RebelBio

Re: Submissions invited on developing Ireland's Bioeconomy

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For the attention of the office of the Department of the Taoiseach.

Providing additional depth on the contributions of venture capital to the development of Ireland's Bioeconomy is our goal in this letter. We appreciate this opportunity to contribute to the pool of information being gathered.

Since 2014, SOSV has invested in early stage life sciences expanding research in the field of synthetic biology, food tech & diagnostics. SOSV is the leading investor in life sciences globally since 2014 thanks to the efforts of our life sciences accelerator programmes.

For context SOSV - The Accelerator VC is a venture capital firm owned and operated by Sean O'Sullivan and our global HQ is based in Cork, Ireland. SOSV is the leading investor globally in hardware (HAX in Shenzen), life sciences (RebelBio based in Cork & IndieBio based in San Francisco), Food technology (Food-X based in New York),Internet technologies (Chinaccelerator in Shanghai) & Mobile Technology (MOX based in Taipei) employing over 90 staff globally with operations increasing rapidly over the next few years.

RebelBio has been a large contributor to the bioeconomy over the last 3 years investing as much as $100k USD in over 41 companies totalling $4.1 Million since 2014.

The number of Irish companies totals 14 meaning RebelBio has invested over a third of funds into Irish incorporated entities such as Helixworks Technologies Ltd, Cell Free Tech Ltd, GlowDx Ltd, MicrosynbiotiX Ltd and Khonsu Therapeutics Ltd. There is substantial interest to increase the number of Irish startups backed by SOSV through our programmes to contribute to the Irish bioeconomy further.

The Irish government should make efforts to recognise and offer additional support to accelerator programmes and expand the definition of the bioeconomy to include key areas. Private funding initiatives for emerging life sciences & bioeconomy related companies should be discussed at the heart of any conversation concerning these matters in order to stimulate the growth of the bioeconomy further. Incentivising venture capital firms to set up and coordinate early stage & seed stage funds in the bioeconomy space should also be considered.

Below are some contributions for inclusion to the submission in line with the 1-10 questions outlined.

1. Does the broad definition outlined adequately encompass the opportunities presented by the bioeconomy?

The broad definition of bioeconomy does and should refer to all economic activity derived from scientific and research activity focused on biotechnology. In other words, understanding mechanisms and processes at the genetic and molecular levels and applying this understanding to creating or improving industrial processes.

The definition of the bioeconomy described above does not include references to synthetic biology which is the design and engineering of biologically based parts, novel devices & systems as well as the redesign of existing , natural biological systems. The step change in the synthetic biology approach is to engineer biological systems to perform new functions in a modular, reliable and predictable way, allowing modules to be reused in different contexts. It has the potential to deliver important new applications and improve existing industrial processes across many sectors including healthcare, energy, pharmaceuticals,materials, food security and environmental remediation. This would result in economic growth and job creation.

To summarise the broad definition outlined in the report neglects mentioning the field of synthetic biology as a keystone of any definition of a bioeconomy. The UK has developed a robust roadmap for synthetic biology as a critical component to stimulate their economic growth.

For context please see the UK Synthetic BIology Roadmap Coordination Groups work titled - A synthetic biology roadmap for the UK.

2. How can a high-level policy statement on the bioeconomy assist in progressing the development of the priority value chains identified?

A high level policy statement on the bioeconomy, including the overview of synthetic biology can address, interlink and create whole new value chains to benefit the existing ones considered in the discussion document such as the horticultural by-products for feedstock for biomaterials; marine discard for animal feed; extracted protein/bioactives from marine discard for functional food applications; forestry resources in decentralised heat generation; recovered vegetable oil for biofuels; sugar-yielding feedstock for production of biochemicals; and seaweed for nutrition,healthcare, cosmetic and energy applications.

To reiterate additional private funding for emerging bioeconomy (including life science/synthetic biology) companies to help them scale in Ireland as well as create employment and infrastructural support subsidies such as funding additional commercial laboratory spaces should be included in the high level policy statement.

3. What lessons can Ireland take from the European approach, including to the Circular Economy?

The Circular economy thrives as part of an integrated ecosystem and innovation cluster, like international collaborations, but also startup-corporate collaboration.

The World Economic Forums - Shaping the Future of Environment and Natural Resource Security System Initiative and the Platform for Accelerating the Circular Economy was launched in 2017 as a public-private collaboration to create systems change at speed and scale by enabling partners to:

1. Lend finance and broker partnerships to scale existing and kick-start new circular economy projects between private, public and regional funding organizations, enabled through four hubs in Africa, China, Latin America and Europe.
2. Address cross-cutting barriers to scaling the circular economy through a Global Leaders Network.
3. Link networks and knowledge and share best practices and policies across existing institutions.

The Circular Economy also extends to other concepts of society and living including energy-efficient buildings, cycle paths, solar adoption rates, electric vehicle adoption rates etc. The most sustainable cities of Europe are also the most innovative. Supporting related developments is important, supporting the intersection of industrial technologies and the understanding of rapidly changing industry landscapes.

4. Given the cross-sector nature of the bioeconomy, how can a national policy statement best support development?

In order to best support development the policy statement should consist of the following:

1. Allowing for flexibility in requirements for grants regarding research focus and region for emerging companies.
2. Supporting emerging early-stage startups with funding.
3. Offering additional infrastructural support subsidies such as funding additional commercial laboratory spaces.
4. Encouraging the younger generation through education, competitions and workshops.
5. Offer additional Incentives for corporates in addition to the pre-existing benefits.
6. Supports for Incentives (tax or grants, or otherwise) for startups and businesses in the verticals related to the bioeconomy (biotech,synthetic biology, ag tech, waste and water treatment, recycling, sustainable textile, materials and fashion, etc.)

5. Can we identify a common set of principles, including in particular the application of the cascading principle, which will assist in the development of both the bioeconomy and circular economy?

A functional bioeconomy is integral to building a successful circular economy, both synthetic biology & biotechnology can provide solutions for both and needs to be supported through the aforementioned supports in a range of areas such as healthcare, food security and also agriculture.

Initiatives to encourage the STEM fields (Science.Technology.Engineering.Mathematics), STEM education, women in STEM, as well as entrepreneurship all interlink to the wider roadmap for the Irish bioeconomy. The availability rapid prototyping, makerspace and fabrication facilities

6. How can a national policy statement support local and regional cooperation around the use of renewable biological resources?

Economic incentives, subsidies for young companies with bio-economy related offerings to consumers (i.e. incentivizing sustainable businesses which might be more expensive in the beginning, as they are growing in a relatively nascent market) are key examples of supports for local and regional cooperation around the use of renewable biological resources.

7. How can waste policy, including an examination of the definition of waste, best support developments in the bio and wider circular economy?

Waste management and environmental bioremediation are important considerations to be made from the perspective of upcycling and the ability of waste products which can subsequently be converted into reusable products. The use of biological systems is by far the most straightforward approach such as the use of bacterial systems to convert sugar cane molasses into cosmetic grade hyaluronic acid. This was made possible by MaGENta Biolabs, a 2016 participant of our programme. Numerous waste reduction and remediation processes can be optimised through the use of biotechnology & synthetic biology. Offering additional grants and supports to clean up initiatives centred around these areas could be a worthwhile opportunity for the Irish government.

8. How can we stimulate market demand for bioeconomy products? What is in it for the consumer?

Creating visibility for actors in the space, like startups, innovators, experts, etc, including talk and lectures, encouraging inclusion of these topics in curriculum of schools and higher education institutes nationally.

Offering subsidies of commercial bioeconomy products that might be more expensive in the beginning to help increase revenues and improve employment opportunities in those sectors.

Incentives for compliant companies as well as penalties and taxes for non compliant companies failing to to adopt or approve the existing bioeconomy landscape is another potential avenue.

9. What is the most appropriate mechanism to coordinate development and monitor progress?

1. The mapping of self-identified actors of bioeconomy-related businesses and institutions, stakeholders, perhaps directory, creating centralized resources.
2. The identification and participation in key conferences and events.
3. Understanding and economic appreciation of the capacity and potential of using biology as technology to address challenges across sectors
4. Fostering innovation around biotechnology.
5. Launching and supporting startup competitions around the bioeconomy, that brings together stakeholders from various sectors, industries and regions.
6. Creating and supporting platforms for tangible bioeconomy-related experiences - exhibitions, science festivals, events for families with interactive experiences, science slams, comedy, bio-art, pitch competitions for national startups.

10. Are there any other issues to be addressed through a national policy statement?

The startup ecosystem plays a critical role in creating not only technologies capable of addressing bioeconomy challenges, but the successful ones among them will become the leaders of the bioeconomy - engaging them early and adding value is important. Further, they provide important de-risking and know how engaging entrepreneurs, investors and experts in these areas as advisors will be useful, due to the combined market-technological perspective. Another important value is that these startups are positively shaping consumer and public perception around bioeconomy issues and hence providing great value that is often unrecognized.

Therefore, supporting the startup and small business sector is instrumental. For instance, the RebelBio accelerator, backed by global VC firm SOSV has created local economic and societal value by nurturing and building national and startups.

This is an example of a valuable step towards building a productive innovation cluster that is solving wastewater treatment issues. MicrosynbiotiX bring sustainability to fish farming and are putting Ireland

forward on the global map of innovation. Helixworks Technologies serves to attract innovators as well as investors, founders and scientists internationally by enabling research in synthetic biology through low cost gene-synthesis and DNA information storage.

Additional issues are noted below:

- There is a lack of engagement and participation in conferences and pitch events from the state level to understand how policy should be shaped from the ground up.
- There is no cohesive body to help generate workshops to create an active platform for actors which bring together innovators and encouraging the exchange of ideas and strategies for collaboration.
- There is a lack support for interdisciplinary research and businesses through funding, grants, incentives and supporting the interplay between spin-in and spin-out companies within universities.
- Support for specialized research units, small businesses and startups through funding and incentives also especially within the area of infrastructure for companies.

To conclude RebelBio is a prime example of a private initiative devoted to investing in the next generation of bioeconomy related businesses through synthetic biology and biotechnology as vectors by which to contribute.

We welcome any opportunities to collaborate with the office of the Department of the Taoiseach, and research to provide in-depth knowledge of the contributions we help make to help strengthen the bioeconomy.

Yours sincerely,

The RebelBio Team