Submission for the National Bioeconomy Action Plan 2023-2025

1. Introduction

The Government's vision for the bioeconomy is to grow Ireland's ambition to be a global leader for the bioeconomy through a coordinated approach that harnesses Ireland's natural resources and competitive advantage and that fully exploits the opportunities available while monitoring and avoiding unintended consequences. An important objective of the bioeconomy is to move Ireland beyond simply a target compliance and carbon mitigation focus to integrating sustainable economic development into our economic model as we transition to a low carbon and circular economy.

The national policy outlines that one of the major opportunities for bioeconomy development is the sustainable development of relevant and industrial sectors. There is a need to address high complexity, provide for interconnectedness of policy domains and a need to address the potential for conflicting goals, for market failures and for delivery of public goods. The Bioeconomy Forum is mandated, through the national policy statement on the bioeconomy, to liaise with bioeconomy stakeholders across the breadth of industry, relevant semi-state commercial companies, representative bodies and non-governmental and community groups who underpin the sustainable development, and evolution, of the bioeconomy. Additionally, the Climate Action Plan 2021 outlines a specific action which the Government has committed to undertake related to the Bioeconomy Forum which is '***to support the Bioeconomy Forum in its development of policy recommendations in future iterations of key policies and strategies'*** such as future Climate Action Plans, and a Bioeconomy Action Plan currently under consultation. The National Bioeconomy Action Plan 2023-2025 will include a list of actions and measures, which will further support the implementation of the National Policy Statement on the Bioeconomy, placing Ireland on the road to achieving the national vision, principles and strategic objectives for the bioeconomy. The Action Plan will be the main implementation tool for the National Policy Statement in the short term.

The Circular Bioeconomy Cluster South-West (https://cbcsw.ie/), with over 50 members located across Ireland is dedicated to unlocking and accelerating business opportunities and new value chains across sectors. The role of the cluster is to anchor activities that are concrete and beneficial to its business members. Climate action and circular economy is embedded in our approach and principles and therefore helps to streamline and align business innovation with low carbon and sustainability outcomes.

A cluster is a very important framework tool for the circular bioeconomy – as it encourages companies to work together – in what is otherwise a very complex area as new value chains are being developed. An active cluster with industry, SMEs, educational institutes, government and finance stakeholders working together towards similar goals through targeted programmes will speed up the product innovation cycle, foster talent and support enterprise growth in the long term. This contributes to national and European enterprise development and climate neutrality and bioeconomy goals.

The aim of this document is to inform government stakeholders about policy challenges and potential solutions in the Irish Bioeconomy from the perspective of businesses operating within the sector. The Circular Bioeconomy Cluster South-West is a contributor to the Bioeconomy Forum. In relation to the Policy Working Group, members of the CBCSW cluster have come together to identify potential policy solutions with the aim of providing input to help to scale the Irish bioeconomy in a sustainable way, aligning with the Government's vision for the Irish Bioeconomy as outlined in the **National Policy Statement on the Bioeconomy** and the document **Realising the opportunities for enterprise in the bioeconomy and circular economy in Ireland**. It is the intention of this submission to contribute to future **Climate Action Plans**, and the **Bioeconomy Action Plan** currently under consultation.

2. Policy Innovation

The opportunity at hand is to work with government in developing policy solutions that align with business outcomes. Proposed solutions put forward by the group in this paper are based on 'speed' and 'predictability'. Enterprises operate at a different speed than government. Where uncertainty and delays exist, it is easier for businesses to plan with up to date guidance to ensure a predictable outcome. Taking an innovative policy approach is required to ensure that the Irish bioeconomy thrives. Approaching common challenges faced by industry through policy innovation will lead to a better outcome for all.

For example, in the Netherlands, an innovative policy solution called the 'Green Deal' was introduced to fast-track sustainable economic growth. The Green Deal approach is undertaken to overcome challenges faced by companies, civil society organisations and local and regional government who are creating initiatives that stimulate sustainable economic growth across thematic areas like energy, food, water, resources, biodiversity, mobility, bio-based economy, climate and construction. The approach works by having a signed 'Green Deal', a mutual agreement or covenant under private law between a coalition of companies, civil society organizations and local and regional government. The deal defines the initiative, the actions and the input by participants as clearly as possible. The deals last on average about 2 to 3 years. A deal ends when all agreements are fulfilled, and the goals are achieved. So far, 235 Green Deals were closed in the Netherlands.[i]

In Ireland, several examples exist where policy is a barrier. One such example is foreshore licensing, it is a long-discussed problem in Ireland for aquaculture and wild seaweed industry. As this is a known administration challenge and is regularly come up against by businesses, where can predictability around time to market be embedded? One for example could be through a sustainable harvesting policy that is developed through a Green Deal approach. This would prevent delays to businesses operating in the sector and widen the net of understanding of the issues faced by different parties and interests with a role to play here.

However, there are also examples of how policy barriers have been addressed due to the proactive nature of government and responsible implementation bodies with industry e.g. meat and bone meal valorisation. While this is a new area in which bioeconomy solutions could thrive, the cross- interested parties here from both a regulatory and commercial side work together to find solutions with the overall aim of reducing animal by-products sent for incineration to the UK and instead realising a new commercial opportunity to benefit both the environment and the economy.

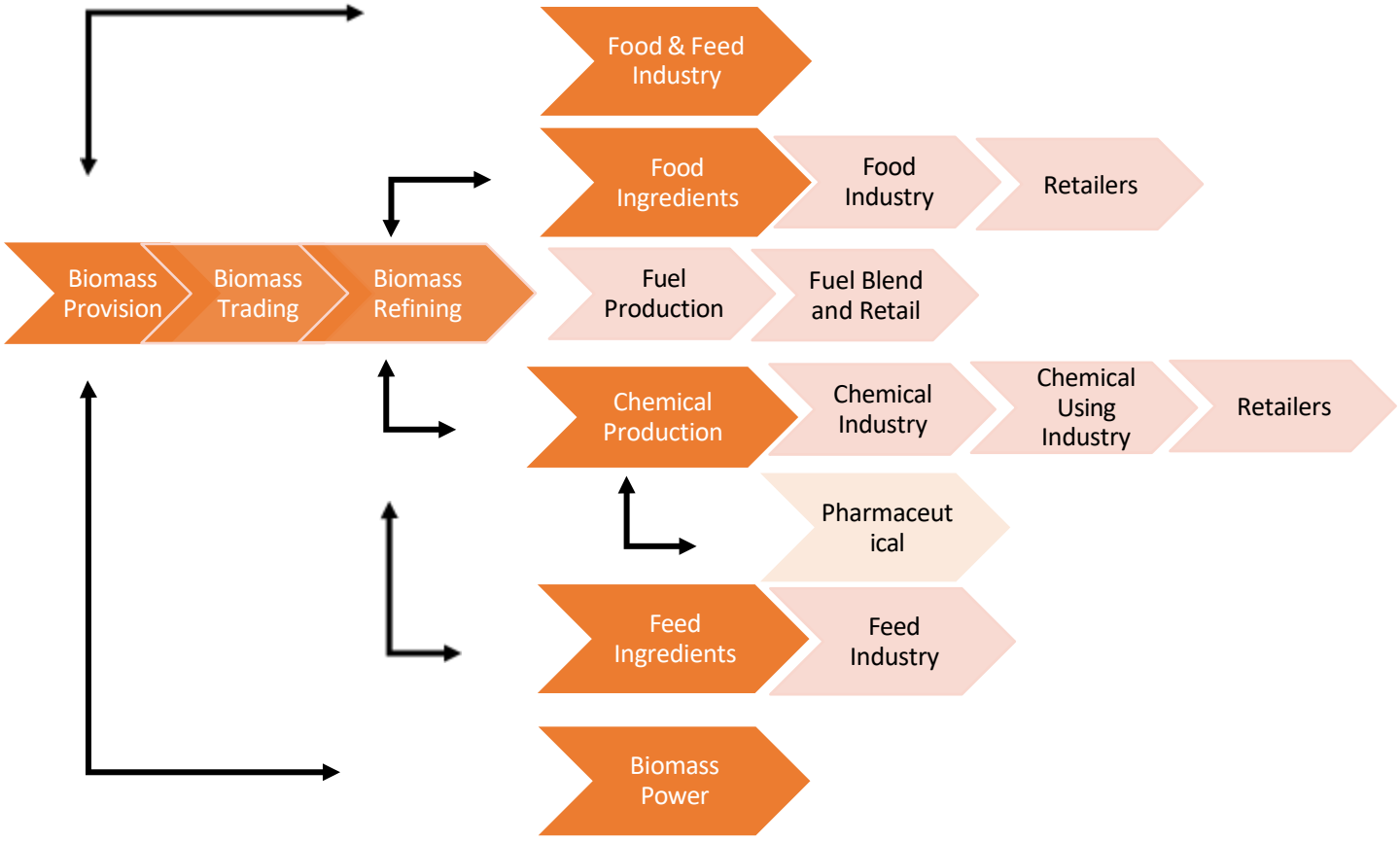
To benefit Ireland, we need to harness innovative approaches to policy in an accelerated manner otherwise we will face consequences:

- Without a policy enabling environment to scale solutions we will not achieve a full Circular Economy or Climate Action.
- Businesses lose out on commercial job creation opportunities.
- Without development and scale of bio-based value chains rural diversification will slow.

3. Policy Challenges and Proposed Solutions to enable Ireland's Bio-based Low Carbon Economy

In alignment with the bioeconomy based value chains schematic below from the paper, *Realising the opportunities for enterprise in the bioeconomy and circular economy in Ireland*[ii] the group have identified policy barriers and solutions under specific areas in the value chain. Proposed solutions put forward by the group in this paper are based on '**speed'** and '**predictability'**.

Schematic: Bioeconomy Value Chains



Biomass Provision: access to sustainable sources of biomass

1. Challenge:

The foreshore licensing process for both inshore wild seaweeds harvesting, and aquaculture activity takes a significant amount of time delaying business objectives and outcomes to meet the Irish bioeconomy. '*Waters within 12 nautical miles of the Irish coast may be classified as (a) 'inshore waters' or (b) 'internal waters of the state'*. (Marine Institute)

Solutions

Speed

- Streamline and Reduce timelines for foreshore licensing process

Predictability

- Develop a policy for the sustainable harvesting of wild seaweed in Ireland. This must cover:
  - Commercially relevant species including *Ascophyllum nodosum, Laminaria digitata* and *Laminaria hyperborea.*
  - Consideration to harvesting of seaweeds in Marine Protected Areas (MPAs).
  - The policy is recommended to be written in consultation with the Irish seaweed industry who form a key part of the circular bioeconomy, and therefore have substantial knowledge of what is required.
  - The policy should follow similar models for harvesting wild seaweed in Norway, Iceland and France (see Annex 1)
  - Food markets are predicted to be key for the short-term development of the European sector. Thus, other key edible species need to be recognised and appropriate management plans put in place.

Responsible Department

- Department of Housing, Local Government and Heritage
- Department of Agriculture, Food and the Marine
- Bord Iascaigh Mhara / Marine Institute

Relevant Policy / Regulation / Act

- Maritime Area Planning Act 2021.
- Foreshore Act, 1933

2. Challenge

There is no data to indicate the availability of wild inshore seaweed biomass along the Irish coast.

Solutions

Predictability

- Where applicable investigate the possibility to map the biomass along the Irish coast. It is recommended this is completed in consultation with the seaweed industry in Ireland, who are activity engaged in harvesting and management of the resource.
- Make data available to public.

- Create a policy for sustainable harvesting of wild seaweed in inshore areas along the Irish coast. As above, it is recommended to be undertaken with the seaweed industry in Ireland. See Annex 1 for example.

Responsible Departments

- Department of Housing, Local Government and Heritage
- Department of Agriculture, Food and the Marine
- Bord Iascaigh Mhara / Marine Institute
- Department of Energy, Climate Change and Communications

Relevant Policy / Regulation / Act

- Maritime Area Planning Act 2021.
- Foreshore Act, 1933

3. Challenge

It is currently underknown whether licensing for offshore (12 miles plus) seaweed harvesting is required. Irish seaweed farmers / companies are not aware of the 1) process and 2) the authority under whom to apply for a licence for offshore seaweed aquaculture.

Solution

Development of aquaculture of aquatic plants offshore e.g. seaweed for nutrition and other uses either as standalone or co-located with wind farms is a growing market opportunity to the benefit of seaweed farmers and companies. Co-locating helps to de-risk the investment and supports efforts to increase carbon fixation activity.

Offshore wind projects are being scoped under a Fast-Track mechanism Maritime Area Consent (MAC) Regime. The new regime enables the Minister DECC, on an interim basis, to issue Maritime Area Consents (MACs) to renewable energy developers who meet the relevant assessment criteria. Developers must have a Maritime Area Consent to make an application for permission, to include environmental assessments, to An Bord Pleanála. Could this fast-track mechanism be applied to aquaculture development offshore for aquatic species such as seaweed?

Speed

- Provide clarity to seaweed farmers and companies on the steps required to develop offshore seaweed farms either standalone or co-located with new or existing infrastructure

Predictability

- Create a sustainable growing and harvesting policy for growing seaweed in offshore areas
- Connect offshore wind with aquaculture development in policy documentation – Marine Area Consent Regime and Marine Area Planning 2021
- In relation to aquaculture, there is potential for cultivation of additional seaweed species in aquaculture development. Most of Europe & US are cultivating the same species and we should look to develop capacity.

Responsible Department

- Department of Energy, Climate Change and Communications

- The European Commission, the European Climate, Infrastructure and Environment Executive Agency (CINEA) and a consortium of sustainability consultants and algae organisations are launching a European algae stakeholder platform, called EU4Algae. The aim of the platform is to accelerate the development of a European algae industry and promote algae for nutrition and other uses among consumers and businesses in the EU

Relevant Policy / Regulation / Act

- Maritime Area Consent Regime
- Maritime Area Planning Act 2021

4. Challenge

Residues as a resource. The need for distinguishing of organic residues from fisheries and agriculture and either classifying under end-of-waste criteria or move over to animal-by-products regulation and to create a circular economy interlink with land nutrient management plans.

This is holding up the valorisation of some feedstocks; needs attention and a fast-track approach to encourage more players into the circular bioeconomy field.

Solutions

Predictability

- In Ireland, there is a lack of 'end-of-waste' criteria for a number of organic residues which prevent implementation of a full circular economy.
- A new strategy to be developed to holistically review biological residues and link to potential in the Circular Economy

Responsible Department

- Department of Agriculture, Food and the Marine
- Environmental Protection Authority

Relevant Policy / Regulation / Act

- **End of Waste (Art. 28)**
    - Achieving end-of-waste status for recovered waste materials can support the recycling of waste and the beneficial use of the waste without damaging human health and the environment. This in turn diverts waste from landfill disposal, keeping it in the economy as a resource, which can reduce the environmental impacts arising from waste management.

- Waste Action Plan for a Circular Economy

5. Challenge

To incentivise large scale fertiliser production from domestic or organic or secondary raw materials in line with a circular economy by transforming residues and waste into nutrients for crops. With the approaching application of the Fertilising Products Regulation in mid-July 2022, industry is urgently seeking guidance on the possibility of placing animal derived component materials (including manures) on the market in the EU Fertilising Products under the FPR.

In addition to CMC 10, questions also remain about the use of animal by-products in composts, digestates, and certain other fertilising component materials (CMCs 3-5-12-12-14-15). As one example, manure (a Cat 2 animal by-product) is a major input material for anaerobic digestions and represents the largest potential for increasing the circular use of nutrients for land management. (*See ANNEX 2 for more information)*

Solutions

Speed

- Representatives from Department of Agriculture, Food and the Marine to provide input to the Fertilising Product Regulation to ensure regulatory certainty is a key prerequisite for market actors to upcycle and re-valorise animal by products as safe and effective fertiliser and to work with the European Commission team to specifically to define the appropriate animal by-product end points allowing for circular economy.

Relevant Department

- Department of Agriculture, Food and the Marine

Relevant Policy / Act / Regulation

- Regulation (EU) 2019/1009 – the Fertilising Products Regulation

Biomass Refining: processing biomass sustainably

6. Challenge

Small-scale biomass projects <25,000 tons require different tweaks to planning applications per County creating a long-winded process. In addition, local authorities are under-resourced to deal with numbers of applications leading to delays. This a challenge for companies who operate at a speed conducive to good profitable business and may have capital deployed and managing risk.

Solutions

Speed

We recommend a fast-track mechanism. For example

- A central authority for validation of small-scale projects that is transversal across Counties.
- A Pre-validation process for known technologies and project replication
- Shared learning for small scale for proven technology could be through permission development rights

Relevant Departments

- Local Government: County Councils
- Department of Housing, Local Government and Heritage

Relevant Policy / Regulation / Act

- Planning and development regulations: Schedule 2 Part 1 - Exempted Development — General'

7. Challenge

Biomass processing and conversion technologies that are proven in Europe and supporting sustainability outcomes are facing validation challenges in Ireland.

Solutions

Speed

- Create a Fast-track mechanism at government (central) level that incudes
    - Pre-validation of proven technologies
    - Proven technologies could be allowed through permission development rights
    - Potential for central/decentralised processing facilities for these resources

Predictability

- Equip EPA and County Councils with knowledge and dissemination materials from successful projects with proven technologies
- Create culture of openness to new/all forms of extraction, all forms of waste and residue, enable full recycling and valorising residues among government, industry and primary producer stakeholders

Responsible Department

- County Councils
- Department of Housing, Local Government and Heritage
- Department of Agriculture, Food and the Marine

Relevant Regulation / Policy / Act

- Planning regulations: Permission development rights

8. Challenge

There is a lot of information about the bioeconomy but it is widely dispersed and sometimes confusing altering public perception around the sustainability of bioeconomy solutions and in turn affecting delays to projects that could bring benefits to communities.

Awareness around implementation of bioeconomy and circular economy is low among

1. Decision makers and support staff.
2. Public in general

Solutions

Speed

As was done for the 'Wild Atlantic Way' – we need a specific communications campaign targeting the public/citizens but also primary producers to explain the Bioeconomy and its opportunities and positive image.

- Educate public about role and value of bioeconomy and the societal benefits
- Targeted Dissemination Events with EPA and County Councils E.g. CircBioCityWaste Project
- Public engagement events
- Targeted communications (about societal events)
- Distilling or 'sense-making' to be done with the body of information before dissemination

Responsible Departments

- County Councils
- Department of Housing, Local Government and Heritage
- Department of Agriculture, Food and the Marine
- Department of Environment, Climate Change and Communications

Food Ingredients

9. Challenge

The interpretation of daily value of iodine from dietary sources is different across EU states. This has an impact on companies in Ireland creating food-grade ingredients and supplements from raw materials such as seaweed, as they have to create a different product for each target market, adding to their costs. The varying levels of iodine guidance are based on older studies, and information about iodine levels could be improved. For example, the maximum permitted level of iodine in France is set at 2 mg/g dry weight for all species of edible seaweed (ANSES, 2018). In contrast, Germany recommends a maximum concentration of 20 mg/kg of iodine in dried seaweed for consumption and a maximum daily uptake of 500 µg/day (BfR, 2004).[iii]

Solution

Predictability

- Harmonisation of the limits of dietary intake of iodine across European countries. FSAI to work with EFSA.
- Consolidate and/or gather up-to-date studies and/or conduct up-to-date research on safe limits of iodine and use this to inform European wide harmonisation.

Responsible Department

- Food Safety Authority Ireland
- European Food Safety Authority

10. Challenge

In terms of risk of allergens from seaweed, there is no guidance from the Food Safety Authority on whether seaweed raw materials are a potential source of allergens. In the report Safety Considerations of Seaweed and Seaweed-derived foods available on the Irish market by FSAI they highlight *Seaweed is not known to pose a significant allergenic risk to consumers (Miyake et al., 2006). However, due to the marine origin, it is possible that edible seaweed could carry debris from fish, molluscs and crustaceans, constituting a relatively minor and indirect allergenic risk.*

Without guidance, major issues arise when seeking contract manufacturers as many of them do not want to handle seaweed due to perceived risk of cross contamination in a manufacturing workspace. The guidance sought is what is the industry standard with regards to allergens and seaweed. Should a company declare that it may contain allergen if they are using seaweed derived ingredients?

Solutions

Predictability

- Provide clarity and guidance to industry about the standard for allergens and seaweed

Responsible Department

- Food Safety Authority Ireland
- European Food Safety Authority

Cosmetics Manufacturing

11. Challenge

The level of quality in cosmetic manufacturing is variable. While the Health Products Regulatory Authority are responsible for cosmetic manufacturing, the manufacturing process is not a licensed process, compared to the pharmaceutical industry. This means that all of the responsibility for GMP (good manufacturing practice) is with the responsible person (RP) and the contract manufacturer is not held account to a standardised / licensed process. This a gap in the market for companies who are looking to create high quality bio-based cosmetics.

Solutions

Speed & Predictability

- Introduce a licensed process for cosmetic manufacturing as per pharmaceutical manufacturing.

Responsible Department

- Health Products Regulatory Authority

Biomass Power

Challenge

A major challenge in realising green energy in Ireland and unlocking new business models for a low carbon economy, has been the low levels of subsidisation for bioenergy to compensate for the higher costs of production and a sectoral distributed model. Biomass energy should be part of the sustainable energy mix in Ireland. A distributed model, where there is potential for on-farm bioenergy production, or co-operative activity or co-location with industry and urban areas is favourable to meet domestic and industrial energy needs, as well achieving low carbon and circular economy goals.

For example, in the United Kingdom, the Renewable Heat Incentive (RHI) offered funding to support heat and biomethane (from anaerobic digestion) produced from renewable sources. The RHI was designed to encourage the use of low carbon heating technologies such as ground source heat pumps. This in turn could help to reduce demand for heat produced from more polluting fossil fuels. By switching to a renewable heat source, a business could generate income from the RHI tariff payments, which could lead to significantly reduced fuel costs, particularly if switching from oil or LPG. The RHI was split in to two different parts for domestic RHI and nondomestic RHI, depending on the nature of the heating system installed. The RHI could provide an excellent diversification opportunity, particularly on farms with a large heat demand such as greenhouses, pig and poultry sheds or a cluster of buildings requiring heat.

Solutions

- Subsidies for biomass power, both electricity and heat
- A distributed model for bioenergy production
- Irish government to attract capital funding via the RePowerEU scheme. Measures proposed under the Biomethane Action Plan – which is to be co-funded by the Common Agricultural Policy (CAP) – aim to "unlock the full biogas and biomethane potential" of all EU member states. The action plan involves a €37 billion investment for sustainable biomethane and its increased use in households, industry and agriculture.
- In the schematic on Page 2 which is copied from the Department of Business, Enterprise and Innovation: *Realising Opportunities for Enterprise in the Circular and Bioeconomy in Ireland,* please change **Biomass Power to Biomass Energy** (Power, Heat and Bio-Gas).

Responsible Department

- Department of Environment, Climate Change and Communications
- Department of Agriculture, Food and the Marine

Overall: Bioeconomy Value Chain Schematic

The Bioeconomy Value Chain schematic on page 2 of this document is taken from the Department of Business, Enterprise and Innovation: *Realising Opportunities for Enterprise in the Circular and Bioeconomy in Ireland.* The schematic requires updating, for example, key products that are manufactured in Ireland and are aligned with EU regulations are not reflected in the schematic such as bio-based food supplements and biostimulant/biofertilizers. For example, plant biostimulant have recently been defined in law (EU regulation n°2019/1009). Other products for crop production include: Soil improvers (EU regulation n°2019/1009)**,** Fertilizers (EU regulation n°2019/1009) and Plant protection products (Regulation (EC) No 1107/2009)

Solution

- To support the development of Irish Bioeconomy Action Plan, effort should be made to accurately reflect Irish bioeconomy value chains in a policy document with input from industry stakeholders participating in the Bioeconomy Forum and cluster organisations on the island of Ireland.

Responsible Department

- Department of Agriculture, Food and the Marine
- Department of Environment, Climate Change and Communications

ANNEX. 1

The need for a seaweed harvesting policy in Ireland.

Seaweed harvesting is an important component of the Circular Bioeconomy in Ireland. However, there is currently no policy in place in Ireland governing this activity, despite the fact that over 98% of Ireland's harvested seaweed comes from commercial harvesting of wild resources, with less than 2% derived from aquaculture. To ensure the economic potential of seaweed resources in Ireland is realized, it is essential that a policy is put in place. This document summarizes the models for seaweed harvesting in Norway, Iceland and France, including regulatory aspects, quantities harvested, methodology and rotation periods involved. Information on seaweed harvesting in Ireland is provided for comparison. Overall, the Norwegian, Icelandic and French models provide a good framework for the sustainable management of seaweed resources, particularly given their focus on collaboration between industry and relevant scientific bodies. It is recommended that the Irish Government develop a seaweed harvesting policy in line with Norwegian, Icelandic and French models, covering:

- Commercially relevant species including *Ascophyllum nodosum, Laminaria digitata* and *Laminaria hyperborea.*
- Harvesting of seaweeds in Marine Protected Areas (MPAs), both mechanically and by hand.
- The policy should be written in consultation with the Irish seaweed industry who form a key part of the circular bioeconomy, and therefore have substantial knowledge of what is required.

Regulatory aspects (National level):

(a) **Norway:** The Norwegian Ministry of Fisheries and Coastal Affairs, FKD, regulates seaweed harvest by laws and instructs the Directory of Fisheries, FD, which sets the regulations together with industry, Institute of Marine Research (IMR), researchers and other relevant stakeholders (Meland et al., 2011). Licenses to commercial companies are obtained from the Directorate of Fisheries (Gómez et al., 2021). Harvesting is monitored through collaboration between industry, scientific bodies and experts in academia (Steen et al., 2016).

(b) **Iceland:** In 2018, a new regulation on commercial seaweed harvesting was issued, "Regulation on the acquisition of Seaweed for commercial purposes No 90/2018", covering permits and regulatory aspects. The Regulation was issued by the Directorate of Fisheries, Ministry of Industries and Innovation based on the Fisheries Management Act No 116/2006 and Act No 57/1996 concerning the Treatment of Commercial Marine Stocks. It was adopted with the intention to "Improve the conduct of exploited marine stocks and promote sustainable utilization that ensure long-term maximum yield for the Icelandic Nation" (Gómez, 2021; Maack, 2019).

(c) **France:** Commercial seaweed harvesting is regulated at national and regional scale in France. Seaweed harvesting takes place in the Parc naturel marin d'Iroise (PNMI), a Marine Protected Area (MPA) located in waters off the north west coast of France, where human, commercial and industrial activities operate according to a set of defined criteria. The French Research Institute for the Exploitation of the Sea (Ifremer) monitors kelp harvesting in the PNMI and advises administrations involved in the management of seaweed harvesting (ref: Mesnildrey et al., 2012).

(d) **Ireland:** Commercial harvesting is regulated by government departments and licensed under the Foreshore Act, 1933 and the Maritime Area Planning Act 2021. License decisions are made following consultations with expert groups and prescribed bodies including the Marine Institute, National Parks and Wildlife Services, Inland Fisheries Ireland, Sea Fisheries Protection Authority, Marine Survey Office, Underwater Archaeology Unit, and other relevant government bodies and departments. Licenses are issued in line with EU regulations and involve collaboration between industry and scientific experts to monitor the resource.

Quantities:

Most brown seaweeds harvested in Europe come from Norway, Ireland, Iceland and France, including commercially important species such as *A. nodosum, L. hyperborea* and *L. digitata:*

(a) Norway: Wild seaweed has been harvested in Norway for over 50 years. Approximately 162,824 tonnes of brown seaweed were harvested in Norway in 2019, including *A. nodosum* and *L. hyperborea*, *Alaria esculenta* and other brown seaweeds.

(b) Iceland: Wild seaweed has been commercially harvested in Iceland since the 1970s, with approximately 15,000 to 20,000 tonnes of *A. nodosum* and 1,700 to 3,700 tonnes of *L. digitata* mechanically harvested per annum. *L. hyperborea* is also mechanically harvested in Iceland (Maack, 2019). In 2019, a total of 17,533 tonnes of *A. nodosum, L. digitata* and *L. hyperborea,* were harvested in Icelandic waters.

(c) France: Wild seaweed has been harvested in France for over 50 years. Approximately 51141.92 tonnes of brown seaweed were harvested in France in 2019, including *L. hyperborea, L. digitata, A. nodosum* and *Himanthalia elongata*. Most of the seaweed harvested in France comes from the PNMI Marine Protected Area (Mesnildrey et al., 2012).

(d) Ireland: Wild seaweeds have been harvested in Ireland for 100s of years. *A. nodosum* has been commercially harvested for decades and is currently the main seaweed harvested in Ireland. It is estimated that at least 29,500 tonnes was harvested in 2019 (FAO, 2021). Harvesting of *L. digitata* and *L. hyperborea* is also licensed in Ireland.

Methodology and rotation periods:

(a) Norway: Mechanical harvesting of *L. hyperborea* occurs along 40% of the Norwegian coastline and is managed on a 3 to 4/5 year rotational basis, regenerating within 4 years post-harvesting (Steen, 2016, Gómez, 2021). Kelp is mechanically harvested commercially by boat at depths between 5-20m depth, using a 3-meter-wide dredge with pointed prongs that when towed across the seabed, removes kelp plants from the substratum (Gómez, 2021, Steen, 2016). Following canopy removal, understory kelp plants flourish with the improved light conditions, ensuring a short regeneration time of the canopy which grows back at higher densities compared to control sites (Steen, 2016). Mechanical harvesting is sustainable as evidenced by the recovery of biomass between 2 and 6 years post-harvesting, depending on the location (Christie, 1998, Sjøtun, 2006, Steen, 2016).

(b) Iceland: Regulations specify a 4 year rotation system for seaweed harvesting (Gómez, 2021).

(c) France: *L. digitata* is mechanically harvested by boat with a gear called a "scoubidou". *L. hyperborea* is also mechanically harvested by boat using a large rake-like dredge device. *A. nodosum* is harvested by hand. Mechanical harvesting appears to be sustainable as evidenced by the recovery of *Laminaria* spp. biomass post-harvesting to levels comparable to unharvested zones (Davoult, 2011; Leclerc, 2015).

(d) Ireland: *A. nodosum* is hand harvested in sheltered intertidal zones along the west coast of Ireland. The mechanical harvesting of *L. digitata* and *L. hyperborea* in subtidal waters is a licensed activity in Bantry Bay, County Cork, Ireland and involves the cutting of kelp at a minimum of 200mm above the holdfast, without making contact with the seabed, along with scientific monitoring of kelp regeneration rates and flora and fauna 3 and 5 years post-harvesting (BioAtlantis Ltd., 2014).

EU Context:

Harvesting of seaweed in the wild should be undertaken in a manner that is sustainable in both the short and long term, allowing for regeneration of the resource and preventing negative impacts on the marine and coastal ecosystems, habitats and species (Werner and & Kraan, 2004, Kelly et al., 2001 and 2005). In a European context, harvesting must be carried out in line with the habitats and birds directives (Habitats Directive 92/43/EEC, Birds directive 2009/147/EC), particularly when working in protected areas such as Natura 2000 sites, Special areas of Conservation (SACs), Special Protection Areas (SPAs) and Marine Protected Areas (MPAs). In particular, measures are required to ensure that activities associated with seaweed harvesting do not impact on the conservation objectives and targets set for qualifying interests (habitats, species, etc.) within protected sites (NPWS, 2012). Conservation objectives and targets are typically assigned to protect a wide array of marine and coastal species and habitats listed on Annex I/II of the E.U. Habitats Directive, including harbour/common seal *(Phoca vitulina)*, otter *(Lutra lutra),* specific bird species, reefs, shingle, tidal mudflats and sandflats, estuaries,

inlets and bays, salt meadows and sand dunes and a range of harbour seal haul out sites and bird wintering or breeding sites (Nelson, 2019, NPWS, 2019). Adherence to conservation objectives and targets form a key part of legal frameworks aimed at ensuring that activities such as seaweed harvesting are undertaken in a sustainable manner, thus ensuring no significant impacts on protected habitats and species in the marine zone.

References:

- **BioAtlantis Ltd. (2014).** Foreshore licence application for mechanical harvesting of seaweed in Bantry Bay, FS006061. https://www.gov.ie/en/foreshore-notice/e62b9-bioatlantis-ltd-bantry-bay/
- **Christie, H.;** Fredriksen, S.; Rinde, E (1998). Regrowth of Kelp and Colonization of Epiphyte and Fauna Community after Kelp Trawling at the Coast of Norway. Hydrobiologia, 132, 49–58.
- **Davoult et al. (2011).** Cahiers de Biologie Marine, 52(4), 429–434.
- **FAO (2019).** Global capture production 1950-2019 (FishstatJ). www.fao.org/fishery/statistics/software/fishstatj/en
- **Gómez et al. (2021).** European & National Regulations on Seaweed Cultivation and Harvesting. (SUSCULT) Project Report. https://www.submariner-network.eu/images/grass/FINAL-GRASS_GoA_3.2._SYKE_regulation_report.pdf
- **Kelly,** L., Collier, L., Costello, M. J., Diver, M., McGarvey, S., Kraan, S., Morrissey, J. & Guiry, M. D. Impact Assessment of Hand and Mechanical Harvesting of Ascophyllum nodosum on Regeneration and Biodiversity", Marine Resource Series, Marine Institute 2001. https://oar.marine.ie/handle/10793/207
- **Kelly, E. (ed.) (2005).** The role of kelp in the marine environment. Irish Wildlife Manuals, No. 17. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/IWM17.pdf
- **Leclerc et al., (2015).** Community, trophic structure and functioning in two contrasting Laminaria hyperborea forests. Estuarine, Coastal and Shelf Science, 152, 11-22. https://www.sciencedirect.com/science/article/abs/pii/S0272771414003254
- **Maack A (2019).** Ways to encourage sustainable exploitation and improve the regulatory framework on wild seaweed in Iceland. The Int. Inst. for Ind. Env. Econ. Lund University. Thesis. https://www.lunduniversity.lu.se/lup/publication/8997131
- **Meland, et al. (2011).** Introduction to the management and regulation of the Norwegian seaweed industry. Bioforsk, 7, pp.278-279.
- **Mesnildrey, et al. (2012).** Seaweed industry in France. Report Interreg program NETALGAE. https://hal-agrocampus-ouest.archives-ouvertes.fr/hal-00840572/document
- **Nelson B,** Cummins S, Fay L, Jeffrey R, Kelly S, Kingston N, Lockhart N, Marnell F, Tierney D and Wyse Jackson M (2019) Checklists of protected and threatened species in Ireland. Irish Wildlife Manuals, No. 116. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/IWM%20116%20Checklists%20Protected%20and%20Threatened%20Species%202019.pdf
- **NPWS (2012).** Marine Natura Impact Statements in Irish Special Areas of Conservation. A Working Document. National Parks and Wildlife Service (NPWS). Department of Arts, Heritage & the Gaeltacht. https://www.npws.ie/sites/default/files/general/Marine%20Assessment%20Working%20Document.pdf
- **NPWS (2019).** The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished National Parks and Wildlife Service (NPWS) report. https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf
- **Sjøtun, K.;** Christie, H.; Helge Fosså, J (2006). The Combined Effect of Canopy Shading and Sea Urchin Grazing on Recruitment in Kelp Forest (Laminaria hyperborea). Mar. Biol. Res. 2, 24–32.
- **Steen, et al., (2016).** Regrowth after kelp harvesting in Nord-Trøndelag, Norway. ICES Journal of Marine Science: Journal Du Conseil. https://academic.oup.com/icesjms/article/73/10/2708/2647119
- **Werner A, & Kraan S (2004).** Review of the potential mechanisation of kelp harvesting in Ireland. Marine Environment and Health Series No. 17, Marine Institute. https://oar.marine.ie/handle/10793/261

ANNEX 2

OVERVIEW OF STATUS ANIMAL-BY PRODUCT CERTIFICATION AS FERTILISER

In a press release from a number of European associations and organisations working across biogas, compost and fertiliser industry dated in March 2022[iv] it was noted that in a loss for the Circular Economy, Fertilising Products containing ABP are frustrated from entering the single market under the FPR (reg EU 2019/1009). This press release went on to note that while the Fertilising Products Regulation foresaw the use of ABP as components in EU Fertilising Products, relevant end points needed to be defined under the ABP regulation (reg 1069/2009). When the FPR was agreed in 2019, the commission was mandated to begin the process to define appropriate animal by products end points by early 2020. However, to date no such end points have been defined even though the FPR will be applied from July 16 2022 onwards.

END NOTES

[i] Green Deal Approach Netherlands: https://www.greendeals.nl/english

[ii] Department of Business, Enterprise and Innovation: Realising Opportunities for Enterprise in the Circular and Bioeconomy in Ireland https://www.enterprise.gov.ie/en/Publications/Publication-files/Realising-opportunities-for-enterprise-bioeconomy-and-circular-economy-Ireland.pdf

[iii] FSAI Report of the Scientific Committee of the Food Safety Authority of Ireland Safety Considerations of Seaweed and Seaweed-derived Foods Available on the Irish Market https://www.fsai.ie/SafetyConsiderations_SeaweedAndSeaweedDerivedFoods_IrishMarket/

[iv] https://www.europeanbiogas.eu/in-a-loss-for-the-circular-economy-fertilising-products-containing-animal-by-products-are-frustrated-from-entering-the-single-market-under-the-fertilising-products-regulation-fpr