors are still in their infancy[779], however, the National Policy Statement on the Bio-economy[780] notes that Ireland is in a good position to develop its bio-economy. Ireland has an array of natural comparative advantages that can be utilized to develop its bio-economy, including its significant agricultural sector which provides an abundance of biomass to the bio-economy; as well as one of the largest seabed territories in Europe. By supporting the development of the bio-economy, Ireland will also support sustainable growth and job creation in many sectors of the rural economy, including the agricultural, industrial and technological sectors. In addition, expanding the bio-economy will allow for opportunities to arise in relation to the development of products and services such as bio-based materials and chemicals, bio-energy and biofuels, and in the bio-based waste sector; and will therefore allow for greater business development in rural areas.

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[778] https://www.dccae.gov.ie/documents/Delivering%20the%20National%20Broadband%20Plan.pdf
[779] ESRI. Promoting biogas and biomethane production: Lessons from cross country studies http://aei.pitt.edu/102241/1/WP630.pdf
[780] https://assets.gov.ie/2244/241018115730-41d795e366bf4000a6bc0b69a136bda4.pdf

Threats

Obj7.T1: Income volatility across the agricultural sector due to changes in weather and market conditions

According to the National Farm Survey undertaken by Teagasc, there was a decline in average income levels across the agricultural sector due to extreme weather conditions in 2018. This demonstrates the volatile nature of income levels across the agricultural sector as a result of changing weather conditions. According to a report published by the Intergovernmental Panel on Climate Change, the frequency and intensity of extreme weather and climate events have increased because of global warming and these events are predicted to continue increasing.[781] In recent years, Ireland has experienced several extreme weather events including droughts and floods and these extreme weather events are expected to continue.[782] These changing weather conditions will have an effect on our temperate climate and will have an impact on yields and productivity[783] and therefore farmer incomes.

In addition to changes in weather conditions, changes in market conditions can also lead to income volatility. According to Teagasc's National Farm Survey, cattle prices fell in 2019. In addition to a fall in cattle prices, there was a sharp reduction in cereal prices, reflective of global supply and demand conditions.[784] Unlike other sectors, it is extremely difficult for farmers to cut production in response to falling prices over the short-term because production decisions are usually made a year in advance[785]; and therefore price changes greatly affect farmers' incomes. As income volatility is evident across all farming systems, this may deter young people from starting a career in agriculture.

Obj7.T2: Low incomes in certain sectors may deter young farmers

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[781] https://www.ipcc.ch/site/assets/uploads/2019/08/2c.-Chapter-2_FINAL.pdf

[782] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf [and] Desmond, M. et al. (2018), *State of Knowledge on Climate Change Impacts for Ireland* [online] http://www.epa.ie/pubs/reports/research/climate/EPA%20RR%20223_web.pdf

[783] Sweeney, J. et al (2008) Climate Change – Refining the Impacts for Ireland: STRIVE Report (2001-CD-C3-M1) ISBN: 978-1-84095-297-1. Technical Report. Environmental Protection Agency, Wexford, Ireland.

[784] https://www.teagasc.ie/media/website/publications/2020/TeagascNFS2019-Preliminary-Results.pdf

[785] https://www.gov.ie/en/publication/91e7e-annual-review-and-outlook-for-agriculture-food-and-the-marine-2020/

In 2019, average family farm income was €23,576; however, family farm income differed considerably by farm system. As already noted, dairy farms recorded the highest average income levels at €66,828 in 2019. This compared to €9,006 for cattle rearing farms, €13,761 for cattle other farms, €14, 780 for sheep farms and €32,700 for tillage farms.[786] Cattle and Sheep farms are typically characterised by lower profitability and smaller holdings which is reflected in their total Family Farm Incomes (FFI). Income and profitability related challenges particularly in relation to beef or sheep sectors may deter potential young farmers from a career in farming as opposed to other sectors of the economy. Farmers earn less than 40% of the average income earned across the economy.[787] This lower income will deter young people from pursuing a career in the agricultural sector and is likely to cause a continued decline in available labour.

Obj7.T3: Reduction in existing young farmer supports

A reduction in the level of young farmer supports such as the National Reserve, the Young Farmer Scheme and the Young Farmer Capital Investment Scheme under TAMS II; or a revision of national measures around taxation, succession and loan schemes, may lead to a less favourable economic climate for young farmers and would likely result in the reduced viability of some farming sectors due to the high initial and ongoing costs of setting up a farm business. While there are no indications of a decrease in support for young farmers in the short terms, policy interventions by their nature are constantly subject to review and therefore could be considered a threat.

Obj7.T4: Continued decline in young farmer numbers

As highlighted by the European Commission in its report 'Young Farmers and the CAP,' Ireland and the wider European Union are faced with the challenge of an ageing farming population.[788] The CSO's Farm Structures Survey, undertaken in 2016, found that in Ireland young farmers (those under 35 years of age) accounted for just 5.4% of total Irish farmers.[789] Farmers face many economic challenges, including a declining

[786] https://www.teagasc.ie/media/website/publications/2020/Teagasc-National-Farm-Survey-2019.pdf
[787] Common Context Indicator C.26 'Agricultural entrepreneurial income' https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf
[788] https://noaw2020.eu/wp-content/uploads/2017/05/KF0214706ENC_002-Young-Farmers-and-CAP-English.pdf
[789] Source: Department of Agriculture, Food and the Marine, Annual Review and Outlook 2018

rate of productivity growth, pressures on production costs due to high input prices, price volatility, and the position of farmers in the food supply chain. In addition, they face environmental and social challenges, including problems relating to resource efficiency, threats to habitats and biodiversity, depopulation and an ageing population in rural areas.[790] As identified by the European Commission report 'Young Farmers' needs[791], potential young farmers may prefer to opt for a career that is less demanding referring to the demanding hours and unsociable nature of the work. These challenges act as a deterrent to young people thinking of starting a career in the agricultural sector and continue to threaten the sustainability of the agri-food sector.

Obj7.T5: The deterioration of rural towns and villages

In recent years, Irish rural towns and village centres have faced increasing difficulties related to retaining vibrancy and vitality and as a result, business development in these areas has declined. From a retail perspective, the increase in online shopping as well as the development of shopping centres and retail parks situated outside of rural towns has led to a decline in business development in these areas. In addition, high rental prices have led to property vacancies also thwarting business development. Furthermore, there has been an increased occurrence of people migrating to larger urban centres for work and other reasons, resulting in a further deterioration of these areas. [792] This ongoing deterioration also acts as a deterrent to young people thinking of setting up a business in these areas or starting a career in agriculture.

Obj7.T6: Not maximising opportunities presented by the digital economy

The successful roll-out of the National Broadband Plan is essential if business development is to be encouraged in rural areas. Any delay in its roll-out could have negative knock on effects on rural communities. These negative effects include the continued decline in younger age cohorts and missed opportunities for business development in rural areas. In a declaration made by the Council of the European Union in 2017, entitled "A smart and sustainable digital future for European agriculture and rural areas" it was found that less than 50% of rural areas across the EU had fast broadband connectivity. The low prevalence of fast connectivity prevented these

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[790] https://op.europa.eu/en/publication-detail/-/publication/fa9c8e5e-eff8-11e5-8529-01aa75ed71a1

[791] https://ec.europa.eu/agriculture/sites/agriculture/files/external-studies/2015/young-farmers/country-reports/annex-i.14-ireland.pdf

[792] A framework for Town Centre renewal https://dbei.gov.ie/en/Publications/Publication-files/A-Framework-for-Town-Centre-Renewal.pdf

communities from reaping the many benefits associated with digitalisation, including social and economic integration; and contributed greatly to the depopulation of rural areas. In addition, it results in an increase in the average age of rural populations. [793] Without efficient broadband connectivity, businesses will be deterred from setting up in rural areas. Therefore, it is clear that there is an ongoing need to provide broadband to all areas and any delay in the provision of this will negatively affect people living in these areas.

Obj7.T7: Increasing levels of poverty and social isolation in rural Ireland

Poverty levels are higher in rural areas than they are in urban areas. If poverty levels continue to increase in rural areas as a result of poor employment opportunities, over reliance on primary sector employment and the high expenses associated with having to travel for basic services, then less and less people will be enticed to live and work in rural Ireland. Rural communities face greater challenges with regard to accessing services compared to their urban counterparts and this has allowed for higher levels of social isolation to persist in rural areas. The impact of poverty and social isolation are felt by many groups with those most affected usually being older persons, young people, women and lone parents, persons with a disability, migrants and the traveller community. These at-risk groups are often listed as being in consistent poverty.[794] Higher levels of poverty and social isolation in rural areas will acts as a deterrent to young people thinking of setting up a business in these areas or starting a career in agriculture.

Obj7.T8: Uncertainties associated with climate change

There is the ongoing and increasing threat of climate change. As agriculture in Ireland depends primarily on outdoor production processes which are dependent on specific temperature and rainfall levels, agriculture is therefore one of the most climate-sensitive industries in the country. Projected changes that are likely to impact agricultural processes include climatic changes, such as an increase in temperature, increased winter rainfall and decreased summer rainfall; and, an increase in frequency of extreme weather events.[795] The occurrence of extreme weather events over the last

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[793] https://data.consilium.europa.eu/doc/document/ST-7085-2019-INIT/en/pdf

[794] https://www.cso.ie/en/releasesandpublications/ep/p-silc/surveyonincomeandlivingconditionssilc2017/povertyanddeprivation/

[795] Flood, S. (2013) 'Projected Economic Impacts of Climate Change on Irish Agriculture' https://www.stopclimatechaos.ie/assets/files/pdf/projected_economic_impacts_of_climate_change_on_irish_agriculture_oct_2013.pdf

few years, including storms, snow, heatwave and drought highlights the vulnerability of agriculture to climate change[796]; demonstrating that any change to our temperate climate will have an impact on incomes, yields and productivity.[797] The uncertainties associated with climate change may act as deterring factors for young people thinking of starting a career in agriculture.

[796] https://data.oireachtas.ie/ie/oireachtas/committee/dail/32/joint_committee_on_climate_action/reports/2019/2019-03-28_report-climate-change-a-cross-party-consensus-for-action_en.pdf

[797] Sweeney, J. et al (2008) Climate Change – Refining the Impacts for Ireland: STRIVE Report (2001-CD-C3-M1) ISBN: 978-1-84095-297-1. Technical Report. Environmental Protection Agency, Wexford, Ireland.

Objective 8: promote employment, growth, gender equality, social inclusion and local development in rural areas, including bio-economy and sustainable forestry;

Strengths

Obj8.S1: Dedicated Government Department for Rural and Community Development

In 2018, 57% of the Irish population lived in rural regions, 14.7% lived in intermediate regions; and only 28.3% lived in urban regions.[798] The Department of Rural and Community Development was established in 2017.[799] The aim of its establishment was to promote and encourage rural and community development; as well as to support vibrant, inclusive and sustainable communities throughout Ireland. The establishment of this Department demonstrates the importance of supporting rural communities across Ireland and the Government's commitment to ensure the sustainability of rural areas.

Obj8.S2: A whole of Government approach to rural development

In 2017, the Department of Rural and Community Development published an over-arching, whole-of-government strategy 'Realising our Rural Potential - the Action Plan for Rural Development' which aimed at delivering change for people living and working in rural Ireland.[800] The Department, building on the success of this Action Plan, is currently finalising a new rural development policy, 'Our Rural Future - Rural Development Policy 2021-2025', which aims to further develop rural communities and support the population of rural Ireland. The new policy sets out a vision for rural Ireland, centred on people, whereby rural communities are recognised as being integral to Ireland's economic, social, cultural and environmental prosperity; and the interdependency of urban and rural areas is acknowledged. It further recognises the importance of developing vibrant rural places; and building upon the opportunities provided in the rural economy to optimise digital technology, create quality jobs, support enterprise and sustain our shared environment. The policy complements other Government policies and initiatives such as Project Ireland 2040, the Climate Action

[798] Common Context Indicator C.01'Population' 2019 update https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[799] https://www.gov.ie/en/organisation/department-of-rural-and-community-development/?referrer=/wp-content/uploads/m3b-scheme-outline.docx/

[800] https://assets.gov.ie/2715/131118093828-a9da81a7a12b4f85aad3260c4f4bd80c.pdf

Plan[801], the National Economic Plan and the National Broadband Plan[802]; placing a particular emphasis on the relevance of those initiatives to rural areas.

Obj8.S3: Ireland's National Planning Framework and Development Plan - Project Ireland 2040 - includes a strategic objective on Strengthened Rural Economies and Communities

Project Ireland 2040[803] establishes a pathway for the long-term development of Ireland, based on two pillars – the National Planning Framework[804] (NPF) and the National Development Plan[805] (NDP). One of the key objectives in Project Ireland 2040 is "Strengthened Rural Economies and Communities." Under this objective, focus is given to implementing the actions outlined in the Action Plan for Rural Development and implementing a targeted Rural Regeneration and Development Fund. Additionally, focus is given to developing rural broadband, providing sufficient public transport in rural areas, maintaining regional and local roads, investing in tourism and the Gaeltacht; and lastly, investing in agri-food and the sustainable growth of the agri-food sector. [806] By 2040, the population of Ireland is expected to increase by 1 million people to a total population of 5.7 million, with 50% of the projected population growth expected to take place in towns, villages and rural areas.

Obj8.S4: High proportion of Irish population live in rural areas compared to EU

According to Eurostat, on the 1st January 2020, 57% of the Irish population were living in predominantly rural regions, 15% were living in intermediate regions and 28% were living in predominantly urban regions. The share of people living in rural areas in Ireland is more than half compared to those living in rural areas across the EU-27. On 1st January 2020, 21% of the EU-27 population were living in predominantly rural areas, 39% were living in intermediate areas and 40% were living in predominantly urban areas. [807] Of the 57% living in predominantly rural regions, 56% are aged from 15-64 years compared to 15% in intermediate regions and 29% in predominantly urban

[801] https://www.dccae.gov.ie/documents/Climate%20Action%20Plan%202019.pdf
[802] https://www.dccae.gov.ie/documents/Delivering%20the%20National%20Broadband%20Plan.pdf
[803] https://www.gov.ie/en/campaigns/09022006-project-ireland-2040
[804] http://npf.ie/wp-content/uploads/Project-Ireland-2040-NPF.pdf
[805] https://assets.gov.ie/19240/62af938dce404ed68380e268d7e9a5bb.pdf
[806] https://assets.gov.ie/19240/62af938dce404ed68380e268d7e9a5bb.pdf
[807] Common Context Indicator C.01 'Population' (2019 update) https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

regions.[808] The fact that more than half of the Irish populationare currently living in rural areas, demonstrates the importance of rural Ireland to the national economy.

Obj8.S5: Unemployment rates lower in rural areas than urban areas in Ireland

In 2018, Irelands total unemployment rate (15-74 y/o) was below the EU-27 average of 7.3%, at 5.8%. In addition, Irelands total youth unemployment rate (15-24 y/o) was also below the EU-27 average, at 13.7% compared to 16.1%. When comparing rural and urban areas, it appears that rural areas generally experience lower rates of unemployment than towns and suburbs, and cities. In 2017, 54.7% of those employed in Ireland were employed in rural regions, compared to an EU-27 average of 15.1%.[809] Total unemployment in rural Ireland in 2018 amounted to 5.3%. This compared to 7% in towns and suburbs; and 5.5% in cities. Similarly, total youth unemployment in rural Ireland in 2018 amounted to 14.2%. This compared to 15.1% in towns and suburbs. However, total youth unemployment was lower in cities at 12.5%.[810] In 2020, following the COVID-19 pandemic, total unemployment increased to 7.5%; and further increased to 21% when all claimants of the Pandemic Unemployment Payment (PUP) were classified as unemployed and included in the calculation.[811] Total unemployment was highest in Dublin at 8.2% and lowest in the Western region (6.4%) and Southern region (6.6%) of Ireland, suggesting that unemployment was lower in areas more likely to be rural.[812]

Obj.8.S6: Strong community involvement and a bottom-up approach to local development

Ireland's approach to local development is bottom-up and is delivered through a wide network of community-based organisations. The policy document, 'Putting People First- Action Programme for Effective Local Government'[813] and the subsequent Local

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[808] Common Context Indicator C.02 'Age Structure' https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[809] Common Context Indicator C.11 'Structure of the employment' https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[810] Common Context Indicator C.07 'Unemployment' (2019 update) https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[811] https://www.cso.ie/en/releasesandpublications/er/mue/monthlyunemploymentnovember2020/

[812] CSO Table QLF08: Persons aged 15 years and over

[813] https://assets.gov.ie/3577/291118175859-d2d605bd596f408f9120ffaa62359e4f.pdf

Government Reform Act (2014)[814] introduced a number of changes to the governance of community development and local development at local level. Section 36 of the Act provided for the establishment of Local Community Development Committees (LCDCs) in all local authority administrative areas, 'for the purposes of developing, coordinating and implementing a coherent and integrated approach to local and community development'. The LCDCs comprise of both public and private sector actors, including local authority members, public bodies, members of the local community, or people with local community interests and people from publicly funded local development groups. They are given primary responsibility for co-ordination, planning and oversight of local development spend; whether it is delivered by local authorities or by other local development agencies and structures on behalf of the State.

Since their establishment in 2014, LCDCs have assumed greater responsibility, particularly in relation to the management and oversight of key national development programmes such as the Social Inclusion and Community Activation programme (SICAP); and the LEADER programme for rural development.[815] LEADER programmes have been in existence in Ireland since 1991[816]; and have effectively supported economic development, enterprise development and job creation in rural areas. Although the LEADER programme was originally implemented by Local Development Companies as the Local Action Groups (LAG's), most LAG's are now LCDC-led with the Local Development Companies implementing the programme on the ground on behalf of the LCDC.[817] In addition to LCDC's, Public Participation Networks (PPN's) were also established in each local authority area to allow local authorities and community groups, including voluntary groups, local organisations and groups that represent socially excluded and marginalised communities, to connect around the country.

The 'Sustainable, Inclusive and Empowered Communities 2019-2024'[818] strategy sets out Ireland's long-term vision to create empowered and self-determining communities, which are vibrant, sustainable and inclusive; and support the social, cultural and economic well-being of all its members. This strategy demonstrates that community involvement is strong, with over 1 million people actively volunteering in Ireland each year, at an estimate value of more than €2 billion. With actions to be implemented over

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[814] http://www.irishstatutebook.ie/eli/2014/act/1/enacted/en/html
[815] https://assets.gov.ie/26971/fc5f55da04ec4574af1db0d87fac84ce.pdf
[816] https://www.gov.ie/en/publication/46cecf-leader-programme-funding/
[817] Indecon Mid-term Evluation of the Rural Development Programme 2014-2020 https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/ruralenvironment/ruraldevelopment/ruraldevelopmentprogramme2014-2020/FinalReportMidTermReviewoftheRDP081019.pdf
[818] https://assets.gov.ie/26890/ff380490589a4f9ab9cd9bb3f53b5493.pdf

the next five years, the Strategy outlines a general direction for Government policy in relation to community development, local development and the community and voluntary sector for the coming years. This involves, amongst other things, further strengthening and developing the participative approaches to public policy development; further supporting and facilitating communities to participate in community and local development; and further developing processes and mechanisms to ensure meaningful consultation with all community actors, including marginalised communities.

Obj8.S7: Strong agri-food sector contributing to the rural economy

The agri-food sector in Ireland is the most important indigenous industry. In 2019, exports of agri-food products were valued at over €14.5 billion. This sector, which is classified as primary production (agriculture, fishing and forestry) along with food & beverages and the wood processing sector, accounted for approximately 4.5% of Gross Value Added (GVA) at factor cost in 2019. The agri-food sector plays a key role in the wider rural and local economy, with estimates for output multipliers ranging from around 2.5 for beef, 2.0 for dairy and food processing, compared with an average output multiplier of 1.4 for the rest of the economy and 1.2 for foreign owned firms.[819] According to the Forestry Statistics Ireland 2020, the multiplier effect was 1.78 in the growing and harvesting subsector and 1.66 in the wood processing subsector in 2012.[820] The agri-food sector including forestry and fishing plays a pivotal role in maintaining the rural economy, mainly by providing significant employment opportunities to people living in rural and coastal areas. In 2019, approximately 164,400 people, or 7.1% of the labour force, were employed in the agri-food sector. The agri-food sector makes a significant contribution to employment in rural and coastal areas in particular, i.e. between 10% and 14% of total employment outside of Dublin and the Mid-East regions.[821] The 2016 Farm Structure Survey, estimated that

[819] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/foodindustrydevelopmenttrademarkets/agri-foodandtheeconomy/publications/aro2020/AnnualReviewandOutlookofDAFM2020Final031120.pdf

[820] Forest Statistics Ireland 2020 https://www.gov.ie/en/collection/15b56-forest-statistics-and-mapping/#annual-forest-sector-statistics

[821] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/foodindustrydevelopmenttrademarkets/agri-foodandtheeconomy/publications/aro2020/AnnualReviewandOutlookofDAFM2020Final031120.pdf

there were 137,500 farms in Ireland, with over 90% of farms located outside of Dublin and the Mid-East regions.[822]

Obj8.S8: Strong tourism sector contributing to the rural economy

Tourism undoubtedly makes a large contribution to Ireland's national economy and along with the agri-food sector, is one of Irelands most important indigenous economic sectors. In 2019, tourism generated an estimated €9 billion worth of revenue for the Irish economy. Export revenues accounted for the majority (€6.9 billion) as a result of overseas visitors travelling to and within Ireland; and a further €2 billion was generated by Irish citizens availing of tourism services in Ireland.[823] Gross Value Added (GVA) from the 'Accommodation and Food Service Activities' sector was €5,710 million in 2019; and according to Fáilte Ireland, in 2019, tourism generated €1.7bn in exchequer revenue. In addition, for every €1 spent on tourism (both domestic and overseas) 23c was generated in tax.[824]

Tourism is also a significant employer and has important multiplier effects on employment. For every job that is directly created by tourism worldwide, nearly one and a half additional jobs are created on an indirect or induced basis.[825] In early 2020, prior to the emergence of the Covid-19 pandemic, 260,000 jobs were supported by this sector. In particular, the tourism sector employs a significant amount of people in rural regions, with a large proportion of jobs in rural counties being dependent on tourism, at 18% in Kerry and 13% in Donegal. In addition, the tourism sector employs a large proportion of young people. In 2016, almost half of all employees in the tourism sector were less than 35 years of age, compared to less than a third of all employees in the total workforce. Unfortunately, following the advent of Covid-19 and the subsequent restrictions imposed on many businesses, the tourism sector was adversely impacted and it is suggested that tourism revenue in 2020 will be less than 25% of the revenue generated in 2019.[826]

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[822] https://www.cso.ie/en/releasesandpublications/ep/p-fss/farmstructuresurvey2016/da/fs/

[823] Tourism Recovery Plan 2020-2023 (October 2020) https://www.gov.ie/en/publication/be0cb-tourism-recovery-plan-2020-2023/

[824] https://failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/Preliminary-Tourism-Facts-2019-August-2020.pdf?ext=.pdf

[825] Department of Business, Enterprise and Innovation: Focus on Tourism and Hospitality August 2020 citing: ILO Sectoral Brief-The impact of COVID-19 on the tourism sector https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/briefingnote/wcms_741468.pdf

[826] Tourism Recovery Plan 2020-2023 (October 2020) https://www.gov.ie/en/publication/be0cb-tourism-recovery-plan-2020-2023/

Obj8.S9: Ireland's landscape and unique cultural heritage are a key tourism attraction (domestic and international)

According to a survey undertaken by Fáilte Ireland on tourism experience, beautiful scenery, a good range of natural attractions; and a natural, unspoilt environment were all factors considered important by more than 80% of holiday makers thinking of choosing Ireland as their holiday destination.[827] This indicates that a large proportion of holiday makers coming to Ireland are eager to experience Ireland's unique green landscape and rural communities, as well as its array of natural attractions. Heritage sites help to generate employment and revenue for rural Ireland through cultural and heritage tourism and are a big point of attraction for overseas tourists and domestic holidaymakers. As these natural and built assets are dispersed around the country, they can bring much needed economic and employment opportunities to rural communities, ultimately assisting in balanced regional development. As part of Project Ireland 2040, €285 million is planned to be invested in natural and built heritage. There will also be substantial investment in the Natural Heritage through national parks, reserves and outdoor recreation facilities. According to the CSO, the total number of overseas trips to Ireland by non-residents in 2019 grew by 1.8% to a total of 10,808,000 trips all together.[828]Any increase in tourism numbers is beneficial to rural communities as it results in greater economic activity and opportunities.

Obj8.S10: National policy ambition to become a global leader for the bio-economy

The National Policy Statement on the Bio-economy[829] expresses Ireland's policy ambition to become a global leader for the bio-economy. This is to be achieved through a co-ordinated approach that harnesses Ireland's natural resources and competitive advantage. One of the main objectives of developing the bio-economy is to integrate sustainable economic development into society as we transition towards a low carbon and circular economy.

The Government, under the national policy statement, has several strategic policy objectives in mind which create favourable conditions allowing for the development of the bio-economy. These include:

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[827] *Source: Fáilte Ireland's Tourism Experience Port Survey 2019* https://failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/Preliminary-Tourism-Facts-2019-August-2020.pdf?ext=.pdf

[828] CSO Table TMA15: Overseas Trips to and From Ireland

[829] https://assets.gov.ie/2244/241018115730-41d795e366bf4000a6bc0b69a136bda4.pdf

- Sustainable economy and society – This involves growing the bio-economy, and encouraging the use and re-use of resources and materials, in order to place Ireland's economy on a sustainable footing.
- Decarbonisation of the economy – This involves developing innovative practices and processes that can improve both agriculture and forestry production systems, thereby leading to greater efficiencies and lowering GHG emissions. Additionally, it involves bio-processing and bio-refining which allows for the production of bio-based alternatives and new products which can be used to replace high embedded carbon products such as concrete, steel, plastics and chemicals.
- Jobs and Competitiveness – This relates to how the bio-economy can foster employment. Many of the inputs for the bio-economy can be sourced nationally and therefore, its development has a greater impact on employment compared to other areas of the economy that are reliant on imports. The development of this industry will be even more crucial in the context of Brexit, as it represents an opportunity for the agri-food and marine sectors to diversify and reduce the risks confronting it.
- Regional Prosperity – This involves developing the bio-economy in order to halt the decline in rural areas and instead boost rural economic growth as many of the businesses rooted in the bio-economy are located in rural and coastal areas.

Obj8.S11: Ireland has an abundance of natural advantages to allow for the development and expansion of the bio-economy

According to the 'Bio-economy Implementation Groups First Implementation Report', prepared by the Bio-economy Implementation Group co-chaired by the Department of Communication, Climate Action & Environment; and the Department of Agriculture, Food and the Marine, Ireland has many comparative advantages to allow for the development of the bio-economy. These include:

- healthy and productive soils;
- a climate that is good for producing grass as well as a well-established agri-food sector;
- funding for coordinated research and the development of innovative practices;
- well established, early stage companies, that are promising pioneers in the bio-economy;
- well established research producing organisations and companies that are increasing research capacities;
- supportive national policy arena;
- growing forestry sector with high ambitions to supply the bio-economy; and

- an extensive coastline providing an array of marine bio-based opportunities.

Obj8.S12: Successive publicly funded forestry programmes

In the last 30 years, the Irish state has invested heavily in developing Ireland's forestry sector. Since 1980, approximately 300,000 ha of private forest have been established; with 23,256 individual private forest owners receiving grant aid.[830]The most recent Forestry Programme 2014-2020 includes a number of supports and schemes designed to encourage planting of trees in order to reach 18% forest cover by 2046. These schemes include the Afforestation Scheme, the Native Woodlands Establishment Scheme, the Agro-Forestry Scheme, the Creation of Woodlands on Public Lands Scheme and the Forestry for Fibre Scheme.[831] Total expenditure committed since 1990 amounts to some €3 billion.[832]

Obj8.S13: National policy ambition to support the development of social enterprises

In July 2019, the Department of Rural and Community Development published Ireland's first *National Social Enterprise Policy (2019 – 2022)*.[833] This policy aims to support enterprises which set out to provide services to communities and tackle social or socio-economic issues. Social Enterprises hope to achieve a social, societal or environmental impact through the trading of goods and services; and any surpluses generated by these activities are reinvested to achieve the central purpose of the organisation. As social enterprises often work to support disadvantaged groups; and as they often fill gaps in service provision or in markets which are not adequately served by the private sector, they are therefore particularly important in rural areas. Furthermore, they tend to be deeply embedded in communities and community structures, which can make them more resilient and effective than other types of businesses.[834]

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[830] Forest Statistics Ireland 2020 https://www.gov.ie/en/collection/15b56-forest-statistics-and-mapping/#annual-forest-sector-statistics

[831] Forestry Programme 2014-2020 https://www.gov.ie/en/publication/01381-forestry-programme-2014-2020-ireland/

[832] DAFM estimate

[833] National Social Enterprise Policy for Ireland (2019-2022) https://s3-eu-west-1.amazonaws.com/govieassets/19332/2fae274a44904593abba864427718a46.pdf

[834] National Social Enterprise Policy for Ireland (2019-2022) https://s3-eu-west-1.amazonaws.com/govieassets/19332/2fae274a44904593abba864427718a46.pdf

Weaknesses

Obj8.W1: Rural regions in Ireland are sparsely populated

Ireland's total land area (including inland waters) amounts to 69,947 km^2. Of this area, 62,132 km^2, or 88.8% is considered predominantly rural, 9.8% is considered intermediate and only 1.3% is considered predominantly urban.[835] As a result, Irelands urban areas are densely populated, with a total of 1,456 inhabitants per km^2. This compares to a total of 45 inhabitants per km^2 in rural areas. Sparsely populated regions face a number of challenges. Firstly, professional opportunities are limited, leading younger members of society to migrate to more economically prosperous areas. Secondly, economic activity in sparsely populated areas tend to be confined to limited occupations, such as agriculture and tourism, and this can lead to economic stagnation in these areas. Thirdly, the provision of services in these areas is uncommon as a result of economic austerity measures and also due to a lack of qualified people living in these regions, such as a lack of doctors available to provide medical servcies.[836]

Obj8.W2: Rural population at higher risk of poverty than those living in urban areas

Despite some improvement in reducing poverty levels, Ireland continues to experience significant levels of poverty and deprivation. In 2017, the Central Statistics Office undertook a survey that found that 15.7% of the population were at risk of poverty; and 6.7% were living in consistent poverty.[837] Results of this 2017 survey were further analysed to provide a breakdown of poverty by region, with data suggesting that poverty was unevenly distributed across the country. In particular, the CSO analysis found that the risk of poverty was higher in rural areas compared to urban areas. It found that in 2017, the risk of poverty in rural Ireland was 17.2% compared to the risk of poverty in urban Ireland at 15.1% (a 2.1% difference).[838] In 2018, 21.5% of the rural population was living in poverty compared to 17.6% of the urban population. Although

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[835] Common Context Idicator C.03 'Territory' https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[836] Briefing European Parliamentary Research Service (September 2016) 'Sparsely populated and under– populated areas' https://www.europarl.europa.eu/RegData/etudes/BRIE/2016/586632/EPRS_BRI(2016)586632_EN.pdf

[837] https://www.cso.ie/en/releasesandpublications/ep/p-silc/surveyonincomeandlivingconditionssilc2017/povertyanddeprivation/

[838] Social Justice Ireland (2019) Poverty Focus https://www.socialjustice.ie/sites/default/files/attach/publication/5763/2019-04-15-sjipovertyfocus2019final.pdf?cs=true

the share of people living in poverty in rural areas was higher than those in urban area, intermediate areas had the highest share of people living in poverty altogether, at 25.8%.[839] Females, young people (aged between 0-17 years old) and people living in rural regions are those most affected by consistent poverty.[840] Furthermore, in December 2019, the CSO published a report that found that Household income in Highly Rural/Remote areas were 34% lower than in cities; and the "at risk of poverty" was highest in these areas.[841]

Obj8.W3: Low levels of female participation in the agriculture, forestry and fisheries sector; especially in leadership roles

In 2016, only 10.8% of people employed in agriculture were women. This compared to an EU-28 average of 28.4%.[842] According to the CSO's Labour Force Survey (LFS), the share of females working in the agriculture, forestry and fishing sectors in Ireland in 2020 (second quarter) was 14.6%[843], an increase on 2016 levels but still a small proportion. In addition to low levels of female farmers, there is a persistent challenge in relation to gender equality, particularly in leadership roles. Across the EU, 71.5% of all farm managers are male with the majority being 55 years or older.[844] Overall, the number of young farmers and young farm managers is in decline and in 2016, the share of total farm mangers accounted for by young farmers was only 6.1%, with the majority (5.6%) being male and the minority (0.5%) being female. Women are underrepresented in management roles and this is likely linked to succession planning in the broader agri-food sector. In Ireland, less than 12% of landholders are women[845] presumably as a result of traditional cultural bias towards male successors, resulting in women rarely inheriting land. This has had a significant negative impact on the participation of women in agriculture at all levels and has reinforced a perception that farming is a male occupation.

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[839] Common Context Indicator C.09 'Poverty rate' https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[840] Ireland's UN SDGs 2019- Report on Indicators for Goal 1- No Poverty https://www.cso.ie/en/releasesandpublications/ep/p-sdg1/irelandsunsdgs2019-reportonindicatorsforgoal1nopoverty/poverty/

[841] https://www.cso.ie/en/releasesandpublications/ep/p-urli/urbanandrurallifeinireland2019/

[842] https://www.teagasc.ie/media/website/publications/2019/Women-in-Agriculture---International-day-of-rural-women.pdf

[843] https://statbank.cso.ie/px/pxeirestat/Statire/SelectVarVal/saveselections.asp

[844] Agriculture, Forestry and Fishery Statistics 2019 edition https://ec.europa.eu/eurostat/documents/3217494/10317767/KS-FK-19-001-EN-N.pdf/742d3fd2-961e-68c1-47d0-11cf30b11489

[845] http://www.fao.org/3/a-i4862e.pdf

Obj8.W4: Prevalence of social isolation in rural areas due to limited access to basic services

Rural communities face greater challenges with regard to accessing services compared to their urban counterparts and this has allowed for higher levels of social isolation to persist in rural areas. In addition, people in rural areas are often faced with extra costs as a result of having to travel greater distances to access care. The lack, or inadequacy, of public transport options in rural areas necessitates car ownership in order to provide access to employment basic services and amenities; but, depending on age and the availability of a car, people's ability to access these services may be hindered. For example, in accessing health care, the lack of flexibility regarding appointment times can prevent people in rural Ireland from accessing these services because appointment times do not coincide with public transport.[846]

In addition, the lack of adequate broadband infrastructure further hinders the development of rural areas and prevents business development in these areas too.[847] Ultrafast broadband is only available to 5% of rural premises, which is well below the EU average of 29%; and fixed broadband in Ireland is amongst the most expensive across the EU[848], therefore limiting its uptake in rural areas. Having a more accessible broadband infrastructure would allow people living in rural areas to access greater employment opportunities; and would facilitate people working from home and business development. Additionally, it would facilitate better access to services such as online banking.

All of these factors result in those people living in rural areas being disadvantaged and ultimately marginalised; and as a result, becoming socially isolated. The Teagasc National Farm Survey 2019 Sustainability Report demonstrated that a significant amount of farmers were at risk of isolation between the period 2012 and 2019, increasing from 17% at the start of the study period to 19% at the end of the study period across.[849]

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[846] Poverty and Social Inclusion- the Case for Rural Ireland (2016) http://www.irishrurallink.ie/wp-content/uploads/2016/10/Poverty-and-Social-Inclusion-The-Case-for-Rural-Ireland.pdf

[847] Poverty and Social Inclusion- the Case for Rural Ireland (2016) http://www.irishrurallink.ie/wp-content/uploads/2016/10/Poverty-and-Social-Inclusion-The-Case-for-Rural-Ireland.pdf

[848] COUNCIL RECOMMENDATION on the 2020 National Reform Programme of Ireland and delivering a Council opinion on the 2020 Stability Programme of Ireland https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020DC0507&from=EN

[849] https://www.teagasc.ie/media/website/publications/2020/NFS-2019-Sustainability-Report.pdf

Obj8.W5: Unequal distribution of employment opportunities in rural areas

The total rate of employment in Ireland in 2019 was 69.5%. Employment rates were higher in cities at 81.8%, compared to rural areas at 68.7%.[850] In addition, male employment rates were higher than female employment rates at 75% and 64.2% respectively. In 2018, the total youth unemployment rate was 13.7%, with the highest levels of youth unemployment being found in rural areas at 14.2%, compared to cities at 12.5%. This is more than double the national total unemployment rate of 5.8% and indicates that young people are more vulnerable to unemployment than other age cohorts in Ireland, particularly young people in rural areas.[851]

Obj8.W6: Rural economies are particularly vulnerable to economic downturns

Rural economies are particularly vulnerable to economic downturns due to a less diversified economic base, a strong reliance on micro and small enterprises, and generally lower income levels. This has been demonstrated by the Covid-19 crisis, whereby the Tourism, Hospitality, Arts and Culture sectors have been greatly impacted by the virus resulting in a sharp decrease in employment opportunities and economic activity in rural areas.[852]

Obj8.W7: Fragmented nature of forestry sector and lack of education and training within the forestry sector limiting its sustainability

Ireland has a forest cover of 11.5%, or 801,200 ha, compared to the EU-27 average of 42.4% with only two other countries, Malta and the Netherlands ranking lower.[853] The Government target is to reach 18% forest cover by 2046, up from the current rate of 11%; a target rate of 8,000 hectares per year.[854] The 'Forestry Programme 2014-2020' notes that within the forestry sector, focus is given to providing base level education and training rather than providing lifelong learning opportunities; and this lack of training could result in inefficient harvesting and thus a reduction in forests

[850] Common Context Indicator C.05 'Employment rate' (2019 update) https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[851] Common Context Indicator .C.07 'Unemployment' (2019 update) https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[852] Rural Development Policy 2021-2025

[853] Common Context Indicator C.29 'Forest and wooded land'(2019 update) https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[854] https://assets.gov.ie/10206/d042e174c1654c6ca14f39242fb07d22.pdf

sustainability. Furthermore, it notes that without proper knowledge and skills, the required level of thinning may not take place, or at least may be delayed, ultimately threatening crop stability. This would result in forests not reaching their productive potential and would result in a loss of both economic and environmental value within the forest; as well as deterioration in general forest health, ultimately reducing the sustainability of the forest and leading to a decrease in the supply of timber products for the timber processing sector.[855] Therefore, the lack of education and training within the forest sector is a factor limiting its sustainability.

Obj8.W8: Barriers hindering the supply of biomass resources, ultimately hindering the development of the bio-economy

A report undertaken by the SEAI notes a number of supply-side barriers impeding the adequate supply of biomass resources. Firstly, with regards to perennial energy crops, a lack of experience growing these crops and the fact that supply chains are immature makes it difficult to acquire equipment and planting material. Furthermore, the requirement for upfront investment is a deterrent. In relation to grass silage, there is an apparent lack of sustainability requirements for grassland improvement measures and there is uncertainty around the suitability of silage as a sole feedstock for AD. With regards forestry, some farmers are reluctant to commit to afforestation as they are then obliged to replant the land after felling. Also, people lack the expertise and experience required to plant, manage and harvest private sector forests appropriately. In addition to a lack of expertise and experience, some forests are difficult to access and therefore difficult to harvest. [856] These supply-side barriers and the resultant lack of availability of biomass resources hinder the ability of the bio-economy to develop and grow; thus, decreasing the number of employment opportunities emerging as a result.

Obj8.W9: Lack of awareness and understanding of the bio-economy hindering its uptake and development

The development of the bio-economy in Ireland to date has been driven by top-down policy initiatives at EU and national level. Although these are necessary to facilitate the development of the bio-economy, top-down approaches tend to assume that key

[855] Forestry Programme 2014-2020 https://www.gov.ie/en/publication/01381-forestry-programme-2014-2020-ireland/

[856] Bio-energy Supply in Ireland 2015-2035 http://www.seai.ie/publications/Bio-energy-Supply-in-Ireland-2015-2035.pdf

actors (e.g. farmers) are aware and understand their roles, capabilities and resources available to them; and that the aims and objectives of such policies are shared and accepted by these actors. Furthermore, it assumes a general acceptance of new products and their associated technologies both in the marketplace and by society as a whole. Teagasc notes that unless farmers are made aware of the aims and objectives of these policies; and unless they are helped to understand their roles and responsibilities in the development of the bio-economy, then it will not be seen as a desirable future for them and this will ultimately undermine its development.[857] However, the national policy statement on the bio-economy identifies an action to examine how greater primary producer, public and consumer awareness of the bio-economy and its products could be built up - through knowledge transfer, advisory, sustainable business models, public procurement, consumer awareness campaigns and product labelling initiatives etc.

[857] https://www.teagasc.ie/publications/2020/developing-irelands-bioeconomy.php

Opportunities

Obj8.O1: Build local capacities to enable and support cohesive rural communities

The true potential of communities will only be realised if communities are supported in a meaningful way and are encouraged to become change-makers for their locality; and to play a leading role in the development of their areas. The LEADER programme, under Pillar 2 of the Common Agricultural Policy plays an important role in supporting communities and enterprises in progressing job creation, social inclusion and environmental projects at local level.

The first 'National Social Enterprise Policy 2019-2022'[858] and the 'Smart Community' Initiative[859] will further support cohesive communities. The 'National Social Enterprise Policy 2019-2022' aims to provide "new opportunities for social enterprises to address social and environmental challenges, contribute to the revitalisation of local communities throughout the country, and support many of those most vulnerable in society." The 'Smart Community' initiative ensures that rural communities are exposed to digital content and technologies and aims to encourage and support people living in these communities to build their digital capacity and use digital services in their everyday lives.

The 'Strategy to Support the Community and Voluntary Sector'[860] includes a series of actions to improve the capacity of all communities to fully engage in decision making processes at a local level. This strategy addresses the need for partnerships working at all levels to support sustainable development in rural and urban communities. In addition, it stresses the importance of building communities' capacities to address issues such as climate change and to consider ways in which they can contribute to the achievement of the Sustainable Development Goals. This will provide opportunities for rural communities to engage more comprehensively at a local level with these challenges.

Obj8.O2: Develop the tourism industry in rural areas in a sustainable way, including through agri-tourism

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[858] National Social Enterprise Policy 2019-2022
https://assets.gov.ie/19332/2fae274a44904593abba864427718a46.pdf

[859] https://www.gov.ie/en/press-release/03aa8c-minister-canney-launches-the-smart-community-initiative-in-tubbercur/

[860] Strategy to Support the Community and Voluntary Sector
https://assets.gov.ie/26890/ff380490589a4f9ab9cd9bb3f53b5493.pdf

Tourism is a hugely important economic sector for Ireland. In 2018, tourism was worth approximately €9.4 billion to the economy and supported the employment of 325,000 people across the country.[861] It is a sector that brings much needed employment and income to rural communities throughout Ireland.

There are significant opportunities available in rural Ireland to maximise the potential of our natural resources and our built heritage to support economic development The Government's tourism policy, 'People Place and Policy: Growing Tourism to 2025'[862], sets out its vision for Irish tourism and notes the importance of protecting our key tourism assets, including our natural scenery and environment and our built heritage. It is implemented by way of multi-annual Action Plans.

'The Tourism Action Plan 2019-2021'[863] aims to achieve the headline target outlined in the governments tourism policy of increasing revenue from overseas tourists to €5 billion a year in real terms by 2025. This growth is to be achieved by promoting outdoor activities and developing Irish food-related experiences; by increasing tourism in the regions outside of traditional tourism destinations to lesser known areas and attractions; and by working with local stakeholders, tourism businesses and communities. It relies on a diversification of the tourism offering, with an emphasis on activity and experiential tourism offerings, as well as new growth areas, such as the 'Season of Food' initiative. [864]

Outdoor recreation continues to be a major component of the tourism offering in Ireland; and there is significant potential to grow the outdoor recreation sector even further, to the benefit of both the tourism sector and the wider rural community. The development and promotion of outdoor activity tourism, which is a key growth sector worldwide, provides opportunities for employment growth in rural areas in particular. The Rural Policy 2021 – 2025 outlines a number of measures to support the development of outdoor recreation in rural areas. Government investment will enable building on the already successful establishment of blueways, greenways, walking trails and other outdoor recreation infrastructure as well as the Wild Atlantic Way and the Ancient East initiatives.

Opportunities also exist to develop agri-tourism by providing on-farm accommodation and allowing for educational on-farm visits to see and experience working farms. This will ultimately provide additional income and employment for people in rural areas.

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[861] https://www.gov.ie/en/policy/3fcc3a-tourism/
[862] https://assets.gov.ie/15792/8b462712683748e7bcec6c7d5c7ecd2a.pdf
[863] https://assets.gov.ie/19701/030f419fbc6749f384940be70fef8eab.pdf
[864] https://assets.gov.ie/19701/030f419fbc6749f384940be70fef8eab.pdf

Obj8.O3: Improve availability of and access to necessary services in rural areas

Rural Ireland has the opportunity to be a vibrant and thriving place to live and work if people can be encouraged to remain in these areas; and others can be attracted to move to these areas. However, access to good quality public transport and other vital services, such as broadband, are fundamental to realising that potential. The key services that people rely on, which must be developed in rural Ireland, include housing, healthcare, education, childcare, public transport and infrastructure, digital connectivity, clean water and managed wastewater.[865]

A 2019 report by the CSO on Measuring Distances to Everyday Services highlighted that the average distance to most everyday services in rural Ireland was at least three times longer compared with urban areas. In addition, it found that the average distance to a supermarket, pharmacy and a GP for people living in rural areas was about seven times longer than those in urban areas.[866] This presents a number of challenges for people thinking of moving to rural areas; as travelling greater distance to basic services will have greater financial consequences and will take greater time. Additionally, in order for rural businesses to expand and attract Foreign Direct Investment, they will need to have access to appropriate infrastructure, whether that is transport services or high-speed broadband.

Obj8.O4: Increase employment rates, and expand employment opportunities in rural areas

In 2019, the employment rate amongst 15-64-year olds in Ireland was 69.5%[867] and of this 69.5%, 12.9% were self employed.[868] One of the main objectives of the government's Action Plan for Jobs 2018[869] is to stimulate regional development and to support the creation of quality jobs in rural Ireland that will remain resilient into the future. Supporting the creation of more and better jobs in rural Ireland will allow

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[865] Rural Development Policy 2021-2025

[866] https://www.cso.ie/en/releasesandpublications/ep/p-mdsi/measuringdistancetoeverydayservicesinireland/

[867] Common Context Indicator C.05 'Employment rate' https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[868] Common Context Indicator C.06 'Self employment rate' https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[869] https://dbei.gov.ie/en/Publications/Publication-files/Action-Plan-for-Jobs-2018.pdf

people to have a greater choice of employment and improved career prospects. It will also enable them to continue to live and work in their local area and encourage people to return to rural areas. Increasing employment rates and expanding employment options in rural areas will be made possible by supporting new business ventures in the agri-food industry, strengthening the tourism sector in rural areas, and investing in digital infrastructure.[870] Further development of initiatives in social enterprises could be used to explore opportunities for linking in with local food production and in helping to develop the Bio-economy.

The National Planning Framework (NFP)[871] identifies the opportunity to develop strong regions which will enable people to live closer to where they work, moving away from the current unsustainable trends of increased commuting; and will improve the economic and job opportunities of people living in rural Ireland. Strengthened regions are to be achieved using the Rural Regeneration and Development Fund, established under Project Ireland 2040.[872] In addition, Our Rural Future - Rural Development Policy 2021-2025 outlines some key deliverables designed to support job creation in rural areas. These include a continued focus by the enterprise development agencies to grow regional employment; implementation of a National Remote Working Strategy[873] and investment in remote working facilities in order to facilitate employees in working from home, or from co-working spaces in rural areas; diversification of rural economies into new sectors and markets; and maximising of opportunities presented by the Bio-economy, Circular economy, and Green Economy.

Obj8.O5: Increase opportunities for women in agriculture, including in leadership roles

Research has shown that enabling women to exercise rights and opportunities will generate wider prosperity for the country and will benefit society more broadly[874]. Furthermore, the OECD has suggested that achieving gender parity would add 0.6 percentage points to the world's annual GDP growth rate[875]. In Ireland, the 'National Strategy for Women and Girls', published in 2017 identified six high level goals to achieve the strategy's vision to work toward "an Ireland where all women enjoy

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[870] https://dbei.gov.ie/en/Publications/Publication-files/Action-Plan-for-Jobs-2018.pdf
[871] http://npf.ie/project-ireland-2040-national-planning-framework/
[872] https://www.gov.ie/en/policy/project-ireland-2040-policy/
[873] https://enterprise.gov.ie/en/Publications/Making-Remote-Work.html
[874] https://eige.europa.eu/publications/economic-benefits-gender-equality-european-union-overall-economic-impacts-gender-equality
[875] http://www.justice.ie/en/JELR/National_Strategy_for_Women_and_Girls_2017_-_2020.pdf/Files/National_Strategy_for_Women_and_Girls_2017_-_2020.pdf

equality with men and can achieve their full potential, while enjoying a safe and fulfilling life."[876] Six action points were identified under the overarching objectives for implementation by the Department of Agriculture, Food and the Marine; five related to rural female entrepreneurs:

- Provide support for rural female entrepreneurs at start-up stage through the 'ACORNS' programme;
- Improve statistics and reporting on women's involvement in the agri-food sector;
- Clarify any perceived taxation barriers to registering farms in joint ownership, and publish the outcomes;
- Ensure that gender equality and the empowerment of women and girls is prioritised in Ireland's overseas development assistance programme, particularly in relation to agriculture and nutrition;
- Encourage female involvement in decision making and leadership in all parts of the agri-food sector, especially through mentoring and positive case studies.

There is an opportunity to pilot programmes to encourage greater participation of women in agriculture, by building on the success of the ACORNS programme and encouraging peer to peer learning or agriculture focused discussion groups.[877] During consultations, stakeholders also highlighted that women are more likely to drive change and consider alternative options for their enterprise.

Obj8.O6: Foster social cohesion in rural areas

Rural Ireland is becoming increasingly diverse with its population encompassing diversity of age, family type, nationality, ethnicity, religious belief, ability, gender identity and sexual orientation. As Ireland enters a new decade of opportunity and connectedness, it will be crucially important to ensure that our society is cohesive, empowered, engaged. and that the wellbeing of everyone is catered for in an inclusive way. Embracing our diversity will result in society wide benefits.

The Social Inclusion and Community Activation Programme (SICAP) 2018-2022 provides funding to tackle poverty and social inclusion through local engagement and partnership between disadvantaged individuals, community organisations and public sector agencies. SICAP supports disadvantaged communities and individuals who fall into one of 13 specified target groups. One of these target groups is 'New

[876] http://www.justice.ie/en/JELR/National_Strategy_for_Women_and_Girls_2017_-_2020.pdf/Files/National_Strategy_for_Women_and_Girls_2017_-_2020.pdf
[877] https://acorns.ie/

Communities' which includes migrants experiencing disadvantage, refugees and asylum seekers.

The current SICAP (2018-2022) has two goals:

- to support communities and target groups by engaging with relevant stakeholders in identifying and addressing social inclusion and equality issues, developing the capacity of local community groups and creating more sustainable communities
- to support disadvantaged individuals to improve the quality of their lives through the provision of lifelong learning and labour market supports

SICAP is managed by the LCDCs in each local authority area. The Committee agrees targets for their area based on local needs that must be achieved annually. In addition, they have the power to add target groups to the programme if they believe the group is in need of assistance in their local area. [878] Ultimately, SICAP aims to ensure social inclusivity and equality amongst all members of a community to allow for social cohesion. Building on the progress made so far will further encourage social cohesion in rural areas.

Obj8.O7: Optimise digital connectivity and entrepreneurial activity

One of the main impacts of the COVID-19 global pandemic has been an increased prevalence in remote working. This has had many positive effects on society, for example, as a result of less people having to travel to work, there has been a reduction in traffic emissions and an increase in people's personal leisure time. In addition, with greater numbers of people working from home or in local hubs, there is a possibility that more people will shop and spend locally which could have a positive knock-on effect on local employment and the sustainability of locally trading businesses.

In order to facilitate and encourage remote working, particularly in rural areas, it is necessary to develop an adequate broadband infrastructure which can support the increased connectivity. This can be achieved through the delivery of the National Broadband Plan (NBP)[879] which will also develop further opportunities for social cohesion, community empowerment, enterprise, employment, education, innovation and skills development for those who are living and working in rural areas. Providing broadband to rural areas will enable people to pursue their careers in rural areas

[878] https://www.gov.ie/en/policy-information/6609f4-social-inclusion-and-community-activation-programme-sicap/
[879] https://www.dccae.gov.ie/documents/Delivering%20the%20National%20Broadband%20Plan.pdf

without needing to relocate and will create a climate whereby new people and businesses will consider relocating to rural locations.

Obj8.O8: Develop and expand the bio-economy and circular economy in rural Ireland

The bio-economy is evolving from the narrower field of research and innovation to now being considered in a much broader economic development and public policy context. The Department of Business, Enterprise and Innovation's response to the enterprise opportunity arising from the transition to a low carbon circular economy and bio-economy has been informed by the publication of the paper 'Realising the Opportunities for Enterprise in the Bio-economy and Circular Economy in Ireland', which provides a clear evidence-based understanding of the potential enterprise opportunities the bio-economy brings. This paper sets out a clear identification of the bio-economy and circular economy across the areas of: agri-food, forestry, and marine, biomaterials and biochemical; bio-energy and bio-fuels; and the technical/mechanical, and circular economy. It notes that with 80% of the agri-food sector situated in rural Ireland, there is huge potential for the bio-economy and circular economy to boost employment in these regions by providing low to high-skilled jobs, ranging from sorting recyclables to eco-design.[880]

In order to capitalise on the opportunities presented by the bio-economy and circular economy, a cross-government response is needed. Currently, the High-Level Bio-economy Implementation Group, which was established following the publication of the National Policy Statement on the Bio-economy, is advancing the key systemic and strategic actions in the policy statement. In their First Progress Report, they noted that one of the advantages of the bio-economy is that businesses rooted in it tend to be located in rural and coastal areas; and that helping the bio-economy to grow can assist in halting rural decline. Multiple Government Departments and Agencies are also playing an active role and this engagement should continue to ensure enterprise opportunities are realised.[881]

Obj8.O9: Develop and expand the forestry sector to manage the increasing supply of timber biomass

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[880] https://dbei.gov.ie/en/Publications/Publication-files/Realising-opportunities-for-enterprise-bioeconomy-and-circular-economy-Ireland.pdf
[881] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/research/bioeconomy/BIGProgressReport050919.pdf

As a result of the Irish state investing heavily in the development of Ireland's forestry sector since the 1980's, there has been a large increase in the number of trees reaching a mature age in Ireland, ready for felling for use as biomass. The most recent timber forecast from COFORD found that the supply of timber biomass on the island of Ireland is predicted to increase from 3.8 million M3 at present to 4.7 million M3 by 2020; and 6.5 million M3 by 2028; and this will be a result of an increase in supply coming from the private sector.[882] In order to support the felling of this increased supply, the forestry sector will likely have to expand and this will lead to greater job opportunities within the forestry sector for those living in rural areas. Already between 2015 and 2017, the number of people employed in the forestry sector increased by more than 50%,[883] however, there is scope to increase this further. However, it is worth noting that demand for timber is predicted to be 6.3 million M3 by 2020 and therefore demand will outstrip supply, leading to a roundwood deficit.

Obj8.O10: Encourage the development of community-based energy production schemes

Community energy is a term used to describe citizens local ownership and participation in renewable energy generation, distribution and efficiency; and is concerned with embracing the advantages that local natural resources provide as forms of renewable energy, allowing the benefits (economic, social and environmental) to flow to all of members of a community. This could include, amongst other things, a wind farm near the community, solar panels built on the roofs of local buildings, a biomass fed district heating system, an anaerobic digester fed from local farms, or a collective insulation project.[884] The Climate Action Plan identifies several business opportunities to mature as new technologies, such as micro-generation, anaerobic digestion, biomass, heat recovery, carbon capture and bio-methane, come on stream. This opportunity could be availed of through community-based schemes or cooperative type structures. Encouraging the development of community energy could create significant economic and employment opportunities in local communities; and could provide for the sustainable development of renewable resources across Ireland

Obj8.O11: Increase afforestation rates

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[882] https://www.forestryservices.ie/timber-supply-demand/

[883] Common Context Indicator C.15 'Labour productivity in forestry sector' https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf

[884] https://www.foe.ie/assets/files/pdf/executive_summary_community_energy_leaflet.pdf

Forestry in Ireland provides multiple social, economic and environmental benefits. The timber that is produced from our forests sustains and supports a vibrant forestry industry and provides over 12,000 jobs in rural areas.[885] The Government ambition is to reach 18% forest cover by 2046, up from the current rate of 11%. This is to be achieved by increasing afforestation rates at a target of 8,000 hectares per year.[886] In order to meet this target, employment in the forestry sector will have to increase; and forestry will have to be promoted as an alternative land-use to agriculture, which will require both economic and social incentives.

Despite the fact that forestry provides many benefits, most of these benefits emerge at the end of the forestry cycle (which is almost 30-40 years long) and this means that farmers are less enticed to invest in afforestation and are more inclined to continue producing traditional agricultural products which provide a financial benefit in the shorter term. Furthermore, the requirement under felling licences that farmers maintain their land as forestry after planting trees further deters farmers from partaking in afforestation. Therefore, in order to entice farmers to undertake afforestation, the Department of Agriculture, Food and the Marine provides 100% state support for afforestation in the form of non-repayable establishment grants and annual premiums to incentivise land owners to plant their land with trees.[887]

Obj8.O12: Increase opportunities for diversification of rural economies, including farm enterprises

The economic and environmental challenges facing the agri-food sector can be offset through diversification of activity at farm level and in the wider rural economy. The strength of the agri-food sector and the integral role it plays in Ireland's economy as the largest indigenous industry creates a unique opportunity to generate significant returns from modernisation, restructuring and market development; and to capitalise on the opportunities associated with the bio-economy, circular economy, climate mitigation/adaptation, eco-tourism, sustainable land management and sustainable energy.

The growing interest in the bio-economy and forestry sectors present opportunities to diversify the economic landscape of rural Ireland. In order to successfully transition to a more circular and bio-based economy; and to contribute to the achievement of the Sustainable Development Goals, there will need to be a shift in the way we produce

[885] https://www.coillte.ie/coillte-delivers-record-financial-performance-2019/
[886] https://assets.gov.ie/10206/d042e174c1654c6ca14f39242fb07d22.pdf
[887] Forestry Programme 2014-2020 Ireland https://www.gov.ie/en/publication/01381-forestry-programme-2014-2020-ireland/

energy and manage our waste. Creating a favourable environment for diversification into these sectors will allow for a greater production of bio-based products and will ensure the generation of waste is minimised in a sustainable manner; while also increasing job opportunities in both sectors.

Diversification of farm enterprises offers many social, economic and environmental benefits, such as providing the potential to improve economic returns to farm businesses, thereby contributing to both the longer-term viability of the farm business and farm household; and by increasing the potential of land to sequester carbon and produce more energy efficient products.[888]

Obj8.O13: Capitalize on the increased market opportunities for wood and biomass particularly in the construction and energy sectors

In 2018, Ireland ranked 25th out of the EU-27 countries for the production of renewable energy coming from the forestry sector. Ireland produced 18.6% of its renewable energy from forestry which was well below the EU-27 average of 41.4%, with only Cyprus and Malta producing less.[889] It is predicted that there will be a substantial increase in demand for the wood-based panel and wood energy sectors in Ireland, especially on the energy side, up to 2025. Based on work undertaken by the Sustainable Energy Authority of Ireland (SEAI), and by COFORD, and as outlined in the Wood Supply and Demand on the Island of Ireland to 2025[890] report published in 2018, the wood energy supply gap in the Republic of Ireland could potentially reach upwards of 1.4 million cubic metres by 2020, increasing to 2 million cubic metres by 2025. While an increase in the level of harvest to meet wood energy demand is forecast, there is likely to be a need for sizeable wood energy imports to fill the anticipated supply gap. The 'Wood Supply and Demand on the Island of Ireland to 2025' report also predicts a continued shortfall of sawlog and stakewood supply on the island up to 2020, reaching 0.73 million cubic metres per annum. Looking to the sawmilling sector, demand is forecast to outstrip indigenous supply by 0.7 million cubic metres by 2020, but is expected to come into balance by 2025, on foot of the increasing level of supply.[891] It is therefore clear that there is an opportunity to expand the forestry sector to increase

[888] https://www.teagasc.ie/rural-economy/rural-development/diversification/
[889] Common Context Indicator C.43 'Production of renewable energy from agriculture and forestry' https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf
[890] http://www.coford.ie/media/coford/content/publications/2018/3COFORDWoodSupplyandDemand121218.pdf
[891] http://www.coford.ie/media/coford/content/publications/2018/3COFORDWoodSupplyandDemand121218.pdf

wood supply, which could positively affect people in rural Ireland by providing greater job opportunities and economic activity to these areas.

Threats

Obj8.T1: Prevalence of higher age profile in rural areas compared to national average

Ireland has an ageing population with the total number of people over 65 years of age increasing between 2011 and 2016 in both urban and rural areas. However, the over 65 age cohort is more prevalent in rural areas than it is in urban, accounting for 15% of the population in rural areas in 2016, compared to 12% of the population in urban areas in the same year. The population in the 25 years and underage groups fell by 1.2% in rural areas between 2011 and 2016, compared to an increase of 1.5% nationally for this age cohort during the same period. Rural areas considered to be highly remote had the highest average age profile of 41.2 years, compared to a national average age of 37.3 years. This indicates that the age profile in rural areas is higher than the national average.

The ongoing reality of young people moving away from rural areas means a loss of talent and loss of potential entrepreneurs in rural communities. This ultimately results in rural areas being deprived of a cohort who could act as key contributors to society, community, and the economy for many years to come; and without whom will make the development of rural areas much more difficult. It is essential that policies are designed, and that essential and appropriate services, supports and facilities are provided, to retain young people in rural areas in order to ensure the sustainability of communities and local economies.[892]

Obj8.T2: Over reliance on traditional employment options and reluctance to diversify business types in rural areas

According to the 2014 CEDRA report, rural areas were most negatively impacted by the 2008 financial crisis as a result of their heavy reliance on declining employment sectors such as construction. Rural areas experienced an increase in unemployment of 192% between 2006 and 2011, compared to urban areas which experienced an increase in unemployment of 114%.[893] Rural economies tend to be more vulnerable to

[892] Rural Development Policy 2021-2025
[893] https://www.chg.gov.ie/app/uploads/2017/01/162404-rural-ireland-action-plan-web-2-1.pdf

economic downturns due to having a less diversified economic base, focused largely on agriculture and tourism, a reliance on micro, small and medium enterprises, and generally having lower incomes.[894] A research project undertaken by Teagasc on 'Attitudes to Farm Diversification' found that only 2% of 472 farmers expressed an interest for setting up a diversified farm-based business. [895]

Obj8.T3: Changing nature of retail, service delivery and town centre living

In recent years, towns and village centres in Ireland have found it difficult to retain vibrancy and vitality for a number of reasons. From a retail perspective, the increase in online shopping and the emergence of shopping centres and retail parks situated outside of towns; as well as people migrating to larger urban centres for work and other reasons, have resulted in a deterioration of these areas. [896] This deterioration is detrimental to rural communities as it further isolates them from urban regions. A report undertaken by the Society of Chartered Surveyors, 'Rejuvenating Ireland's small town centres- A call to action', found a number of barriers preventing the development of regional high streets, such as increasing costs and overheads, lack of collaboration between the community, private sector and public sectors, reduced funding for local authorities, governance challenges and a lack of connectivity.[897]

The Department of Rural & Community Development recently concluded a pilot initiative aimed at examining and addressing the issues associated with town centre living and the issue of vacant properties. Under the initiative, up to €100,000 of funding was provided to the relevant Local authorities in 6 rural towns, who then worked in collaboration with the local communities to explore ways to encourage increased residential occupancy.[898] Subsequently, an independent report outlining the challenges associated with decreasing residential occupancy in town centres and potential solutions to this issue was published. Some of the challenges recognised included the high cost associated with restoring old buildings, particularly buildings with protected designations or other legal constraints; the high cost associated with adapting older buildings to modern living standards, negative perceptions associated with town centre

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[894] Rural Development Policy 2021-2025

[895] https://www.teagasc.ie/media/website/publications/2013/5912_Farm_Diversification_Technology_Update_Final_.pdf

[896] Pg. 5 A framework for Town Centre renewal https://dbei.gov.ie/en/Publications/Publication-files/A-Framework-for-Town-Centre-Renewal.pdf

[897] https://www.scsi.ie/resources/pdf/2018/scsi_rejuvenating_irelands_small_town_centres

[898] https://www.gov.ie/en/press-release/ad46d-minister-ring-publishes-report-on-the-pilot-town-centre-living-initiative/

properties; and the limited capability or financial resources of owners to undertake the work required to maintain or restore buildings.[899]

Obj8.T4: Negative economic, social and environmental impacts of climate change and land use changes on rural communities

Climate change, and our response to it, is the most significant issue facing our generation. The 2019 'Report of the Joint Oireachtas Committee on Climate Action'[900] which draws on the reports of the UN Intergovernmental Panel on Climate Change (IPCC) leaves no room for doubt - the climate is warming. The declaration by the Irish government of a climate emergency and the subsequent publication of the Climate Action and Low Carbon Development (Amendment) Bill 2020[901], serves to underline the necessity and the urgency in which collective responses are required to address this challenge. Climate change is already having impacts on Ireland's environment, society, economy and natural resources.

Climate change affects all countries and all communities, but it affects rural communities, both in terms of scale and intensity. Adapting to climate challenge will be more difficult for those living in rural Ireland who are highly dependent on agriculture as a source of income and who do not have readily available alternatives to transport, heating and electrical facilities. Agriculture is highly vulnerable to the effects of climate change. Impacts of climate change include changes in soil/air temperatures, changes in rainfall patterns, and an increase in extreme events. These changes could result in water stress for crops, heat stress for animals and plant diseases occurring more frequently.[902] The increase in global temperature will have negative effects on the production of certain crops in Ireland[903]; and changes to our temperate climate will have an impact on yields and productivity.[904] Ireland has already experienced several extreme weather events in recent years, such as droughts and floods and these are expected to

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[899] https://www.gov.ie/pdf/?file=https://assets.gov.ie/77498/3b9f04d1-987f-4ed9-ac4c-750162e3f2a6.pdf#page=null

[900] https://data.oireachtas.ie/ie/oireachtas/committee/dail/32/joint_committee_on_climate_action/reports/2019/2019-03-28_report-climate-change-a-cross-party-consensus-for-action_en.pdf

[901] https://www.gov.ie/en/publication/984d2-climate-action-and-low-carbon-development-amendment-bill-2020/

[902] Department of Communications, Climate Action and the Environment, National Adaptation Framework - Planning for a Climate Resilient Ireland, January 2018, p.29

[903] https://www.teagasc.ie/media/website/publications/2010/the_impact_of_climate_change_on_irish_farming_5623.pdf

[904] Sweeney, J. et al (2008) Climate Change – Refining the Impacts for Ireland: STRIVE Report (2001-CD-C3-M1) ISBN: 978-1-84095-297-1. Technical Report. Environmental Protection Agency, Wexford, Ireland.

continue.[905] In addition, land use changes, such as an increase in afforestation, may be negatively perceived by rural communities. In particular when afforestation occurs on land which would otherwise be used for agricultural production.[906] All of these changes may affect farmers' income and their ability to continue farming, thus putting a number of people living in rural Ireland at risk of unemployment and many other social issues.

Furthermore, the lack of alternative options of transport is more pronounced in rural areas than urban areas. In rural Ireland, charging infrastructure for electric vehicles is not in place and there is lack, or inadequacy, of public transport options provided as a viable alternative to using cars. [907] In addition, in the Western region, 82% of homes use oil, coal or peat for heating, compared with 44% of homes in the rest of the State, and they have little access to natural gas.[908] Furthermore, as a result of the national grid evolving over the years in the context of fossil fuelled generation sourced from large centralised generators, the national grid is difficult to access[909], ultimately hindering the development of new and distributed plants is rural Ireland.

It is clear that climate change will greatly affect rural Ireland and that people living in rural Ireland will have greater difficulty in adapting to the changes necessary to curb climate change; as well has having greater difficulty dealing with the effects of climate change. 'The Climate Action Plan' includes a range of measures designed to mitigate these challenges- the mitigation of which will be key to sustaining rural communities.

Obj8.T5: Increased financing, compliance and governance requirements

Irelands National Strategy to Support the Community and Voluntary Sector- 'Sustainable, Inclusive and Empowered Communities'[910], contains an action to develop the capacity of organisations working in the community and voluntary sector to

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[905] http://www.climatecouncil.ie/media/Climate%20Change%20Advisory%20Council%20Annual%20Review%202019.pdf [and] Desmond, M. et al. (2018), *State of Knowledge on Climate Change Impacts for Ireland* [online] http://www.epa.ie/pubs/reports/research/climate/EPA%20RR%20223_web.pdf

[906] The Socio-Economic Impact of Forestry in Co. Leitrim (2019) https://www.leitrimppn.ie/wp-content/uploads/2019/09/The-Socio-Economic-Impact-of-Forestry-in-Co.-Leitrim-Final-Report_compressed.pdf

[907] Poverty and Social Inclusion- the Case for Rural Ireland (2016) http://www.irishrurallink.ie/wp-content/uploads/2016/10/Poverty-and-Social-Inclusion-The-Case-for-Rural-Ireland.pdf

[908] https://westerndevelopment.ie/about/publications/making-the-transition-to-a-low-carbon-society-in-the-western-region-key-issues-for-rural-dwellers/

[909] Rebiogen (2017) Community Sustainable Energy Centres: A model for Ireland https://www.seai.ie/publications/RDD_RebioGen.pdf

[910] https://assets.gov.ie/26890/ff380490589a4f9ab9cd9bb3f53b5493.pdf

address issues and challenges presented by compliance and monitoring arrangements across all funding programmes. This includes a review of all regulatory requirements coupled with potential streamlining and standardisation of all regulatory monitoring, reporting and compliance requirements as well as resources to support organisations to fulfil compliance requirements. The timeframe on the implementation of this action will see it addressed incrementally, in the period 2019 to 2023, and will involve ongoing consultation with all relevant stakeholders. Implementation will be led by the Department of Rural and Community Development, in collaboration with other relevant Government Departments.

Obj8.T6: Poor farmer health, wellbeing and rural isolation; and ongoing farm safety issues

In Ireland research has established that "social isolation is associated with older age, poorer health, rurality, and infrequent contact with friends."[911] The Teagasc study, 'Pain and Distress in Rural Ireland,' concluded that the prevalence of traditional close-knit social relations in rural Ireland, which may have prevented loneliness and isolation before, were no longer the norm912. Ongoing research undertaken by Teagasc in conjunction with NUI Maynooth further found that 38% of farmers were less likely to have intimate social relationships, i.e. daily or almost daily visits/conversations with family or friends, compared with others (48%) in similar rural settings.

A study done on farmers health found that farmers have a high risk of morbidity and mortality associated with cardiovascular disease, with 80% of farmers being in the high-risk group for heart disease. In addition, almost 50% of farmers were found to have high blood pressure and 46.1% had raised cholesterol levels. Furthermore, a vast majority were overweight or obese.[913] Ongoing research being led by Teagasc has established that when it comes to health, farmers are not a homogenous group and that there are several social determinants or characteristics that impact on their health.

Farm safety is also an issue on Irish farms with the fatality rate in agriculture, forestry and fishing far higher than any other occupation. Statistics from the Health and Safety Authority (HSA) also show that the young and older age categories are particularly vulnerable. [914] Whereas the rate of worker fatalities has significantly reduced in other sectors over the past twenty years, particularly construction, the fatality rate for

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[911] Drennan J, Treacy M, Butler M, Byrne A, Fealy G, Frazer K, et al. The experience of social and emotional loneliness among older people in Ireland. Ageing Soc. 2008;28(8):1113–32.
[912] https://www.teagasc.ie/media/website/rural-economy/farm-management/Pain_and_Distress_in_Rural_Ireland_Report.pdf Pg. 8
[913] https://irishheart.ie/news/new-farmers-health-study-launched/
[914] https://www.hsa.ie/eng/Your_Industry/Agriculture_Forestry/Further_Information/Fatal_Accidents

agriculture, forestry and fishing has shown little improvement over that period, with this sector accounting for half of all fatal workplace accidents in 2017 and 2018[915]. It is therefore evident that work must be done to increase farmer's health and wellbeing, decrease rural isolation and manage farm safety issues. Research suggests that there is a potential positive connection between peer to peer learning and engagement with occupational safety and health to improve farm safety[916].

Obj8.T7: Failure to maximise opportunities presented by the digital economy

Any delay in the roll out of the National Broadband Plan could have negative knock on effects in rural Ireland, including a continued decline in younger age cohorts and missed opportunities for investment in rural Ireland. In 2019, a total of 91% of the Irish population had access to the internet. However, access was greater in cities (93%) than it was in rural Ireland (87%).917 In 2017, it was concluded that less than 50% of rural areas across the EU had fast broadband connectivity. This prevented these communities from being able to reap the many benefits that digitalisation brings, such as social and economic integration. A lack of sufficiently fast broadband connectivity contributes greatly to the depopulation of rural areas; and increases the average age of the rural population. Providing fast connectivity to rural areas improves the life conditions of its inhabitants by opening up new possibilities to work from home, access online markets and to interact with public services such as remote health monitoring. [918] Therefore, it is clear that there is an ongoing need to provide broadband to all areas across Ireland equally, both cities and rural areas; and any delay in the provision of this will negatively affect people living in these areas.

Obj8.T8: Potential negative impact of Brexit on agri-food related employment

A study on the impacts of Brexit, carried out by Copenhagen Economics, found that the agri-food sector in Ireland is likely to be significantly impacted by Britain's exit from the EU and that processed foods, beef and dairy sub sectors are likely to face the largest impacts; with trade and production in these sectors predicted to fall significantly below the non-Brexit baseline level in 2030. Production in other primary agriculture

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915 https://www.hsa.ie/eng/publications_and_forms/publications/corporate/hsa_stats_report_2019.pdf

916 O'Connor T, Meredith D, Kinsella J, et al 583 Evidence-based social learning for safety and health promotion among Irish dairy farmers Occupational and Environmental Medicine 2018

917 https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do

918 https://data.consilium.europa.eu/doc/document/ST-7085-2019-INIT/en/pdf

sub-sectors such as grains, fruit and vegetables, forestry and fishing will also be negatively affected; however, this will be to a lesser extent. Nonetheless, it is clear that Brexit will have huge implications for jobs in the primary and secondary sectors and as these are predominantly located in rural areas, the impacts are likely to be felt the most there.[919] Similarly, a study by KPMG on the impact of non-tariff barriers as a result of Brexit in 2017 found that compliance with additional requirements, such as customs or veterinary costs, would lead to additional costs for the primary producer, but the precise range depended on the product involved and the nature of the checks required. [920] This again would greatly affect primary producers, who are predominantly situated in rural areas.

Obj8.T9: Emerging plant pests and diseases in Irelands forests, reducing the level of biomass available

Climate change has the potential to dramatically modify tree physiology and tree defence mechanisms, while also shifting the current boundaries of insects and pathogens. Already, climate change has been accredited for the spread of pathogens such as Chalara fraxinea (ash dieback disease) and Phytophthora species across Europe. Additionally, invasive exotic alien species now find favourable ecological conditions in areas that would've before been considered unsuitable.[921] The spread of pathogens and invasive species could have negative effects on the availability of biomass coming from Irish forests. For example, ash die back has already had a negative impact on forest cover figures in Ireland with 384 forestry plantations infected in 2017, distributed over 24 counties.[922] As there is no cure for ash dieback, the prevalence of it is of great concern and has significant potential to greatly reduce the supply of biomass from forests.[923]

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[919] https://www.copenhageneconomics.com/publications/publication/ireland-the-impacts-of-brexit
[920] https://assets.kpmg/content/dam/kpmg/nl/pdf/2018/sector/overheid/impact-of-non-tariff-barriers-as-a-result-of-brexit.pdf
[921] https://www.forestryfocus.ie/growing-forests-3/threats-to-forests/climate-change/
[922] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/forestservice/treediseases/ashdiebackchalara/
[923] Pest Risk Analysis for Hymenoscyphus pseudoalbidus for the UK and the Republic of Ireland https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/forestry/treediseases/ashdiebackchalara/PestRisk290116.pdf

Objective 9: improve the response of EU agriculture to societal demands on food and health, including safe and nutritious food produced in a sustainable way, food waste, as well as animal welfare;

Strengths

Obj9.S1: National Action Plan developed to tackle Antimicrobial Resistance

Antimicrobial Resistance (AMR) has been described by the World Health Organisation as "a global crisis that must be managed with the utmost urgency".[924] It is estimated that if AMR is not addressed by 2050, it will be responsible for 10 million deaths annually (more than are currently lost to cancer) and will cost USD$100 trillion in lost global production[925]. AMR is a global threat to the lives of citizens and therefore reducing antibiotic usage in the agricultural sector is crucial. The National Action Plan on Antimicrobial Resistance 2017-2020 (iNAP)[926], which is a joint initiative between the Department of Agriculture, Food and the Marine and the Department of Health; recognises the serious threat that anti-microbial resistance (AMR) poses to human health. The iNAP aims to tackle this serious and increasing threat by addressing on farm use of antibiotics; and by continuously educating stakeholders in the animal health sector on ways to reduce the overall quantity of antibiotics being used, as well as ways to prevent disease outbreaks from occurring. Furthermore, it aims to improve the availability of antibiotic consumption data in order to provide a benchmark of antibiotic use for farmers and veterinary practitioners and to provide for evidence-based policy making.

Obj9.S2: Antibiotics usage in Ireland is below the EU average

In 2016, 102.3 tonnes of antibiotics (tablets excluded) were sold in Ireland. In terms of sales per population correction unit (PCU) for veterinary antimicrobial agents marketed

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[924] https://www.who.int/dg/speeches/2016/antimicrobial-resistance-un/en/

[925] iNAP Irelands National Action Plan on Antimicrobial Resistance 2017-2020 https://assets.gov.ie/9519/afcba9bce7c54bf9bcbe9a74f49fdaf2.pdf

[926] Irelands National Action Plan on Antimicrobial Resistance 2017-2020 https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/animalhealthwelfare/amr/inap/IrelandNationalActionPlanAntimicrobialResistance030818.pdf

for food producing animals, Ireland was at 52.1 mg/PCU. Ireland ranked 14th out of 30 European countries (EU-28 plus Norway and Switzerland) and was well below the EU average of 124.6 mg/PCU.[927] In 2018 sales levels had reduced to 98.6 tonnes (tablets excluded) and the PCU for food producing animals in Ireland was at 46.0mg/PCU.[928]

Obj9.S3: National Plan on the Sustainable use of Pesticides

The National Action Plan for the Sustainable use of Pesticides (2019)[929] builds on the original National Action Plan (2013), and consolidates the objectives set out in that document. The 2019 National Action Plan (NAP) has five main areas in which it aims to make improvements:

- Training, Education, Information Exchange and Data Gathering;
- Controls on Application Equipment;
- Controls on Storage, Supply and Disposal of Plant Protection Products;
- Controls on use of Plant Protection Products in Specified Areas;
- Integrated Pest Management (IPM).

The plan aims to ensure human and environmental safety while continuously maintaining viability of the farming and amenity sectors; and places particular emphasis on protecting our drinking water from pesticides. It also strongly encourages the use of IPM. Overall, sales of Plant Protection Products in Ireland declined since 2011, with an overall decrease of -28% recorded between 2011 and 2018.[930] There was a sharp decrease in total sales between 2011 and 2012, followed by a steady increase in sales to 2015. However, total sales declined again in 2016 and continued to decline until 2018. Total sales of Plant Protection Products in 2018 were 2.65m tonnes, down from 3.5m tonnes in 2015.[931] However, it has been highlighted that the current control system is insufficient. Few inspections are carried out on the equipment in use; many pesticide operators lack training and certification; there is promotion of low pesticide-input pest management and controls for integrated pest management are limited.[932]

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[927] https://www.ema.europa.eu/en/documents/report/sales-veterinary-antimicrobial-agents-30-european-countries-2016-trends-2010-2016-eighth-esvac_en.pdf

[928] https://www.ema.europa.eu/en/documents/report/sales-veterinary-antimicrobial-agents-31-european-countries-2018-trends-2010-2018-tenth-esvac-report_en.pdf

[929] http://www.pcs.agriculture.gov.ie/media/pesticides/content/sud/Irish%20National%20Action%20Plan%20for%20the%20Sustainable%20Use%20of%20Pesticides%20-%20February%202019.pdf

[930] https://efood lossc.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20200603-1

[931] Pesticide Sales (Eurostat) https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do

[932] European Commission, DG SANTE proposals for country-specific recommendations on F2F objectives, Ref. Ares(2020)4578850 - 03/09/2020

Obj9.S4: Ireland has been successful in decreasing the risks associated with the use of pesticides

Harmonised Risk Indicators show the trend in risks associated with the use of pesticides. Harmonised Risk Indicator 1 (HRI 1) measures the use and risk of pesticides. Across the EU, there has been a decline of 17% since the baseline period in 2011-2013, but no change compared to 2017.[933] Ireland performed above the EU average in relation to HRI1 with a decline of 31%.[934] Harmonised Risk Indicator 2 (HRI 2) is based on the number of emergency authorizations and again, Ireland performed well in relation to this indicator. This suggests that Ireland is on the right track to meet its pesticide related obligations under Farm to Fork.

Obj9.S5: National Strategy developed to sustain optimal animal health on farms

Superior herd health can improve overall farm efficiency and contribute to farm sustainability and lowered environmental impact on the national herd. Ireland's National Farmed Animal Health Strategy (2017-2022)[935] is concerned with sustaining optimal animal health within the Irish agri-food sector. In addition, it aims to improve the sustainability and profitability of Ireland's farming and processing industries; as well as to protect public health and the environment. The strategy is underpinned by four main principles:

- Working in partnership to improve animal health standards;
- Ensuring clarity with regards the roles and responsibilities of all stakeholders;
- Consistently applying the 'prevention is better than cure' principle; and
- Ensuring animal health programmes have clear objectives and are sustainably and appropriately funded.

Increasing animal welfare standards is key to addressing consumer concerns relating to the treatment of farmed animals. Teagasc produced a guidance document outlining the importance of, and best practices for, maintaining animal welfare.[936] The document discusses ways to achieve best animal welfare practices; and outlines the main

[933] https://ec.europa.eu/food/plant/pesticides/sustainable_use_pesticides/harmonised-risk-indicators/trends-hri-eu_en
[934] https://ec.europa.eu/eurostat/databrowser/view/sdg_02_51/default/table?lang=en
[935] National Farmed Animal Health Strategy 2017-2022 https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/animalhealthwelfare/nationalfarmedanimalhealthstrategy/NFAHS110717.pdf
[936] https://www.teagasc.ie/media/website/animals/beef/Managing-Welfare.pdf

environmental requirements to attain optimal welfare, which include: providing comfort and security, maintaining hygiene and permitting coping behaviours.

Obj9.S6: Establishment of Animal Health Ireland

Animal Health Ireland (AHI)[937] – a partnership between private sector organisations/businesses in the agri-food sector and the Department of Agriculture, Food and the Marine – was established in order to ensure the profitability and sustainability of the agri-food sector in Ireland by improving animal health. It aims to assist livestock producers and processors in ensuring optimal animal health by providing the knowledge, education and coordination required to establish effective control programmes for non-regulated livestock diseases, including BVD, Johne's disease and IBR. The advice provided is developed by a number of Technical Working Groups, and wherever possible, the major outputs and policy advice provided by these groups are published in international peer-reviewed journals.[938]

Obj9.S7: History of successful agri-food industry initiatives concerning animal health and welfare

The Irish agri-food industry has demonstrated its ability to both initiate and support initiatives aimed at improving animal health, animal welfare and public health. Various stakeholder initiatives such as the Campylobacter Stakeholder Group[939] and the Pig Stakeholders Group[940] are examples of this. The report of the industry-led Campylobacter Stakeholder Group, published in 2017, contained a series of thirteen recommendations aimed at reducing the incidence of human campylobacter infection in Ireland. Good progress has been made on many of these recommendations.

The Pig Industry Stakeholder Group convened in response to the various challenges facing the industry, with particular emphasis on salmonella in pigs. The report of the group, published in 2016, contains 63 recommendations, the implementation of which is overseen by the PISG under its independent chairperson. Recent advances have

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[937] http://animalhealthireland.ie/
[938] http://animalhealthireland.ie/?page_id=499
[939] REPORT OF THE CAMPYLOBACTER STAKEHOLDERS GROUP (2017) https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/foodsafetyconsumerissues/foodsafetypublications/FinalReportCampyPrintVer3090517.pdf
[940] Report of the Pig Industry Stakeholder Group https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/farmingsectors/pigs/REPORTPIGINDUSTSTAKEHOLDERGROUP290116.pdf

included the agreement by pig producers to co-fund, together with DAFM, an Animal Health Ireland Pig Health Programme, Pig HealthCheck[941], which will be instrumental in the delivery of a number of recommendations from the report. Furthermore, Ireland's first animal welfare strategy is due to be launched shortly.[942]

Obj9.S8: Development of a Food Safety and Food Authenticity Strategy

The Department of Agriculture, Food and the Marine launched its *Food Safety and Food Authenticity Strategy*[943] in 2018. Key to the development of this strategy was ongoing consultation with both internal and external stakeholders who contribute significantly to the safeguarding of public health, public confidence, food safety and food authenticity in Ireland. The strategy aims to protect public health while also developing a culture of cross-compliance across the agri-food sector to ensure consumer safety; as well as providing opportunities for collaboration across government and industry. Promoting and safeguarding public health is a priority for the Department; with over 600 staff members directly involved in food safety and food authenticity controls. The Department has developed a formal project management approach in its delivery of the five high level goals identified in the strategy.

Obj9.S9: Existence of a Sustainable Healthy Agri-Food Research Plan

The Sustainable Healthy Agri-Food Research Plan (SHARP)[944] is a strategic agenda identifying a clear set of research priorities in the agri-food sector that will act as a blueprint to guide the funding decisions of all relevant funders over the coming years. The plan was developed by a cross-funder working group within DAFM and is the result of an exercise drawing on the knowledge of the relevant Government Departments, funding bodies, the research community, all parts of the industry and the broader society. It aims to identify and develop research and innovation opportunities for Sustainable Food Production and Processing; and Food for Health. The strategy is built around three main guiding principles- competitiveness, sustainability and citizen/consumer orientation; and is concerned with the production and processing of

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[941] http://animalhealthireland.ie/?page_id=18234
[942] https://www.gov.ie/en/publication/12d6a-animal-welfare-strategy/
[943] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/foodsafetypublichealthampconsumerissues/foodsafetypublications/DOABookletFinalSQLayout02072018Sample120718.pdf
[944] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/research/whatsnew/SustainableHealthyAgriFoodResearchPlan300315.pdf

safe, high-quality, nutritious food which can be made in an efficient, competitive, and sustainable manner. Fostering research in the agri-food sector enables the sector to achieve its full potential in a sustainable yet competitive way.

Obj9.S10: Strategy for the Development of the Organic Food Sector

Although the organic sector in Ireland is small, the national market for organics has recently experienced considerable growth, growing by 10.5% in 2017.[945] The Strategy for the Development of the Organic Sector recognises the opportunities that exist for the Irish Organic Food Sector and provides clear direction for its further development up to 2025.[946] It is envisaged that the organic sector will produce a wide range of organic products to meet increasing domestic and export market opportunities. The stated vision of this new Strategy is "for Irish organic food and drink, based on its natural production attributes, to be a desirable choice for farmers, consumers and retailers." The Strategy sets strategic objectives for each sub sector (cereals and pulses, dairy, horticulture, beef, sheep, aquaculture and poultry/eggs) up to 2025 and lists a number of cross-sectoral actions to be taken to assist in meeting these objectives. Furthermore, an Organic Strategy Implementation Group was established in order to monitor progress and ensure that commitments are met within the specified time frames. The strategy also aligns with the strategic growth plans of the Organic Sector within the broader Food Wise 2025[947] Strategy for food and drink.

Obj9.S11: Increasing percentage of UAA organically farmed

The area of land under organic production has expanded significantly, with latest figures indicating that there is now c.74,000 hectares under organic production in Ireland, which corresponds to around 2% of total agricultural area.[948] The total area under organic farming in the EU-28 in 2019 was 13.8 million hectares, which is an average of 8.5% of agricultural area.[949] Organic farming is based on principles and methods of farming that promote co-existence with natural systems, as well as the protection and enhancement of the environment. Emphasis is placed on practicing

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[945] Bord Bia Research 2017 as noted in the Review of Organic Food Sector and Strategy for its Development 2019-2025

[946] Review of Organic Food Sector and Strategy for its Development 2019-2025 https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/farmingsectors/organicfarming/organicsscheme/ReviewofOrganicFoodSector290119.pdf

[947] Food Wise 2025 https://www.gov.ie/en/publication/a6b0d-food-wise-2025/

[948] DAFM figures

[949] https://ec.europa.eu/eurostat/statistics-explained/index.php/Organic_farming_statistics

environmentally friendly methods of farming, with particular concern for animal welfare. Looking at organic farming from an operational perspective, it concentrates on nourishing the soil through the use of natural inputs; avoiding the requirement for herbicides, fungicides and insecticides by using methods such as crop rotation; maximising access to the outdoors using more appropriate breeds of animal, including traditional breeds; providing liberal space when indoors; and finally, excluding the use of GMO's. Altogether, crops and animals are produced organically as they are provided with the very best that nature has to offer, starting with the soil. In essence, Organic Food is produced in the most natural way and in compliance with strict EU Regulations.[950]

Obj9.S12: Internationally recognised and credible Sustainable Quality Assurance Schemes

Quality Assurance Schemes are fundamental in promoting food and horticulture and provide a platform for the promotion of good product quality. The Irish Food Board, Bord Bia operates Quality Assurance Schemes for the following product sectors: beef, lamb, dairy, pigmeat, poultry, eggs, feed, fresh produce, mushroom compost & casing manufacturers and ornamental plant producers. These schemes are built on best practice in farming, processing, current legislation, relevant industry guidelines and international standards. Origin Green, which is ran by Bord Bia, is the only national sustainability programme, which includes farmers, primary producers, processors and retailers working together and leading the way to create a better future for all involved. It continuously identifies steps towards increased efficiency using a system of measuring and feedback and has resulted in an increasing number of Irish farmers recognising the benefits of improved sustainability practices. Sustainability and efficiency go hand in hand and together they can preserve farm businesses and the environment for future generations. [951] The reputation of Irish produce at home and abroad is built on the strong tradition of quality produce associated with Irish farmers.

Obj9.S13: Numerous EU co-funded marketing campaigns

[950]Review of Organic Food Sector and Strategy for its Development, 2019-2025 https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/farmingsectors/organicfarming/organicsscheme/ReviewofOrganicFoodSector290119.pdf

[951] https://www.bordbia.ie/farmers-growers/farmers/quality-assurance-schemes/

The Irish Food Board, Bord Bia, is currently managing 5 EU campaigns worth a total of €25.8m across Beef, Porkmeat, Sheepmeat, Poultrymeat and Horticulture sectors.[952] They are targeted at both the internal EU market and Third countries. These EU promotion campaigns aim to increase the awareness of, and promote, the EU's high safety and quality standards as well as the diversity and authenticity of European products. They are also aimed at increasing the information available on our products in order to gain market access in new international markets; as well as diversifying our trading partners. These campaigns link with Food Wise 2025, and foresee a sector that acts more strategically and achieves a competitive critical mass in the international marketplace. The level of EU funding varies across the different campaigns depending on whether the programmes are single or multi country (70% - 80%). For the 2020 call, Bord Bia made applications under the competitive process for a share of the total EU €183m budget available under the Annual Work Programme 2021 for co-financed programmes.

Obj9.S14: Public and private initiatives accorded to combating food waste

The UN's Sustainable Development Goal 12.3 aims to "halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses."[953] This Goal is given effect through its incorporation into the new EU Waste Framework Directive (Directive (EU) 2018/851 of the European Parliament, amending Directive 2008/98/EC on waste), which was transposed into Irish law in July 2020 This is one of four directives under The Circular Economy Waste Package to be transposed into Irish law. The Department of Communications, Climate Action and Environment play a key role in implementing the Waste Directive and have established a National Food Waste Forum. This forum brings together business owners and policy makers across the food supply chain to discuss issues and come up with solutions around tackling waste.

For nearly a decade, the Environmental Protection Agency (EPA) has had a statutory role leading on food waste reduction and has managed the *Stop Food Waste Programme.* This is a national programme designed to gather data, develop knowledge and skills in relevant sectors, and drive education and awareness across society and the economy to combat food waste.[954] Awareness raising and behavioural change

[952] https://ec.europa.eu/chafea/agri/en/campaigns/map-and-statistics-target-countries?field_year_value%5Bmin%5D=2010&field_year_value%5Bmax%5D=2020&field_country_beneficiary_tid%5B0%5D=153&field_program_type_value=All&field_eu_organisation_value=All&field_is_chafea_value=All&items_per_page=5&page=1

[953] http://www.fao.org/sustainable-development-goals/indicators/1231/en/

[954] https://stopfoodwaste.ie/

initiatives towards individuals, householders and small businesses are delivered through this initiative. The EPA has also published a number of guides to assist Irish citizens in making the right choices when disposing of waste, including the 2017 "A Household Guide to Composting,"[955] which aims to guide people through the process of composting unavoidable food waste at home.

Additionally, the private sector plays a key role in food waste reduction in Ireland. Under Origin Green, member companies have established a total of 394 waste targets comprising of 1,193 initiatives. Of these initiatives, 83 are focused on food waste. In the Retail and Food Service level, a target to reduce food waste by 15% has been set.[956]

A new waste policy supporting the transition to a circular economy will be published in 2020 and will incorporate national food waste reduction policies for the first time.

[955] https://www.epa.ie/pubs/reports/waste/stopfoodwaste/2017-Compost-Booklet-Web-Version.pdf
[956] Origin Green Progress Update Report (2020) https://www.origingreen.ie/mwg-internal/de5fs23hu73ds/progress?id=Ee4CeEj1dbC_2eFxBsbkTRWC8qRKHuVoVgEmaNgViUU,

Weaknesses

Obj9.W1: Low level of understanding of AMR

Several Eurobarometer surveys undertaken since 2010 in relation to AMR indicate that the level of awareness in Ireland of the relationship between the use of antimicrobials and the development and spread of AMR is still low.[957] According to the 2018 Special Eurobarometer 478 Report on Antimicrobial Resistance, people's awareness that antibiotics do not kill viruses declined the most in Ireland at -11% points since 2016, indicating a low level of understanding of AMR. Furthermore, only two countries (Ireland and Croatia) were found to experience an overall decline in the average number of correct answers provided in this survey (at -0.1) further indicating a lack of awareness and understanding around AMR in Ireland.[958]

Obj9.W2: Lack of appropriate data to monitor antibiotic usage on farm

In Ireland, antimicrobial usage of food-producing animals is measured by sales; and therefore, data concerning the breakdown of use by species and age-group of animals; and data concerning whether the treatment is applied at farm/herd level, is not available. As a result, it is impossible to accurately monitor antibiotic usage at farm level.[959] Studies have shown that intensive production systems[960] tend to have higher rates of antibiotic usage, which impacts on the ability to effectively advise on appropriate usage especially for livestock.

Obj9.W3: Persistence of animal welfare issues

One of the key principles of Bord Bia's Sustainable & Quality Assurance Schemes is to ensure the welfare of animals on Irish farms. Bord Bia performs routine inspections on Irish farms through which animals are certified as being properly treated when they are treated in compliance with the relevant animal welfare legislation.[961] However, issues relating to animal welfare, specifically the tail docking of pigs, the welfare of male dairy

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[957] Irelands One Health Report on Antimicrobial Use and Antimicrobial Resistance https://www.gov.ie/pdf/?file=https://assets.gov.ie/11418/66ec356a49754ee7a0b53268170b9b9c.pdf#page=1

[958] Special Eurobarometer 478 Report on Antimicrobial Resistance (2018)

[959] Irelands One Health Report on Antimicrobial Use and Antimicrobial Resistance https://www.gov.ie/pdf/?file=https://assets.gov.ie/11418/66ec356a49754ee7a0b53268170b9b9c.pdf#page=1

[960] https://ec.europa.eu/health/amr/sites/amr/files/amr_studies_2015_am-in-agri-and-env.pdf

[961] https://www.origingreen.ie/who-is-involved/producers/animal-welfare/

calves, lameness in sheep, and foot pad dermatitis in broilers continue to persist on Irish farms.

Tail biting in pigs is an aberrant behaviour and results in poor welfare for the pigs. In addition, tail docking is painful. Tail biting can result in pathological changes such as abscesses that result in partial or total condemnation of carcases.[962] The presence of tail-bitten pigs is therefore a strong indicator of unacceptable welfare standard. However, in Ireland, the practice of tail docking to prevent tail biting is still widely used and 99% of pigs at slaughter do not have intact tails.[963]

In relation to male dairy calves, the rapid expansion of the dairy industry in the past number of years has brought a number of animal health issues, particularly in relation to the large number of dairy sired male calves being produced as a result. In 2019, some 400,000 male calves were sired from a dairy breed.[964] As there is a limited market for these low-value animals in Ireland at present, significant numbers of male dairy calves are exported for veal production every year. The oversupply of relatively low value dairy male calves during the spring period and the long-distance transportation of these unweaned animals for exports have led to a risk of animal welfare issues.

In relation to lameness in sheep, lameness is an indicator of poor welfare[965] and is a common, persistent and costly disease for the sheep industry.[966] The affected animals find it hard to move as a result of pain. The reduced mobility leads to a reduced feed intake, and subsequently a lower body condition and an increased risk for other diseases. Sheep lameness has also been identified as a main area of concern with regard to antibiotic usage on farm and antimicrobial resistance.[967] The Scheme Welfare Scheme, under the 2014-2020 RDP means that farmers are already engaged in improving sheep welfare and there is an opportunity to improve and expand the scheme to further address lameness in sheep.

In relation to broilers, foot pad dermatitis is a significant welfare and economic challenge for the Irish broiler industry. It is a painful condition that reduces mobility,

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[962] ESFA Journal 2007 "The risks associated with tail biting in pigs and possible means to reduce the need for tail docking considering the different housing and husbandry systems" https://efsa.onlinelibrary.wiley.com/doi/pdf/10.2903/j.efsa.2007.611

[963] DAFM data

[964] DAFM data

[965] Goddard, 2011. Welfare assessment in sheep. *In Practice*; **33:**508-516.

[966] Lovett, 2015. Causes, control and costs of sheep lameness. *Teagasc National Sheep Conference 2015*

[967] 4.Doidge, C. et al (2020) Farmers' Perceptions of Preventing Antibiotic Resistance on Sheep and Beef Farms: Risk, Responsibility, and Action. Frontiers in Veterinary

feed and water intake and leads to increased condemnation of carcases.[968] In 2020, there were 121 flocks out of 375 presenting with significant (>50%) foot pad dermatitis lesions.[969]

Obj9.W4: Low level of organic farming in Ireland

Although the overall level of organic farming in Ireland is increasing, the amount of utilised agricultural area (UAA) in Ireland allocated to organic farming is c.74,000 hectares, which corresponds to around 2% of total agricultural area.[970] Ireland has the third lowest level of agricultural land allocated to organic farming across the EU-27, with only two other countries, Romania and Malta, having less. Austria in comparison has 24.1% of its UAA devoted to organic production followed by Estonia at 20.6% and Sweden at 20.3%.[971] Ireland has not yet tapped into the full potential of the market.

Obj9.W5: Reliance on imports of certain animal feeds

Ireland lacks self-sufficiency in certain animal foodstuffs and therefore relies on imports to make up the difference. In 2017, the total value of imported animal foodstuffs was €1,058,368, amounting to 4,039,215 tonnes. This is an increase in value of 36% since 2017 where the total value of imported animal foodstuffs was €780,026; and an increase in volume of 32%, where the total volume of imported animal foodstuffs in 2017 was 3,057,533 tonnes. Animal foodstuffs accounted for 11% of total agri-food imports in 2018, indicating a heavy reliance on imports of certain animal feeds.[972]

Obj9.W6: No system in place to measure farmers' efforts to meet societal demands

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[968] EFSA" Scientific Opinion on the use of animal-based measures to assess welfare of broilers" https://efsa.onlinelibrary.wiley.com/doi/pdf/10.2903/j.efsa.2012.2774

[969] DAFM data

[970] DAFM figures

[971] Organic Production, CAP Indicators: https://agridata.ec.europa.eu/extensions/DashboardIndicators/OrganicProduction.html?select=EU27_FLAG,1

[972] Annual Review and Outlook for Agriculture, Food and the Marine (2019) https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/foodindustrydevelopmenttrademarkets/agri-foodandtheeconomy/publications/DepartmentAgricultureAnnualReviewOutlook2019200919.pdf

Ireland lacks a robust means of quantifying the efforts being made by individual farmers to meet societal demands in relation to the safety of the food they produce and the health and welfare of their livestock. Research based on choice experiments and cost estimate experiments show that animal welfare friendly practices *may* be economically sustained by consumers increased willingness to pay, however further research is required to determine if the additional premium will sustain the higher costs of production.[973] Countries such as Denmark and the United Kingdom have developed a food label highlighting animal welfare standards[974][975]. However, Ireland has not yet developed such a standard and associated labelling scheme. This label would demonstrate the effort made by a particular farmer to meet societal demands; and would allow consumers to make an informed choice when purchasing.

Obj9.W7: Lack of accurate data available on food waste

The new Waste Framework Directive 2018/851[976] requires Member States to assess and monitor food waste prevention initiatives and to provide data on food waste/loss to the EU. There is currently no data available for food waste/loss at primary producer level, but work is being done at EU level to develop a methodology to collect relevant data. There are now new requirements under the Waste Framework Directive which outline how food waste is to be reported across the food waste chain (primary production, processing and manufacturing, retail and distribution, restaurants and food services and households). The Department of Climate Change and the Environment is coordinating its work, with the Environmental Protection Agency (EPA), the Department of Agriculture, Food and the Marine (DAFM) and the Central Statistics Office (CSO), to ensure that the data required is available and will be reported to the Commission in mid-2021, for the first reporting year (2020). According to the EPA's "Towards a Resource Efficient Ireland- Irelands National Waste Prevention Programme Annual Report for 2017" it is estimated that more than 1 million tonnes of food waste is produced annually[977] (not including wasted food from agriculture, which is yet to be quantified).

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[973] https://www.sciencedirect.com/science/article/pii/S0924224410001767

[974] https://www.foedevarestyrelsen.dk/english/Animal/AnimalWelfare/Pages/New_animal_welfare_label_will_win_the_hearts_of_Danes.aspx

[975] https://www.rspcaassured.org.uk/

[976] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32018L0851&from=EN

[977] Towards a Resource Efficient Ireland- Irelands National Waste Prevention Programme Annual Report for 2017 https://www.epa.ie/pubs/reports/waste/prevention/reports/EPA_NWPP_Ministers%20Report%202017_web.pdf

Obj9.W8: Persistent level of food poverty in Ireland

According to a food poverty indicator that was constructed on Central Statistics Office (CSO) figures contained in the annual Survey on Income and Living Conditions (SILC) between 2004 and 2010, food poverty affected 10% of the Irish population. This figure was higher amongst low income earners, particularly lone parent families and the unemployed; and children.[978] In 2010, a survey conducted by the Health Promotion Research Centre found that overall 21% of Irish schoolchildren reported going to school or bed hungry due to a lack of food at home, an increase from 16.6% in 2006. Again, the prevalence of hunger in this study was more apparent in children from lower socio-economic backgrounds.[979] As food poverty necessitates the consumption of low cost energy dense foods that are high in fats and refined sugars, there is an increased risk of this part of the population becoming overweight or obese.[980] According to the Healthy Ireland Survey 2015, 23% of people are obese, indicating that food poverty is a huge issue in Ireland. [981]

[978] Carney C, Maître B. Constructing a food poverty indicator for Ire- land. Dublin: Department of Social Protection; 2012 [cited 2014 30 Oct] Available at: http://www. welfare.ie/en/downloads/dspfood- povertypaper.pdf

[979] NUI Galway. Health behavior in school-aged children (HSBC): background information [Internet]. Galway: Health Promotion Research Centre; last updated 2014 Jul 31 [cited 2014 Oct 21]. Available at: http://www.nuigalway.ie/hbsc/ hbsc_ireland_background.html

[980]Sugrue, D. Food Poverty and Policy in Ireland: A Review of the Literature (http://www.ucdsmj.com/food-poverty)

[981] https://www.hse.ie/eng/about/who/healthwellbeing/our-priority-programmes/heal/key-facts/#overweight

Opportunities

Obj9.O1: Further encourage the use of vaccines to decrease the dependency on antibiotics

The development and use of vaccines as an alternative solution to the use of antibiotics could decrease the likelihood of Anti-Microbial Resistance. The Irish National Action Plan on Anti-Microbial Resistance promotes research and sustainable investment in new medicines, diagnostic tools; and vaccines in order to decrease AMR in Ireland.[982] Vaccines can prevent bacterial and viral infections from developing and spreading.[983] Research suggests that vaccines firstly specifically target the organisms and strains carrying resistant genes thus leading to their reduction; and secondly, reduces the likelihood of developing a febrile illness that often leads to antibiotic usage.[984]

According to Teagasc, vaccinations boost the immunity of a herd leading to a reduction in diseases; and further prevent or reduces the shedding of disease by infected animals. They further note that in order to prevent the development of AMR, farmers must improve the overall health status of the animals on their farm. This can be achieved through disease prevention strategies including, farm bio-security measures, good farm husbandry practices and animal vaccination programmes.[985]

Obj9.O2: Develop a database to monitor antibiotic usage

The Irish National Action Plan on Anti-Microbial Resistance[986] (iNAP) highlights a number of initiatives to tackle antibiotic usage. One of the main aims of the iNAP is to "Enhance surveillance of antibiotic resistance and antibiotic use through surveillance systems that facilitate greater standardisation of data collection, data linkage and sharing of real time information." One way in which this is to be achieved is through the development of a national database that provides timely access to reference laboratory systems. This database could then be used to produce the outputs required

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[982] Irelands National Action Plan on Antimicrobial Resistance 2017-2020 https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/animalhealthwelfare/amr/inap/IrelandNationalActionPlanAntimicrobialResistance030818.pdf

[983] Buchy, P. et al (2020) 'Impact of vaccines on antimicrobial resistance' International Journal of Infectious Diseases, Volume 90, Pages 188-196, (http://www.sciencedirect.com/science/article/pii/S1201971219303972)

[984] Klugman, K.P, Black, S. (2018) Impact of existing vaccines in reducing antibiotic resistance: Primary and secondary effects https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6304973/

[985] https://www.teagasc.ie/animals/amr/disease-prevention/

[986] Irelands National Action Plan on Antimicrobial Resistance 2017-2020 https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/animalhealthwelfare/amr/inap/IrelandNationalActionPlanAntimicrobialResistance030818.pdf

for the European Surveillance of Veterinary Antimicrobial Consumption (ESVAC) project run by the European Medicines Agency (EMA). This database would further provide the data needed to enable policy makers, farmers and advisors to make informed decisions on appropriate antibiotic usage.

Obj9.O3: Encourage farmers to move towards sustainable/organic food production systems, in order to meet increasing consumer demand for sustainably produced food

The demand for organic produce is increasing both nationally and internationally; and this increase provides opportunities for the continued growth of the organic farming sector in Ireland to meet this demand. Ireland recently conducted a review of the organic food sector and this review identified a series of changes arising in the market place which may impact the future development of the sector, including: changing consumer preferences on how food is produced, taking into account factors related to the environment and health; and an increase in demand by industry for organically produced cereals. As noted in the review, Ireland has a clean, 'green' image and therefore, would be an ideal platform to market organic products.[987]. Changing consumer preferences relating to how food is produced could result in a market opportunity arising for farmers whereby an emphasis is placed on 'green,' sustainable production. This would provide a significant opportunity for Irish farmers to develop sustainable production systems that would further Irish farmers' "green" image. Furthermore, there is potential to develop branding around this concept to further signify Ireland's green image for example, 'farming for nature'.[988] The potential to expand the existing networks of local markets, farmers markets and other community based initiatives could be further explored. Stakeholders also pointed to initiatives such as the Open Food Network which could be utilised to digitise and make more efficient local food initiatives.

Obj9.O4: Increase consumer awareness of food provenance through the development of a labelling system

There is an opportunity here to build on the clear animal health benefits provided for by the RDP funded Measure 2: Targeted Advisory Service on Animal Health

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[987] http://www.bordbiavantage.ie/market-information/sector-overviews/organic-market/
Review of Organic Food Sector and Strategy for its Development, 2019-2025 https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/farmingsectors/organicfarming/organicsscheme/ReviewofOrganicFoodSector290119.pdf

[988] https://www.farmingfornature.ie/

(TASAH)[989] and the subsequent increased health of the national herd through the development of a labelling system that highlights the health and welfare status of the primary producer. This labelling system would demonstrate the ongoing efforts made by producers to ensure good animal health and welfare on their farms and would allow consumers to make informed choices when purchasing.

Obj9.O5: Increase the use of targeted advisory services on animal health

The Targeted Advisory Service on Animal Health (TASAH)[990] provides farm-specific advice to farmers across a variety of programmes, including in relation to Bovine Viral Diarrhoea, Johne's Disease, Infectious Bovine Rhinotracheitis, and Somatic Cell Counts; and is designed to increase the overall health of the national herd. A review undertaken by Dr Maria Guelbenzu (BVD programme manager, Animal Health Ireland) found that TASAH-funded BVD herd investigations played an important role in facilitating veterinary involvement in herds testing positive for BVD, allowing for detailed investigations to take place and the provision of herd-specific advice to be offered. It has further allowed for the accumulation of data from which key bio-security messages can be drawn.[991] This demonstrates why TASAH is a beneficial service to farmers and highlights the importance of developing this service further. With an increased focus on the use of antibiotics in the livestock sector, it is now an appropriate time to look at alternative strategies for fending off prevalent diseases. For example, Ireland currently has an initiative through Animal Health Ireland which looks at 'selective dry cow strategy' to fend of mastitis, which focuses on reducing antibiotic usage. This requires farmers to maintain milk recording records and farm plans to assist in the development of the strategy.[992]

Overall, increasing the targeted advice available to farmers on issues relating to animal health will provide opportunities for farmers to effectively manage the health of their herd. Furthermore, there may be an opportunity to build on initiatives such as the 'selective dry cow strategy' in the new programme period to further increase the knowledge base of farmers and to further encourage farming practices beneficial to animal health.

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[989] http://animalhealthireland.ie/?page_id=11040
[990] http://animalhealthireland.ie/?page_id=3417
[991] M. Guelbenzu (2018) "A Review of BVD TASAH Investigations in 2018" http://www.veterinaryirelandjournal.com/images/pdf/focus/focus4_apr_2019.pdf
[992] http://animalhealthireland.ie/?page_id=10584

Obj9.O6: Improve fertility performance on farm

In Ireland, only 853 herds altogether (6% of cattle herds, 20% of dairy herds) had usable fertility data at the beginning of Year 1 of the last Knowledge Transfer programme.[993] This increased by 50% over the course of the programme to 1,299 herds in Year 3. An increase in fertility recording to support improved sustainability of our dairy herds is essential; and key to measuring fertility performance in herds is accurate data recording. More awareness is needed to stimulate a higher uptake of fertility recording in Irish cattle herds; and this can be achieved with an Animal Health Measures specifically driving action on farms. Heifer rearing is also key to improving fertility performance on farms. Currently, only 69% of heifers calve between 22-26 months.[994] In order to ensure heifers long term viability in the herd, this value must increase towards 100%. Late calving heifers are at higher risk of early culling, thus reducing the sustainability of the herd. Evidence from Irelands HerdPlus fertility records suggests 34% of cows as either culled or recycled annually.[995] This generates a real need to increase the replacement rate, which if minimised could reduce the number and overall cost of producing replacement heifers to enter the herd. The national farmed animal herd health programme could include a reproductive efficiency module, to encourage and increase the level of data collection on farms and enable good decision making within herds to improve reproductive efficiency.

Obj9.O7: Improve awareness of bio-security protocols and cohesiveness of strategies

Of the 47,000 breeding herds in Ireland (a herd with more than an average of ten births between 2018 and 2019), only 2.5 % of beef herds had no recorded movement into the herd in the past five years. Dairy herds were no different, with only 3.8 % of dairy herds recording no movement in the past five years.[996] As a result, there is an increased risk of infection from many diseases. Therefore, it is necessary to implement bio-security protocols to reduce this risk. Bio-security encompasses bio-exclusion (keeping infectious diseases out of holdings) and bio-containment (reducing infectious disease

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[993] Lane EA. 2017. Knowledge transfer – do the numbers reflect fertility? Irish Veterinary Journal. 7: 662-668. Invited Review.

[994] Dairy stats from ICBF. Accessed at: https://www.icbf.com/wp/?p=13855#:~:text=Following%20last%20weeks'%20release%20of,(See%20graph%201%20below)

[995] Dairy stats from ICBF. Accessed at: https://www.icbf.com/wp/?p=13855#:~:text=Following%20last%20weeks'%20release%20of,(See%20graph%201%20below)

[996] Graham DA, Clegg TA, Thulke HH, O'Sullivan P, McGrath G, More SJ. Quantifying the risk of spread of bovine viral diarrhoea virus (BVDV) between contiguous herds in Ireland. Prev Vet Med. 2016 Apr 1;126:30-8. doi: 10.1016/j.prevetmed.2016.01.017. Epub 2016 Jan 21. PMID: 26850846

threats within the farm).[997] In Ireland, as elsewhere across the EU, multiple bio-security-related protocols and initiatives are in place. For example, in Ireland, Animal Health Ireland provides a series of information leaflets for farmers, advisors and veterinary practitioners that offer science-based, practical advice; and guidelines related to disease control that can easily be implemented on farm.[998] In addition, the Department of Agriculture, Food and the Marine also provides information leaflets related to bio-security, such as "Bio-security for Non-intensive and Pet Pigs."[999]

For effective farm-level bio-security, there is a need to harmonise and integrate these resources. The development of a national approach to bio-security is one of the Department of Agriculture Food and the Marine's high level priorities for 2020; the development of which is timely, considering a new package of EU legislation that consists of the Official Controls Regulation (EU) 2017/625[1000] and the new Plant Health Regulation 2016/2031/EU[1001]came into effect on the 14th December 2019. This legislation recognises the importance of disease prevention and risk-management for both animal and public health and provides better control against animal diseases, as well as safer products for consumers. The new 'animal health law,'[1002] which is to come into effect in 2021, places the responsibility for animal health and bio-security on farmers and others working with animals. The new law also requires that farmers and animal professionals have adequate knowledge of bio-security and other areas of animal and public health.

Obj9.O8: Use local networks to support sustainable food productions and reduce food waste

There is potential to explore using local development networks to support sustainable food production and reduce food waste, including through community-based initiatives. There are already good examples of social entrepreneurs using innovative approaches to address food waste. For example, Food Cloud, an Origin Green partner charity, has developed digital solutions to effectively match surplus food from food and retail businesses with food distribution charities[1003]. With the use of funding made available under the Rural Innovation and Development Fund, FoodCloud has extended its food hub network to parts of rural Ireland, ultimately demonstrating the strong

[997] http://animalhealthireland.ie/?page_id=395
[998] http://animalhealthireland.ie/?page_id=397
[999] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/animalhealthwelfare/diseasecontrols/africanswinefever/BiosecurityNonIntensivePetPigs170817.pdf
[1000] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32017R0625&from=EN
[1001] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32016R2031&from=EN
[1002] https://ec.europa.eu/food/animals/health/regulation_en
[1003] https://food.cloud/

potential community-based initiatives have for developing sustainable food production systems.

Obj9.O9: Harness the considerable carbon reduction potential of reducing food waste

According to the Food and Agriculture Organization (FAO), approximately 1.3 billion tonnes of food is wasted globally each year- that's a third of the food raised or prepared for human consumption that does not make it from farm or factory to fork.[1004] Producing food that goes uneaten is wasteful. In order to produce this food, countries must squander a whole host of resources including—seeds, water, energy, land, fertiliser, hours of labour and financial capital. Not only is it wasteful, but it also leads to the generation of greenhouse gas (GHG) emissions at every stage of the production process and ultimately results in the generation of methane emissions when organic matter (food waste) ends up in a landfill.[1005] The food we waste is responsible for roughly 8% of global emissions[1006]. Reducing food waste is important if we are to combat climate change. It is also an essential component of building a sustainable food system.

Obj9.O10: Assess food loss at all stages of the production cycle

The new European Waste Framework Directive requires Member States to take measures to prevent waste generation. Among other things, Member States are required, in conjunction with the Sustainable Development Goals, "to promote and support sustainable production and consumption models" and "to reduce the generation of food waste in primary production, in processing and manufacturing, in retail and other distribution of food, in restaurants and food services as well as in households as a contribution to the United Nations Sustainable Development Goal to reduce by 50% the per capita global food waste at the retail and consumer levels and to reduce food losses along production and supply chains by 2030." [1007]

Under this Directive there are also obligations to report on waste reduction targets, The Department of Communications, Climate Action and the Environment is working with the Department of Agriculture, Food and the Marine and other

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[1004] http://www.fao.org/news/story/en/item/74192/icode/
[1005] https://www.epa.gov/sustainable-management-food/reducing-impact-wasted-food-feeding-soil-and-composting
[1006] https://www.drawdown.org/solutions/food/reduced-food-waste
[1007] Article 9 'Prevention of waste' https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32018L0851&from=EN

departments/agencies to develop a methodology to collect this data, in line with the Directive. The data collected will provide a picture of food waste from farm to fork and will quantify where it arises along the food chain. In addition, it will assist in developing targets to reduce food losses; and will provide the basis for developing effective food waste management policies.[1008]

Threats

Obj9.T1: Increasing levels of intensive farming resulting in increasing use of antibiotics

Increasing levels of intensive farming pose a threat in terms of AMR. Intensive farming systems are associated with higher levels of antibiotic usage. As most animals are kept in confined conditions within intensive farming systems, antibiotics are therefore prescribed to either prevent an infection from developing within a flock or herd, or, to increase the pace in which animals gain weight; and are therefore, not only used for therapeutic purposes.[1009] This poses a serious threat to human health because resistant bacteria can be transmitted from animals to humans through the food chain, leading to longer and more severe illnesses amongst both humans and animals.[1010] As noted in the iNAP, both the data available in Ireland and the experience of AMR in other countries, indicate that it is the intensive side of farming where improvements both in the prevention of disease and the prudent use of antibiotics are needed.[1011]

Obj9.T2: Any reduction in animal welfare standards will negatively affect the economy

The enforcement of existing animal health and welfare Statutory Management Requirements (SMRs) on the welfare of calves, pigs and farm animals ensures minimum standards for their care and husbandry; and non-compliance with these legislative requirements will result in legal and financial consequences. Furthermore, in Ireland, the agri-food sector is a significant contributor to the national economy and has the potential to expand further; but maintaining a reputation for high standards of animal

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[1008] Government of Ireland (2019) Public Consultation Waste Action Plan for a Circular Economy

[1009] Antimicrobials in Agriculture and the Environment: Reducing unnecessary use and waste. The Review of Antimicrobial Resistance (2015) https://ec.europa.eu/health/amr/sites/amr/files/amr_studies_2015_am-in-agri-and-env.pdf

[1010] WHO (2017) Antimicrobial resistance in the food chain https://www.who.int/foodsafety/areas_work/antimicrobial-resitance/amrfoodchain/en/

[1011] https://assets.gov.ie/9519/afcba9bce7c54bf9bcbe9a74f49fdaf2.pdf

health is critical to allow for this.[1012] Any reduction in these standards may have implications for Ireland's international reputation and this could in turn result in a reduction in market share for Irish produce.

Obj9.T3: Effects of Climate change

Slow adaptation to climate change[1013] may impact animal health and welfare, for example the fodder shortages in certain parts of Ireland during 2018. A report by Teagasc found that a rise in temperature has the potential to induce heat stress in animals and this can lower their productivity by decreasing their appetite and increasing their susceptibility to parasitic diseases.[1014] An increased susceptibility to parasitic diseases may lead to an increase in the use of antibiotics to prevent further outbreak of disease, ultimately undermining the efforts made towards reducing antibiotic usage. Furthermore, climate change may indirectly affect animals by reducing the quality and quantity of feedstuffs and drinking water; as well as increasing the risk of food-borne diseases.[1015]

Obj9.T4: Slowdown in generational renewal affecting the uptake of appropriate practices

In Ireland, 5% of farmers are under 35 years of age, whereas 30% of farmers are 65 years and over.[1016] According to *'European Young Farmers: Building a Sustainable Sector* report, undertaken by the European Council of Young Farmers (CEJA), 89.78% of young farmers said that they felt responsible for ensuring a sustainable agricultural sector and are concerned with preserving the natural environment.[1017] This indicates that young farmers are willing to uptake animal husbandry practices appropriate to a sustainable agricultural sector; and therefore a slowdown in generational renewal could negatively affect this.

[1012] National Farmed Animal Health Strategy 2017-2022- A framework for collective action by stakeholders https://wayback.archive-it.org/org-1444/20201125093327/http://www.agriculture.gov.ie/media/migration/animalhealthwelfare/nationalfarmedanimalhealthstrategy/NFAHS110717.pdf

[1013] https://www.epa.ie/climate/communicatingclimatescience/whatisclimatechange/whatimpactwillclimatechangehaveforireland/

[1014] https://www.teagasc.ie/media/website/publications/2010/the_impact_of_climate_change_on_irish_farming_5623.pdf

[1015] Lacetera, N. (2018) Impact of climate change on animal health and welfare, Animal Frontiers, Volume 9, Issue 1, January 2019, Pages 26-31

[1016] https://www.cso.ie/en/releasesandpublications/ep/p-fss/farmstructuresurvey2016/

[1017] http://int.masseyferguson.com/ceja-column-40.aspx

Obj9.T5: Antimicrobial and anthelmintic resistance

Antimicrobial resistance (AMR) threatens the effective prevention and treatment of an ever-increasing range of infections and is considered one of the ten global health threats facing humanity.[1018] The overuse and misuse of antimicrobials, in both human and veterinary medicine, is recognised as a key driver in the emergence of AMR. The frequent discovery of bacteria that is resistant to multiple antibiotics has led AMR to become a global public health threat that must be controlled through the reduction in the use of antibiotics in agriculture. Anthelmintic resistance is also a threat to global food security. Therefore, parasite control strategies must also be adapted to alleviate the selection pressure for resistance and maintain drug efficacy.[1019] Research conducted in Ireland reports widespread anthelmintic resistance on sampled dairy calf to beef farms. Resistance was identified for multiple classes of available anthelmintics including benzimidazoles, levamisole, ivermectin and moxidectin. It is critical that Ireland develop an effective national strategy to manage parasitic disease on farms to reduce the threat of anthelmintic resistance.[1020]

Obj9.T6: Failure to meet animal welfare standards

Animal welfare issues, such as the persistent tail docking of pigs and foot pad dermatitis in broilers, represent a substantial threat to Irish agriculture. Firstly, Ireland's image as 'the Food Island' and the home of 'Origin Green' means Irish agriculture benefits from an excellent reputation for high animal welfare standards, particularly in relation to extensive farming sectors. Therefore, there is a risk that this reputation will be tarnished as a result of non-compliance with legislative requirements around animal welfare issues. Financially, if Ireland fails to make substantial progress in the area of tail docking there is a risk of the EU Commission taking infringement proceedings resulting in substantial fines. From a One Health, One Welfare perspective, and in keeping with the European Farm to Fork Strategy, both of these agendas are important; and there

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[1018] WHO factsheets, 2020. Accessed at: https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance

[1019] Hodgkinson et al., 2019. Refugia and anthelmintic resistance: Concepts and challenges. International Journal for Parasitology: Drugs and Drug Resistance; 10: 51 to 57. https://doi.org/10.1016/j.ijpddr.2019.05.001

[1020] Kelleher, A.C., Good, B., de Waal, T. *et al.* Anthelmintic resistance among gastrointestinal nematodes of cattle on dairy calf to beef farms in Ireland. *Ir Vet J* **73,** 12 (2020). https://doi.org/10.1186/s13620-020-00167

are significant health and productivity gains to be achieved where welfare needs are met.

In relation to foot pad dermatitis in broilers, there is a risk to market access as it has been shown that conditions which lead to the development of foot pad dermatitis also increase the risks of *Campylobacter* contamination. Maintenance of optimal environmental conditions in intensive rearing systems can be a challenge for operators and requires substantial and ongoing investment. Although the situation with foot pad dermatitis has improved somewhat in recent years, further improvement is required.

Obj9.T7: New and emerging crop and animal diseases

New infectious diseases are continually emerging.[1021] Emerging diseases and pests in plants, as well as emerging infectious diseases in animals, can both have a significant impact of agricultural and forest productivity, as well as on trade and public health.[1022] Many of these diseases originate in animals. Although somewhat protected by our geographical location as an island we are not immune to the spread of animal disease. Changes in climate and vector habitats, increased movement of animals, goods and people mean that Ireland is at greater risk than ever for the introduction of diseases. Developments in continental Europe with the introduction of Bluetongue from Africa and the reporting of Schmallenburg raises the importance of rapid detection and early warning systems to ensure that emerging diseases are identified and dealt with as swiftly as possible. The recent epidemics of Avian Influenza and African Swine Fever are examples of the potential impacts on certain sectors.

As a result of Ireland's temperate climate, crop production in Ireland faces the consistent challenge of managing high incidences of disease. In order to control diseases, chemical products are used, but these are now decreasing due to the ability of plant diseases to adapt to the toxic effects of these chemicals, and as a result of tighter EU rules.[1023] There is a chance that changes in temperatures and growing seasons, and the reduced use of chemical products, could affect the proliferation and the spreading of some species, such as insects, invasive weeds, or diseases; which could

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[1021] Morens and Fauci, 2019. Emerging Pandemic Diseases: How We Got to COVID-19. Cell. 2020 Sep 3; 182(5): 1077–1092.

[1022] https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/sfs-10-2017

[1023] Submission by Science Foundation Ireland https://data.oireachtas.ie/ie/oireachtas/committee/dail/32/joint_committee_on_agriculture_food_and_the_marine/reports/2018/2018-07-12_climate-change-and-sustainability-in-the-agriculture-and-food-sectors_en.pdf

ultimately effect crop yields.[1024] Rainfall further influences the transport and dissemination of infectious agents; and temperature affects their growth and survival. Therefore, changes in infectious disease transmission patterns are a likely major consequence of climate change.[1025]With the withdrawal of the active substance Chlorothalonil as a Plant Protection Product (PPP)[1026]; and the reality of the significant increase of Septoria and Ramularia diseases in crops, tillage growers will find it extremely difficult to manage their crops, especially with remaining PPP's that are much less effective and legislative barriers preventing the adoption of New Breeding Technologies.

Obj9.T8: Failure to meet food waste targets poses reputational risks

Failure to meet food waste targets as laid out in the Sustainable Development Goals and the new Waste Framework Directive could potentially threaten Ireland's reputation as a producer of sustainably produced food. This could undermine the improvements driven through Quality Assurance schemes and through Origin Green and could also lead to losses of efficiency gains to both the primary producer and agri-businesses.

Obj9.T9: Dairy-free and meat-free campaigns

During the course of the public consultation and in some of the submissions received, concern was raised around the growing number of dairy-free and meat-free campaigns, which are perceived as anti-farming by some cohorts of the agri-food sector.[1027]. While there is evidence to support the rise in global market share of plant-based or lab-based alternatives compared to traditional dairy or meat options[1028] this share remains relatively low.[1029] However, it should be acknowledged that this is an increasing threat to traditional dairy and beef production.

[1024] https://www.eea.europa.eu/signals/signals-2015/articles/agriculture-and-climate-change
[1025] https://www.who.int/globalchange/climate/en/chapter6.pdf
[1026] https://www.pcss.agriculture.gov.ie/registers/plantprotectionproductsregisterss/recentactivesustancewithdrawals/
[1027] https://www.agriland.ie/farming-news/many-appear-to-support-closing-gate-on-agriculture-mccormack/
[1028] https://www.bordbia.ie/industry/insights/food-alert/globaldata-on-key-innovation-trends-in-dairy-part-1--plant-based-dairy/
[1029] Van Loo, J.E., Caputo, V., Lusk, L.J., (2020) "Consumer preferences for farm-raised meat, lab-grown meat, and plant-based meat alternatives: Does information or brand matter?" Food Policy, Volume 95, Agust 2020, 101931

Cross-cutting objective: Modernising the sector by fostering and sharing of knowledge, innovation and digitalisation in agriculture and rural areas, and encouraging their uptake;

Strengths

ObjAKIS.S1: The constituent parts of the Irish AKIS (Research, Knowledge Transfer, Farm Advisory Service, and Cooperation & CAP Network) are well established

Ireland is considered to have one of the strongest and most integrated Agricultural Knowledge and Innovation System (AKIS) in the EU.[1030] The national AKIS policy is led by the Department of Agriculture, Food & Marine (DAFM). AKIS policy development to date has been achieved through its integration into a range of policy instruments and agri-food related strategies, such as Food Wise 2025; as well its integration into action plans and roadmaps, such as Ag Climatise- Ireland's Roadmap towards Climate Neutrality. Implementation of the AKIS is supported through the Common Agricultural Policy (CAP) related co-funded policy instruments on knowledge transfer, farm advisory services, cooperation and networking. The DAFM has established a Knowledge Transfer programme and a CAP Farm Advisory Service; and there are 23 EIP operational groups in Ireland ensuring cooperation across the agri-food sector.[1031] The National Rural network (NRN) is a well-established network that provides up-to-date information on specific areas such as biodiversity, climate change, farm viability, LEADER, EIP-AGRI organisational groups, case studies, seminars and conferences in order to maximise the beneficial outcomes of Ireland's Rural Development Programme 2014-2020 for rural stakeholders.[1032] Currently, national investment in Research, Development and Innovation targeting the Agri-Food sector is well established, with Enterprise Ireland, the Science Foundation Ireland, Higher Education Institutes and organisations under DAFM working together for the benefit of the Agri-food sector.

ObjAKIS.S2: National investment in agricultural research is significant, delivering new knowledge consistently

Irish Public Sector investment in Research, Development and Innovation targeting the Agri-Food sector is broad based and significant and was in excess of €157 million in the year 2018. Investment was provided through the Department of Agriculture, Food

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[1030] https://knowledge4policy.ec.europa.eu/publication/preparing-future-akis-europe_en
[1031] https://www.nationalruralnetwork.ie/eip-agri/
[1032] https://www.nationalruralnetwork.ie/

and the Marine (DAFM), the Department of Education and Skills (DES) and the Department of Enterprise, Trade and Employment (DETE). The majority of support was provided to agencies under the remit of DAFM, e.g. Teagasc (€73 million), for research in the fields of: Animal and Grassland Research and Innovation, Crops, Environment and Land Use, Food; and, Rural Economy and Development.[1033] €17.5 million was provided under DAFM's competitive research programme covering the key investment areas of the strategic research and innovation agenda.[1034] €22 million was provided to Higher Education Institutes in the area of Agricultural Sciences; and €18.6m was provided to the Science Foundation Ireland (SFI) in that same area including for challenge based funding, and Bioeconomy and Agri-Digitalisation Research Centres. Enterprise Ireland spent a total of €17.6 million on research, development and innovation through in-company supports, dairy processing, meat technology and food for health specific technology centres as well as broader centres applicable to agri-food such as the Irish Manufacturing Research (IMR) research centre and CeADAR the National Centre for Applied Data Analytics & Machine Intelligence, public/private collaborations and, through research commercialisation funds and grants.[1035]

ObjAKIS.S3: Successful peer-to-peer learning through knowledge transfer groups

A central theme in the RDP 2014-2020 was the need to build on and develop the skills and knowledge base in the agri-food sector. The Knowledge Transfer Programme 2016-2019 was a 3-year programme that commenced in June 2016 and was completed in July 2019. The KT programmes developed encouraged efficiency and ensured peer to peer engagement in a process of continuous improvement with the aim to not only develop on farm-enterprises but also contribute to the overall development of the agri food sector. Knowledge Transfer Groups in the beef, dairy, sheep, equine, tillage and poultry sectors were put in place. The approach builds on previous discussion groups as well as best practice in peer to peer learning and normally comprised of 12–18 farmers coming together on a regular basis to discuss issues of mutual interest. The mid-term evaluation of the 2014-2020 RDP found that KT participant farmers on average have higher family income and are younger. It was also

[1033] https://www.teagasc.ie/

[1034] https://wayback.archive-it.org/org-1444/20201125110158/https://www.agriculture.gov.ie/research/competitivenationalprogrammes/

[1035] https://www.enterprise-ireland.com/en/Research-Innovation/Companies/Collaborate-with-companies-research-institutes/Technology-Centres.html

found that there may be a relationship between KT Programme participation and farm productivity.[1036]

ObjAKIS.S4: Teagasc provide a significant range of Education and CPD activities on a national basis

Teagasc has a statutory remit to provide and procure education and training and provides an extensive range of further education, adult and continuing education and higher level education courses.[10371038] In 2017, more than 7,000 learners participated in Teagasc school leaver and adult vocational education and training programmes including Teagasc-linked higher education programmes. Teagasc education programmes are delivered through its network of seven colleges (four Teagasc colleges and three linked private colleges) and 24 Local Education Centres located in various locations in Ireland. A wide range of courses for adults and agri-food sector employees are provided, many of which are accredited and provided subject to demand and staff resources being available. Teagasc has had longstanding and substantial involvement in higher education provision and has a major input into higher education and postgraduate education delivery through its extensive partnership with the higher education sector. In addition, Teagasc provides a range of continuous professional development (CPD) activities. The Teagasc ConnectEd programme provides education, knowledge, professional development and networking opportunities that are designed to provide businesses and professionals working with the agri-food sector structured access to Teagasc research, education, knowledge resources and online tools. The programme is aimed at professionals or companies that provide services or has linkages to the agri-food sector and provides access to knowledge, advice, education and research. Teagasc also delivered the Continuous Professional Development Programme, funded under the Rural Development Programme (RDP) 2014-2020, thereby up-skilling knowledge transfer facilitators and veterinary practitioners to facilitate learning on the knowledge transfer programme.

ObjAKIS.S5: Significant engagement by agri-food actors in developing AKIS related programmes

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[1036] Indecon mid-term evaluation https://www.gov.ie/en/collection/6606a-rural-development-programme-rdp-2014-2020/

[1037] https://www.teagasc.ie/media/website/publications/2019/Teagasc-College-Prospectus-2020.pdf

Private agri-food actors consistently engage in the development of the agri-food sector through their development of AKIS related programmes. Agri-food organisations such as the IFA, ICOS, Macra na Feirme and XL Vets have developed Skillnet programmes to advance the competitiveness, productivity and innovation of Irish businesses through enterprise-led workforce development. In addition, Bord Bia established its Origin Green Farm Assurance Schemes, which require Irish farms to be audited every 18 months to ensure the production of safe, high-quality food, drink, and ingredients. These schemes measure a broad spectrum of criteria including animal health, welfare and traceability, water and feed, pasture management, environmental management, and farm safety.

ObjAKIS.S6: Well-established public and private farm advisory services within the AKIS system which act as one of the main information sources for farmers

Agricultural advice can serve two functions: a development function and a service function. While the former supports public goods and covers advice on farm occupational health and safety, and CAP related agri-environment & climate schemes; the latter focuses on private goods including accountancy services and legal advocacy advice services. The purpose of the Farm Advisory System (FAS) is to aid farmers in meeting their Cross Compliance obligations and to help them to avoid financial reductions in respect of failing to meet the necessary Statutory Management Requirements (SMR) and Good Agricultural and Environmental Conditions (GAEC). Farm advisory services cover economic, environmental and social dimensions. DAFM maintains a List of FAS Advisors which is available to farmers, of which there are 802 advisors available.[1039] There are a range of public and privately funded advisory activities and services available to farmers, such as the Teagasc Advisory Programme, the Agricultural Consultants Association, the Irish Tillage Consultants Association, Veterinary Advice and Advisory Services and other advisory services provided through private sector commercial companies or individuals.

ObjAKIS.S7: Successful implementation of EIP-AGRI projects

The EIP-AGRI innovation mode brings together specific actors (e.g. farmers, advisors, researchers, businesses, etc) to work together in multi-actor projects to develop solutions for specific issues or to develop concrete opportunities. There are 23 EIP Operational Groups in Ireland, which actively work to address competitiveness and

[1039] https://www.gov.ie/en/service/a3036-find-a-farm-advisory-system-advisor/https://www.gov.ie/en/service/a3036-find-a-farm-advisory-system-advisor/

environmental challenges.[1040] These groups provide practical on the ground examples of how engagement, tacit knowledge, education, knowledge transfer, advice and deployment activities can be developed. These operational groups are based on two principles: the involvement of multiple users in the creation process; and the use the real-world to test ideas. The overall reaction to the EIP-AGRI project has been overwhelmingly positive, although some changes have been suggested to improve the experience for applicants and successful Operational Groups.[1041] Furthermore, the result-based agri-environment payments approach used by many Operational Groups has been identified as a model that can be rolled-out to delivered a wide range of ecosystem services using habitat quality as a performance indicator.[1042]

ObjAKIS.S8: Significant investment at EU & national level on research and innovation in agri-digitalisation

The EU has been actively undertaking research and innovation activities since 2016, laying the ground for a digitalized and data-empowered European agricultural sector. Strategic interventions have supported the uptake of digital technologies and there has been an increase in research and innovation investments in order to develop new digital solutions. To date over 20 projects have been funded with an investment of €192 million concentrated on the key themes of resource use, robotics, IoT, sustainability, precision agriculture and in 2020, services in rural areas.[1043] Ireland has been successful in coordinating and participating in all the leading projects including Smart AgriHubs[1044] and FAIRshare[1045]. At national level, DAFM and Science Foundation Ireland (SFI) have funded a number of precision agriculture type projects through their respective research programmes and through European Research Area-Networks. They have also co-funded the €44 million VistaMilk Research Centre. Additionally, Enterprise Ireland (EI), through its Regional Economic Development Fund, has funded a number of Agri-Tech related Centres such as the AgriTech Centre of

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[1040] https://www.nationalruralnetwork.ie/eip-agri-news/eip-agri-irelands-operational-groups-2019-booklet-launch/

[1041] http://www.efncp.org/download/EIPreport2019final.pdf

[1042] McLoughlin, D., Browne, A., and Sullivan, C.A., (2020), 'The delivery of ecosystem services through results-based agri-environment payment schemes (RBPS): three Irish case studies', Biology and Environment: Proceedings of the Royal Irish Academy, No. 2 (2020), pp. 91-106 URL: https://www.jstor.org/stable/10.3318/bioe.2020.13

[1043] https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/factsheet-agri-digital-transformation_en.pdf

[1044] www.smartagrihubs.eu

[1045] https://www.h2020fairshare.eu/

Excellence (ACE) and the AgTech Connector Innovation Hub[1046], where NovaUCD was awarded €3m in funding to help turn UCD Lyons Farm into central leading hub for ag-tech research in Ireland.

ObjAKIS.S9: Significant public-private investment in agri-digitalisation

The agri-food-tech sector in Ireland has grown substantially in recent year as a result of significant public-private investment in agri-digitialisation. For example, in 2018 a Galway-based AgriTech accelerator programme *Yield Lab Europe* announced a €21 million venture capital fund backed by Enterprise Ireland and AIB. In addition, a partnership between the Ireland Strategic Investment Fund (ISIF) and the California-based Finistere Ventures (a global AgTech venture pioneer) is ongoing and is aimed at investing in start-up and early stage AgTech companies that can generate significant economic impact in the Irish Agriculture and Food sectors. The ISIF and Finistere Ventures have launched a €20 million Ireland AgTech Fund. There are also a number of other tech accelerators active in Ireland at present including, the NDRC, Dogpatch laboratories with Alltech and Climate-KIC - TCD that can take agri-tech into account. Overall, some €920 million has been invested in Irish agri-food-tech companies since 2012 with Ireland being one of only a few countries worldwide to see a rise in deal activity last year[10471048].

ObjAKIS.S10: There are already significant innovation support structures in place such as accelerator programmes to support agri-digitalisation development

Ireland has been successful in coordinating and participating in EU funded projects including Smart AgriHubs[1049] and FAIRshare[1050] that provide innovation support to farmers, agri-tech companies and farm advisors for the development and uptake of agri-digital products and services Additionally, Enterprise Ireland (EI), through its Regional Economic Development Fund, has funded a number of Agri-Tech related Centres such as the AgriTech Centre of Excellence (ACE) in Tralee and the AgTech Connector Innovation Hub[1051] where NovaUCD will help turn UCD Lyons Farm into a

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[1046] https://www.ucd.ie/innovation/news-and-events/latest-news/agtech-connector-innovation-hub-kildare/name,479612,en.html

[1047] https://www.irishtimes.com/business/technology/1bn-invested-in-irish-agrifood-tech-companies-since-2012-1.4185637

[1048] https://agfunder.com/research/agfunder-agrifood-tech-investing-report-2019/

[1049] www.smartagrihubs.eu

[1050] https://www.h2020fairshare.eu/

[1051] https://www.ucd.ie/innovation/news-and-events/latest-news/agtech-connector-innovation-hub-kildare/name,479612,en.html

leading hub for Ag-tech innovation in Ireland. Regarding accelerator programmes, Yield Lab Europe have a €21 million venture capital fund backed by Enterprise Ireland and AIB. In addition, a partnership between the Ireland Strategic Investment Fund (ISIF) and the California-based Finistere Ventures (a global AgTech venture pioneer) is ongoing and aimed at investing in start-up and early stage AgTech companies that can generate significant economic impact in the Irish Agriculture and Food sectors

ObjAKIS.S11: Significant development of public agri-digital products (decision support tools) and services (LPIS, AIMS), which can support the design and implementation of agriculture policies

PastureBase Ireland, as an example, is both a web-based decision support tool and a grassland database, with more than 1100 grassland farmers participating on the system.[1052] The tool is designed to help farmers (dairy, beef and sheep) to manage their grass production and utilisation. PastureBase allows farmers to quantify the amount of grass grown on the farm on a given day and assists farmers in planning their grazing a week in advance. It can increase output because it ensures livestock is grazed on high quality grass throughout the grazing season; and can also reduce input costs. [1053] The Public Service Data Strategy 2019-2023 sets out a detailed vision, with a set of goals and actions, to deliver a more joined-up, whole-of-Government, approach to how data is used and managed within the Public Service. One of the strategic objectives of the public service ICT strategy is data as an enabler and in line with statutory obligations and Data Protection guidelines, facilitate increased data sharing and innovative use of data across all Public Bodies to enable the delivery of integrated services, improve decision making and improve openness and transparency between Government and the public. One of this strategy's objectives, DISCOVERY, is to increase reuse of data for the benefit of citizens, businesses and policy makers. One of the key actions of this strategy objective is to develop a Government data catalogue, for internal and public use, cataloguing key data holdings within PSBs, supporting reuse and transparency. Such a catalogue is expected to not only be used to stimulate cross Government data awareness and reuse. Furthermore, a citizen view of the catalogue will support the measures outlined within the Transparency strategic theme of this strategy. DAFM is in the process of identifying high value datasets that will be made available with the aim to increase reuse of data for the benefit of citizens, businesses and policy makers

[1052] https://www.teagasc.ie/media/website/publications/2016/Teagasc-Technology-Foresight-Report-2035.pdf

[1053] https://www.teagasc.ie/crops/grassland/pasturebase-ireland/

ObjAKIS.S12: Irish farmers are highly educated and have high levels of agricultural training

According to Teagasc's *National Farm Survey 2019 Sustainability Report,* the percentage of famers receiving agricultural education has increased over the period 2014-2019 from between 44% in 2014 to 49% in 2019.[1054] *Farmers in the EU-Statistics Explained,* found that 13% of the agricultural workforce in Ireland attained a high level of education in Ireland in 2016 and this placed Ireland 11th out of the EU-28 countries in terms of high educational attainment by farmers.[1055] In 2013, 37% of farm managers below 35 years of age had full agricultural training and 21% had basic training. In that same year, 24% of all farm managers had full agricultural training. As a result, farm managers in Ireland ranked 8th among all farm managers across the EU in terms of having 'full agricultural training'.[1056] The percentage of farmers relying on 'practical experience only' declined from about 90% in 1990 to approximately 50% in 2013.[1057] According to a study undertaken by Teagasc entitled '*The Economic Return to Formal Agricultural Education,'* there is a correlation between participation in formal agricultural education and farm size; with average farm size increasing by almost 20 hectares for those farmers who attained a formal education.[1058]

ObjAKIS.S13: Ireland ranks highly in the Digital Economy and Society Index 2020

The Digital Economy and Society Index (DESI) is a composite index that summarises relevant indicators on Europe's digital performance and tracks the evolution of EU Member States in digital competitiveness. Ireland ranks 6th out of 28 EU Member States in the Digital Economy and Society Index (DESI) 2020. Based on data prior to the pandemic, Ireland continues to rank first in the Integration of digital technology dimension and has maintained a leading position in the use of e-Commerce by SMEs. Ireland is in the 'top 10' on the Use of internet by individuals and recorded a notable increase in the share of internet users. Ireland has maintained its top 10 position in digital public services, where it excels in open data and the provision of digital public services for businesses. There was no substantial change in Ireland`s position in the

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[1054] https://www.teagasc.ie/media/website/publications/2020/NFS-2019-Sustainability-Report.pdf

[1055] https://ec.europa.eu/eurostat/statistics-explained/pdfscache/62101.pdf

[1056] https://wayback.archive-it.org/org-1444/20201125093327/https://www.agriculture.gov.ie/media/migration/foodindustrydevelopmenttrademarkets/agri-foodandtheeconomy/publications/DepartmentAgricultureAnnualReviewOutlook2019200919.pdf

[1057] https://www.teagasc.ie/media/website/publications/2018/Teagasc-Education-Vision-Report.pdf

[1058] https://www.teagasc.ie/media/website/publications/2014/Teagasc_Impact_of_Education_Report.pdf

Human capital and Connectivity dimensions despite some improvement in key indicators where it has been lagging behind, such as the digital skills of the wider population.[1059]

[1059] https://ec.europa.eu/digital-single-market/en/scoreboard/ireland

Weaknesses

ObjAKIS.W1: The organisational set-up of AKIS is not structured and lacks coordination and strategic direction

The organisational set-up of AKIS in Ireland currently involves numerous different policy areas, activities and instruments; and is implemented through different government departments (DAFM, DES and DETE). There is a need to strengthen the agricultural knowledge and innovation system to make it more cohesive, collaborative and responsive to needs and to set out its strategic direction, thereby increasing the impact of public expenditure and spurring private investment. Coordination with the AKIS actors within the public and private sector is viewed broadly by the OECD, European Commission's Standing Committee on Agricultural Research (SCAR) Strategic Working Group on AKIS as being a key starting point.

ObjAKIS.W2: Weak relationships between certain parts of the AKIS system

A previously undertaken network analysis of the Irish AKIS system suggests that there are some weak connections between many of the key stakeholders in the AKIS system. Weak connections exist between external research organisations and key stakeholders; and there is a weak connection between Teagasc advisory services and external private advisory services. Linkages between the Teagasc extension service and the technical services provided by input suppliers could also be strengthened. Although joint programmes, formal alliances and Memorandums of Understanding (MOU) have improved the knowledge network, it is clear that more work can be done to improve networking & collaboration even further.[1060]

ObjAKIS.W3: The level of agricultural research being applied in practice is insufficient

Although there are high levels of investment in agricultural research, development and innovation in Ireland[1061], the application of this research at farm level could be considered insufficient. Despite the efforts of funding agencies to support impact creation and to support researchers to improve the communication and dissemination of their findings, communication beyond publications remains a challenge for the scientific community. The single action of making knowledge publicly available, through dissemination, does not always result in application, nor exploitation and

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[1060] "AKIS and advisory services in the Republic of Ireland- Report for the AKIS inventory (WP3) of the PRO AKIS project"
https://proakis.hutton.ac.uk/sites/proakis.hutton.ac.uk/files/Final%20Draft-%20Country%20Report%20Ireland(3).pdf

[1061] Irish Public Sector investment in Research, Development and Innovation targeting the Agri-Food sector is broad based and significant and was in excess of €157 million in 2018
Agriculture Knowledge & Innovation Systems (AKIS) DAFM 2020)

subsequent impact.[1062] Many farmers in Ireland, particularly low income farmers, are less likely to adopt/apply findings of agricultural research at farm level due to their low profitability and their reliance on direct payments. In an effort, to address this issue, activities to exploit research and innovation results are now a fundamental aspect of the EU Research and Innovation Framework and CAP Programmes. Additionally, end users of knowledge and the public have limited awareness of efforts to improve and speed up knowledge transfer.

ObjAKIS.W4: Researchers are not incentivised sufficiently for their impact beyond academia

There are limited available metrics to analyse transfer of agricultural research into practice, with only the number of collaboration and consultancy services agreements with industry measuring the transfer of agricultural research into practice under the Knowledge Transfer Ireland (KTI) Annual Knowledge Transfer Survey.[1063] The lack of measurement of knowledge transfer can act as a disincentive to researchers working in the field of agricultural science or agri-food science to support impact creation beyond dissemination activities. It is also clear that, although there are challenges surrounding the knowledge transfer process (i.e. what it is, how to carry it out, how to measure impact), there are bigger issues at play concerning the manner in which publicly funded scientific research is carried out and the role that it plays in society. Inherent differences exist between the research community, industry, policymakers and other users of knowledge insofar as each group works with and among different technical levels, priorities, vocabularies, agendas and timescales. These differences create multiple barriers that can prevent effective knowledge transfer and innovation. In addition, a culture change within the research community is required that places appropriate emphasis and balance on both peer-reviewed publications and incentives for the uptake and application of results.

ObjAKIS.W5: Advisory system involvement in co-creation innovation activity is insufficient

The role of farm advisors within the AKIS is particularly important, since they represent one of the main information sources for farmers' decision-making. Currently, it is difficult to measure close involvement of the farm advisory system in innovative developments, as well as training and thematic, place based or cross-sector events to update advisors' knowledge. For example, advisors' do not in the main participate with researchers in research projects as a useful means to enable closer interactions with research. Furthermore, advisors could play a stronger role in identifying farmers' needs

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[1062] https://www.epa.ie/researchandeducation/research/researchpublications/researchreports/Research_Report_284a.pdf

[1063] https://www.knowledgetransferireland.com/Reports-Publications/KTI-Review-and-Annual-Knowledge-Transfer-Survey-2018.pdf

and opportunities, thanks to their one-to-one interactions with farmers. Farm advisors within the AKIS are also not currently trained to act as innovation brokers/facilitators, helping to prepare, participating in and sharing knowledge from EIP-AGRI OG and H2020 multi-actor projects.

ObjAKIS.W6: EIP Operational Groups do not currently engage in a broad scope of activities, related to all nine CAP specific objectives

There are two distinct streams of EIP projects in Ireland. The first stream is concerned with themes such as farm viability, economic performance, innovative technologies and sustainable forest management and renewable energy. There are currently three projects approved under this stream. The second stream, which consists of 18 approved projects, focuses on environmental challenges relating to natural resource degradation, biodiversity and climate change issues.[1064] There are currently no EIP projects dealing with social issues, which are the focus of three of the nine CAP objectives; and there is little scope of activity relating to economic issues, which make up a further three of the nine CAP objectives. Activities focus mainly on environmental and climate related challenges. Currently, the EIP OGs are also not engaged in cross-border OGs exchanging on similar topics or cooperate with each other.

ObjAKIS.W7: Awareness and confidence levels in using technology are low

According to a Farm Business Skillnet survey, undertaken in conjunction with the IFA, which analysed farmers and relevant stakeholders' current usage and awareness of digital agricultural technology, only 46% of farmers claimed to be already using technology on their farm; and overall, technology awareness was limited, with only 10 individual systems and pieces of equipment registering awareness among one third or more of all farmers. In addition, it found that most farmers required someone else to submit their Basic Payment Scheme online, suggesting that farmers lack awareness in relation to how to use technologies, which limits technological uptake. It further found that more than half of all farmers surveyed said they did not feel confident using technology in general.[1065]

[1064] Annual Review and Outlook of Agriculture, Food and the Marine 2020

[1065] https://www.skillnetireland.ie/wp-content/uploads/2019/11/IFA-Skillnet-Digital-Agriculture-Technology.pdf

Opportunities

ObjAKIS.O1: Structure the AKIS so that it is more collaborative and responsive to the needs of primary producers

A strengthened and coordinated agricultural knowledge and innovation system make it more collaborative and responsive to the needs of policy, farmers industry and the public. Setting of strategic direction, whereby key challenges and key performance indicators are identified to assess implementation would also increase the impact of public expenditure and has the potential to spur further private investment to aid roll out of programmes in tandem with market opportunities and rewards.

ObjAKIS.O2: Enhance the speed and process of knowledge transfer

Research and innovation funding programmes that incorporate knowledge transfer thinking at all stages of the research lifecycle (pre-funding, during project implementation and post project) would improve the speed and process of knowledge transfer. Guidance on incorporating knowledge transfer thinking at all stages of the research lifecycle would greatly aid the uptake the uptake of knowledge transfer thinking by the research community and aid the expansion of the multi-actor approach. The development of Innovation Support Services (ISS) would allow actors including farm advisors across the agri-food chain to share ideas and find innovative solutions to shared issues. This would facilitate communication and support agri-food actors trying to address problem-specific societal actions and assist multi-actor projects in getting off the ground. A back-office activity linking research and the advisory system would drive connectivity in the AKIS system, in particular between farmers, researchers, advisors, H2020 Multi-Actor Projects and EIP Operational Groups; and also with suppliers of inputs, other parts of the supply chain, policy makers and the broader society. Furthermore, the future Irish CAP network should seek to further foster innovation in agriculture and rural development and to further support the inclusion of, and the interaction between, all stakeholders in the knowledge-exchange and knowledge-building process.

ObjAKIS.O3: Knowledge Transfer peer-to-peer discussion group model could be utilised to address societal challenges

The current Knowledge Transfer (KT) programme facilitates discussion groups for farmers across the beef, sheep, dairy, equine, poultry and tillage sectors individually. The KT peer-peer discussion groups model could be utilised to find solutions to adopt sustainable productivity and environmentally and climate enhancing technologies and practices and to uptake knowledge to test place-based innovations, adopt agro-ecological and climate-smart approaches and circularity in primary production, food and bio-based systems.

ObjAKIS.O4: Engagement in cross-border Operational Groups

The EIP-AGRI model indicates that Member States may offer opportunities for operational groups to act at transnational, including cross-border, level.[1066] This offers an opportunity for innovation that may be based on new but also on traditional practices in a new geographical or environmental context that may be new to Ireland but readily practiced elsewhere.

ObjAKIS.O5: Enable equal access to training for public & private advisors

All advisors, i.e. those within Teagasc, the private network, and those based in industry should undergo appropriate training on an ongoing basis in order to be empowered to give advice to farmers on economic, environmental and social dimensions. Ensuring all advisors are continuously and appropriately trained will ensure that the most up to date technological and scientific information developed by research and innovation projects is provided to farmers. In addition, trained advisors will be better able to assist farmers in dealing with the changes associated with climate change and digitalisation. The advisors role in the interactive innovation model needs to be continuously developed in order to facilitate the adoption of sustainable production practices and climate enhancing technologies and practices; and to test place-based innovations, adopt agro-ecological and climate-smart approaches and adopt circularity in primary production and food systems.

ObjAKIS.O6: Further integrate private veterinary practitioners and the DAFM Regional Veterinary Laboratory network

Private veterinary practitioners and the DAFM Regional Veterinary Laboratory network function as information gatherers and opinion leaders in animal disease control in Irish livestock production. Veterinary advice in the past was shared in a diffuse and direct person to person fashion without any formal advisory and communication structure. Recently, Animal Health Ireland and CAP funded Knowledge Transfer programmes have helped formalise advice in respect of key disease threats and has facilitated networking between producers, animal disease experts and research bodies. Further integration of advice from private veterinary practitioners and DAFM staff based in RVLs (and RVOs) will enhance AKIS and increase the potential to deliver certain Objectives of the new CAP, in particular those addressing animal health and welfare and food safety.

ObjAKIS.O7: Promote private and public investment in AKIS

[1066] https://ec.europa.eu/eip/agriculture/en/event/linking-europe%E2%80%99s-rural-regions-relevance-cross

According to the OECD[1067], the private sector should work alongside the public sector to determine the nature of collaboration necessary to address the identified AKIS priorities and to align with public incentives to spur further private investment in AKIS. The OECD also considers that the private sector could examine and employ mechanisms to raise funds for R&D and innovation including in relation to AKIS. In addition, it could reinforce linkages across participants in the AKIS (researchers, educators, extension services, farmers, industry, NGOs, consumers and others) so as to help match the supply of research to demand, facilitate knowledge and technology transfer, and increase the impact of public and private investments.

ObjAKIS.O8: A strategic approach to steer the digital transformation of the farming sector and rural areas

Agriculture and rural areas are changing significantly with the availability and multiplication of modern technologies, accompanied by smart devices, their increased "intelligence", autonomous behaviour and connectivity. A structured approach to a digital transition would be more collaborative and responsive to the needs of primary producers allowing for improved uptake of technologies, for development of products and service by the agri-tech industry and the public sector. It would also allow matters to be addressed such as governance of use of data and provide for a long-term perspective, addressing key challenges, which will increase the impact of public expenditure and spur private investment.

ObjAKIS.O9: Improve training supports to assist farmers to adopt technology on the farm

According to the Skillnet Survey on farmers' attitudes to digital technologies, access to support and training in relation to how to use digital technology was seen as a main barrier to those who are not confident in using everyday technology. The survey found that farmers who completed digital training courses were more likely to invest in technology in the future than those who didn't; and that farmers who used technology on their farm were more likely to have completed on-farm Discussion groups and evening classes than those who did not. This suggests that farmers who receive training and education are more likely to uptake digital technologies. Also, the survey found that farmers are open to training in how to use technologies. [1068]

[1067] http://www.oecd.org/agriculture/topics/agricultural-productivity-and-innovation/documents/analysing-policies-to-improve-agricultural-productivity-growth-sustainably.pdf

[1068] https://www.skillnetireland.ie/wp-content/uploads/2019/11/IFA-Skillnet-Digital-Agriculture-Technology.pdf

ObjAKIS.O10: Make better use of data collected to inform farm level decision and evidenced-based policy.

The EU Commission is at the initial stage of examining how to support the implementation of a Common European data space in the agriculture sector. The data space is intended to facilitate the trustworthy pooling and sharing of agricultural data throughout the whole value-chain. Next to private data, the data space may also include public data and has the potential to serve common good purposes, such as Research and Innovation (R&I). In the development of the data space, experiences gained stakeholder-led Code of Conduct on agricultural data sharing by contractual agreement are to be taken into account. There is an opportunity to examine measures of environmental (e.g. data from carbon navigator), economic (e.g. important indicators of production efficiency from systems such as the ante-mortem, post-mortem [AMPM] data capture; Teagasc profitability data; biosecurity database) and social/ethical (e.g. antimicrobial usage database; systems capturing animal-based measures of welfare) sustainability. Overall, the opportunity arises to make better use of data collected to support evidence-based decision making at farm level and evidence-based policy at national level including the monitoring & evaluation of CAP implementation (e.g. remote sensing or satellite technology).

Threats

ObjAKIS.T1: A non-structured AKIS will lead to inefficiencies in the agri-food sector

The future of food and agriculture depends on the capacity of agricultural knowledge and innovation systems to provide farmers with innovations that address an increasingly diverse and complex range of needs, including improved farm productivity and environmental performance, as well as better responses to climate change.[1069] Governments have a role to play in ensuring that the policy environment is conducive for the agri-food sector to improve productivity, sustainability and resilience. In particular, agricultural innovation systems should be strengthened to make them more collaborative and responsive to needs. OECD research[1070] also shows that the whole policy package matters, and that policy strategies should cover the whole food supply chain and agricultural policy should instead focus on measures to improve the sector's

[1069] https://www.oecd.org/agriculture/topics/agricultural-productivity-and-innovation/

[1070] http://www.oecd.org/agriculture/topics/agricultural-productivity-and-innovation/documents/analysing-policies-to-improve-agricultural-productivity-growth-sustainably.pdf

long-term productivity and sustainability, such as investment in general services that strengthen human capacity. There currently is an education and training system developed by Teagasc but there is also a wider institutional landscape for education & skills development that stems from the Department of Further and Higher Education, Research, Innovation and Science that covers more widely productivity and sustainability for the whole economy. A joined-up approach would allow the agri-food sector to benefit from education, skills & training available for the whole system as well as sector specific opportunities.

ObjAKIS.T3: Issues relating to data use, data security, data sharing and data ownership

Digitalisation in agriculture and forestry needs to address multifaceted challenges related to data use, data security, data sharing and data ownership in the application of digital technologies in agricultural and forestry sectors in Ireland. To begin the process of addressing this matter in 2018, EU stakeholders from both the farming and the machinery sector developed a code of conduct relating to agricultural data sharing by contractual agreement. The European Commission announced in its European strategy for data that it would take stock with Member States and stakeholder organisations of experiences gained with the stakeholder code of conduct. Potential solutions to establish a well-ordered agricultural data space are now being discussed and views are being exchanged on the experiences gained by the Member States with the code of conduct. In the Irish context, current technological challenges and diverse stakeholder concerns are now being expressed in both the CAP Consultative Committee and the Agri-Food Strategy 2030 Consultative Committee. If these concerns and challenges are not assessed this will limit the development of practical strategies, tools and solutions that can be used by policymakers, researchers and innovators to ensure good data governance and responsible data sharing.

ObjAKIS.T4: The costs of technology are often viewed as a barrier to uptake of new technologies

Digital Technologies often incur an upfront cost yet the benefits of using such technology may only accrue over time as data is gathered, analysed and used to inform decision making[1071]. If farmers are not empowered to use platforms and machinery to extract new knowledge to improve their decision making, then the uptake of digitalisation may not be sufficient to play and impactful role in addressing productivity and sustainability.

[1071] https://www.ifa.ie/wp-content/uploads/2020/11/Summary-Report.pdf

ObjAKIS.T5: Broadband provision and quality

The lack of adequate broadband infrastructure in Ireland may hinder the development of the Agricultural Knowledge and Innovation System (AKIS). Ireland has made progress in addressing the provision and quality of broadband available in Ireland over the past decade, with Next Generation Access (NGA) broadband now available to 90% of rural households. However, Ireland is one of the most expensive countries for broadband in the EU and rural areas in particular perform weakly in terms of access to Very High Capacity Network (VHCN).[1072] Access to VHCN coverage in rural areas will be crucial to realise digital opportunities in the agri-food sector and for wider society in rural areas. The delivery of the National Broadband Plan (NBP) and the provision of high-quality broadband to rural areas will enable people to develop digital skills required for an effective Agricultural Knowledge and Innovation System.

[1072] https://www.dccae.gov.ie/documents/Delivering%20the%20National%20Broadband%20Plan.pdf