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05 March 2024

Re: Ireland's Draft National Biomethane Strategy. Our Ref: EPAC-0323

A cháirde,

We acknowledge your notice, dated 02 February 2024, in relation to the consultation on Ireland's Draft National Biomethane Strategy.

The Environmental Protection Agency (EPA) welcomes the development of Ireland's National Biomethane Strategy in line with Ireland's Climate Action Plan. We note that the consultation process aims to gather the views of stakeholders and interested parties which will inform the development of the final strategy.

The EPA is an independent public body established under the Environmental Protection Agency Act, 1992. The EPA's purpose is to protect, improve and restore our environment through regulation, scientific knowledge and working with others. Our vision for Ireland is that we live sustainably in a healthy environment that is valued and protected by all.

Our purpose reflects our three core roles – as an environmental regulator, as a key source of trusted scientific evidence and knowledge, and as a voice for the environment through our leadership and advocacy. We are committed to collaborating and partnering with others to deliver better environmental outcomes. Our statutory responsibilities include the following areas:

- Licensing of industrial, agricultural, water, waste and energy activities
- National Environmental Enforcement
- Climate Science & Climate Change
- Administering EU Emissions Trading System
- EU Carbon Border Adjustment Mechanism
- Circular Economy and Waste Management
- Water Management
- Environmental Monitoring & Assessment
- Chemicals in the Environment
- Environmental Research and Development and
- Radiological Protection

In principle, the Agency supports Ireland's draft National Biomethane Strategy as a key part of decarbonising Ireland's economy. However, it is important that the development and deployment of new biomethane production capacity is within the framework of legal and regulatory obligations in place to protect the environment. In particular, the Agency brings your attention to the need for careful management of feedstocks; licensing and regulatory requirements; the need for technical capacity in managing anaerobic digestion facilities; greenhouse gas reporting and the protection of water quality. Each of these is set out in more detail below:

1. Feedstocks and regulation of anaerobic digestion (AD) plants

Owing to the variability of potential feedstocks proposed, a more detailed assessment on the suitability, availability and classification (waste, non-waste, by-product[1], end-of-waste) of the feedstocks needs to be considered. This has regulatory implications, operational impacts, and land use implications.

The potential role of the by-product and end-of-waste regulatory mechanisms in terms of supporting feedstock generation also needs to be included in the strategy. In relation to by-product feedstocks, a production residue can be considered a potential by-product, and not a waste, when all four conditions of 'the by-product test'[2] are met for the material. The EPA is the competent authority for assessing by-product notifications made be an operator and determining if the material is a by-product. See the Agency's website[3] for further details on by-products.

Regarding end-of-waste materials, only wastes that have been fully recovered through processing at a facility holding a waste authorisation and an end-of-waste decision, and meet the end of waste criteria, cease to be regulated as waste. The EPA is the competent authority for assessing end-of-waste applications and issuing end of waste decisions. Further details on end-of-waste are available on the EPA website[4].

The EPA is the statutory authority for granting licences to installations undertaking industrial activities listed in Annex I of the Industrial Emissions Directive (IED) and to facilities carrying out waste disposal/recovery operations listed in the Third and Fourth Schedule of the Waste Management Act 1996 as amended. The strategy should clarify how the recast of the Renewable Energy Directive (RED III) will impact on streamlining consents associated with renewable energy developments, and in this context, consents associated with anaerobic digestion plants.

EPA licensing requirements, and the environmental considerations required by Best Available Techniques (BAT), need to be considered early in the project design and planning process, particularly in relation to the wide range of proposed potential waste and non-waste feedstocks required to produce biomethane and their potential impact to the environment from storage and processing during plant operations.

The IED is transposed into Irish law via the Environmental Protection Agency Act 1992 as amended. Classes 11.4(b)/11.4(c) and 5.12(a) of the EPA Act lists the following activities as requiring an EPA licence which may be relevant to anaerobic digestion and biomethane production facilities:

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[1] The concept of a by-product was established by the European Waste Framework Directive (WFD). This concept has been transposed into Irish law through Regulation 27 of the European Communities (Waste Directive) Regulations 2011, as amended.

[2] https://www.epa.ie/our-services/licensing/waste/by-products-regulation-27/

[3] https://www.epa.ie/our-services/licensing/waste/by-products-regulation-27/

[4] https://www.epa.ie/our-services/licensing/waste/end-of-waste-art-28/

11.4(b): Recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day involving one or more of the following activities, (other than activities to which the Urban Waste Water Treatment Regulations 2001 (S.I. No. 254 of 2001) apply):

(i) biological treatment;

(c) Notwithstanding clause (b), when the only waste treatment activity carried out is anaerobic digestion, the capacity threshold for that activity shall be 100 tonnes per day.

5.12 The production of organic chemicals, such as:

(a) simple hydrocarbons (linear or cyclic, saturated or unsaturated, aliphatic or aromatic)

Further information in relation to the licensing process is available on the EPA's website[5]. Information on BAT applicable to these installations can be found on the European Commission website[6].

The EPA is committed to working constructively with all stakeholders in determining licensing requirements and providing timely assessments based on application prioritisation criteria and available resources. In this regard, and given the potential scale of plants to be developed, the most appropriate mechanism for licensing of anaerobic digestion and/or biomethane production facilities should be considered in consultation with the Agency.

2. Regulation compliance

The potential risk of environmental impacts from mismanagement of anaerobic digestion plants is high. Issues related to appropriate feedstock acceptance and handling (liquid and solid materials), feedstock storage, odour, operations and production, risk of activity losses (production gases, leachates), digestate storage and management etc. occur regularly. Anaerobic digestion plants must operate in compliance with EPA licence conditions to protect the local environment. To achieve general acceptance by the public, the operators of AD plants must ensure they are 'good neighbours'.

Consideration should be given to the design, including applicable BAT, location and operation of AD plants to ensure the potential impacts to the environment are negated.

Given the employment potential which may result from the projected scale of AD plant development, consideration should be given to the availability and development of appropriately skilled workers with the technical capabilities required for the successful operation of AD plants to ensure compliance with environmental requirements and EPA Licences.

Your attention is also drawn to published and on-going EPA-funded research related to AD and the bioeconomy, listed in Appendix I and Appendix II of this submission, which may provide a useful resource and help inform aspects of the Strategy.

3. Decarbonisation and greenhouse gas emissions

The EPA supports the objective to implement a biomethane strategy with "the potential to displace fossil gas in many hard-to-decarbonise sectors, such as high-temperature heat, while also playing a significant role in the decarbonisation of Ireland's agriculture sector".

[5] https://www.epa.ie/our-services/licensing/industrial/industrial-emissions-licensing-ied/

[6] https://eippcb.jrc.ec.europa.eu/reference/

Biomethane production and consumption has the potential to result in greenhouse gas emissions savings across a number of sectors, including Agriculture, Industry, Residential, Commercial Services and Public Services. These sectors are currently responsible for 38.4%, 10.8%, 10%, 1.3% and 1.1% respectively of Ireland's total emissions (excluding LULUCF[7]).

EPA greenhouse gas Inventory and Projection reports inform the monitoring of Ireland's climate action performance on a sectoral level. EPA greenhouse gas projections 2021-2040[8] indicate that the first two carbon budgets (2021-2030), which aim to support achievement of the 51% emissions reduction goal, are projected to be exceeded by a significant margin of between 24% (With Additional Measures - WAM scenario) and 34% (With Existing Measures – WEM scenario). Included in the WAM scenario assumptions is a large expansion of renewables, including the use of 5.7 TWh of biomethane across the heat sector (split between Residential, Commercial/Public Services and Industry). While the Strategy presents estimates of likely emissions savings in the energy sectors, the emissions savings in the Agriculture sector that may result from the production of biomethane will need to be more accurately estimated to be included in future Projection reports and to monitor the effectiveness of the Strategy in the future.

You are also referred to the recently published "Ireland's Climate Change Assessment" report[9], that provides summary information that can inform decision-making on climate actions. Volume 2 of the report on Achieving Climate Neutrality by 2050 introduces the current best understanding of how to mitigate climate change with a central focus on Irish literature seeking to inform the pathway to a climate neutral Ireland. Chapter 4 on Future Energy Choices highlights some of the factors that need to be considered in relation to biomethane: greenhouse gas emissions savings from slurry storage, monitoring of methane leakage, feedstock mixes and greenhouse gas emissions saving potential (high with high slurry and low grass mix) and global warming potential (high grass silage mix incurred emissions from using fertiliser to provide additional grass silage).

4. Digestate & Water quality

The protection and, where necessary, the improvement of water quality in all waterbodies is a statutory requirement under the Water Framework Directive and it is important to ensure that activities relating to the production of biomethane and the subsequent utilisation of biosolids produced do not adversely affect the environment, or human health.

The EPA acknowledges the requirement for sectoral decarbonisation in line with statutory requirements. It is important to emphasise that this should not happen at the expense of other statutory requirements, such as those stipulated in the 5th Nitrates Action Programme. The development of AD plants at scale, should not lead to the increased application of nutrients to land areas where existing issues of high nutrients exist. Soil testing and nutrient management planning are to be critical tools in this regard.

The Agency welcomes the opportunity to reduce inorganic fertiliser use on land. Any replacement nutrient source should not lead to an increase in nutrient loss to surface or ground water. It is also noted under the Nitrates Directive, that biofertilisers are included as part of the allocation of organic nutrients

[7] Land Use, Land Use Change and Forestry covers the following categories; Forest land, Cropland, Grassland, Wetlands, Settlements, Other land and Harvested Wood products.

[8] https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/irelands-greenhouse-gas-emissions-projections-2021-2040.php

[9] https://www.epa.ie/our-services/monitoring--assessment/climate-change/irelands-climate-change-assessment-icca/

on farms. There are also other potential issues relating to the use of biosolids that need to be considered, such as the presence of pathogens, microplastics, PFAS chemicals and other contaminants. In addition, the movement and control of use of organic fertilisers and biosolids is currently an issue relating to both environmental protection and human health and these issues should be adequately addressed by the strategy going forward.

The Strategy includes an estimate that a land area of c. 120,000 ha will be needed to produce silage as an AD plant feedstock to reach the 5.7 TWh target. This land area will come from land already utilised for growing grass or under tillage and the land requirements could result in displacement of livestock or existing tillage production. The impact of this in terms of nutrient management will need to be carefully considered, particularly in the context of the Nitrates Directive, Water Framework Directive and the Habitats Directive.

Securing a reliable feedstock supply is fundamental to the viability of an AD project and obtaining a long-term supply contract from feedstock producers is critical. However, it is vital that activities associated with producing feedstocks don't themselves lead to an increase in farm intensification such as the increased use of chemical fertiliser which can ultimately impact on water quality. The use of cattle slurry (20% of all winter cattle slurry), which is currently an essential part of Nutrient Management Planning, could possibly also inadvertently result in an increased use of chemical fertiliser. There is also the risk of low intensity farmed land being converted to higher intensity grassland to supply several cuts of silage.

There is a risk that there will not be enough land banks available in the vicinity of the AD plant where digestate could be applied safely without negatively affecting water quality. Careful export of digestate from areas high in nutrients to areas that require additional nutrients would be critical to minimise the potential impact on water quality. Managing the digestate must be done in accordance with the GAP Regulations[10] (similar to chemical fertilisers) and all imports of slurry and exports of digestate to farmers must be readily available electronically to regulators i.e. Local Authorities, DAFM etc.

5. Alignment with key national plans and programmes

The National Biomethane Strategy should be integrated into national policy and as such should be aligned with other key national plans and programmes e.g., Common Agricultural Policy Strategic Plan, National Climate and Energy Plan, River Basin Management Plan, Bioeconomy Action Plan and the National Planning Framework. It is vital that the biomethane strategy is more strongly integrated with water, nature, biomass and land use policies, plans and regulations. In particular, it is critical that the full life cycle of the organic feedstock and digestates, from farm, to plant, and back to farm, are central to the mission statement, and any future regulatory processes that may be developed following the strategy. It would be useful to include a schematic within the Strategy showing the interlinkages and dependencies.

6. Strategic Environmental Assessment

The Strategy should consider, as appropriate, the requirements of the Strategic Environmental Assessment (SEA) Directive, its implementing regulations (S.I. 435 of 2004, as amended) and the Habitats Directive, early in the plan-preparation process. We also refer you to the EPA Good Practice

[10] S.I. No. 113/2022 - European Union (Good Agricultural Practice for Protection of Waters) Regulations 2022

Guidance for SEA Screening[11] to assist you in considering whether SEA is required for the Biomethane Strategy.

7. Implementation of the Strategy

We recommend DAFM and DECC consider the preparation and publication of an implementation plan, to set out a clear pathway for how the Strategy will be implemented. An implementation plan for the Strategy should clearly set out the actions, targets, timeframes and responsible owners for implementation. This would strengthen the overall Strategy and reduce the risk of poor implementation. Such an implementation plan should include provisions for annual reporting on implementation of the commitments made in the Strategy.

The Agency welcomes the proposed Biomethane Strategy as a contribution towards sectoral decarbonisation and considers that the matters outlined above in relation to feedstock assessment, licencing, regulation compliance, determination of greenhouse gas emissions, digestate management and water quality must be adequately considered to ensure the protection of the environment in relation to this strategy. The alignment of the Strategy with key national plans and programmes, the consideration of the requirement of SEA and the preparation and publication of an implementation plan will also ensure that the matters raised are appropriately addressed and environmental impacts negated.

If you have any queries or need further information in relation to this submission, please contact Anne Lucey, Circular Economy Programme, at a.lucey@epa.ie

Yours Sincerely,

David Flynn
Director
Office of Environmental Sustainability

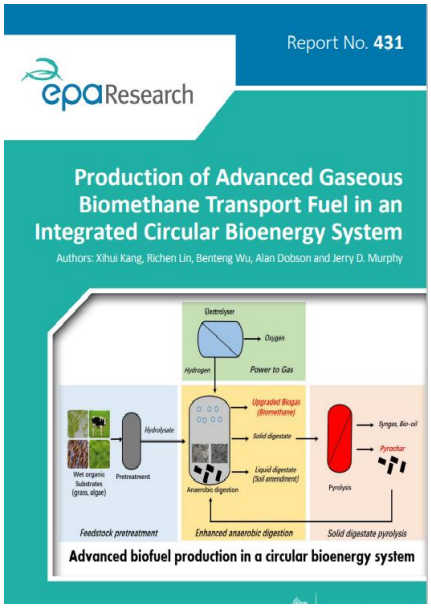
[11] https://www.epa.ie/publications/monitoring--assessment/assessment/strategic-environmental-assessment/sea-screening-good-practice-2021.php

Appendix I.

EPA Research Projects relevant to Biomethane Strategy

EPA Research Report 431: Production of Advanced Gaseous Biomethane Transport Fuel in an Integrated Circular Bioenergy System

Why research was funded:



Ireland's Climate Action Plan 2021 (CAP21) aims to reduce greenhouse gas (GHG) emissions by 51% by 2030 and to achieve net-zero emissions by 2050. The emissions reduction goal for transport is 42–50% by 2030. Transport is by far the largest source of energy-related CO2 emissions in Ireland, accounting for over 40% of such emissions in 2019; this sector is the least decarbonised in Ireland. This research suggests that the overall GHG emissions reduction in Ireland would be only 28% (against a target of 51%) by 2030, even if all measures from CAP21 were implemented. An integrated system that produces biomethane using biomass for transport was developed.

What does it tell us?

The findings highlight the need for a rapid transition from a linear fossil fuel-based economy to a bio-based economy that treats waste as a commodity; reduces GHG emissions, sequesters carbon and produces biofuels, biofertilisers and bioproducts. To meet Ireland's emissions targets the research proposes:

- A circular bioeconomy: developing a bioenergy and carbon capture and use (BECCU) system;
- Renewable energy and transport: using animal manure, grass silage and renewable hydrogen from renewable electricity in Ireland;
- Sustainable agriculture: to facilitate a reduced carbon footprint of farming, improved soil quality and increased crop yields.

How might the research be used?

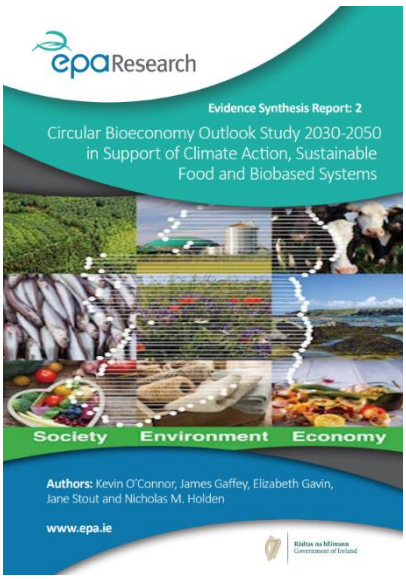
With the integration of biomass pyrolysis, the system can deliver advanced biofuels for transport or produce high-value biochemicals, biofertilisers and biochar while also treating a variety of organic wastes. Recent technological advancements such as increased efficiency in biochar production and the expected reduction in the cost of the hydrogen needed to run this biomass conversion system ensures a more economically viable and environmentally sustainable option for biomethane production. Such circular systems are widely recognised as having the potential to provide promising sound solutions to assist key policy and industry stakeholders in achieving the ambitious CAP21 targets.

Link to the Report: EPA Research Report 431 (published 2023)

Authors: Xihui Kang, Richen Lin, Benteng Wu, Alan Dobson and Jerry D. Murphy

EPA Fast Track to Policy: Evidence Synthesis Report 2: Circular Bioeconomy Outlook Study 2030–2050 in Support of Climate Action, Sustainable Food and Biobased Systems. (Published 2023)

Why research was funded:



The Climate Action Plan and the Food Vision 2030 identified the need to develop a Bioeconomy Action/Deployment Plan. This research was funded via the EPA's Fast-track to Policy Funding Scheme to address a need for an Evidence-based Study to develop understanding of actions that could have the biggest environmental, social and economic impact.

What does it tell us?

This report provides an outlook for Ireland's circular bioeconomy for the period 2030–2050, highlighting the potential to create economic, environmental, and social opportunities for new biobased innovations. It reports on bioeconomy best practice internationally to show how Ireland can benefit from others and tailor the learning to develop a bioeconomy fit for Ireland now and in the future. The circular bioeconomy has the potential to address major interrelated societal challenges, such as climate change, sustainable food production, biodiversity loss, and the production of biobased materials, biobased chemicals, and biobased energy, to help support a modern sustainable society.

Link to report:

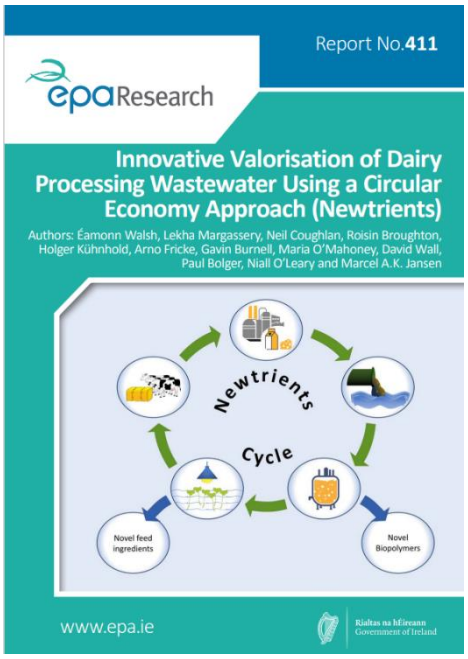
https://www.epa.ie/publications/research/evidence-synthesis-reports/evidence-synthesis-report-2-circular-bioeconomy-outlook-study-20302050-in-support-of-climate-action-sustainable-food-and-biobased-systems.php

Authors:

Kevin O'Connor, James Gaffey, Elizabeth Gavin, Jane Stout, and Nicholas M. Holden

EPA Research Report 411: *Innovative Valorisation of Dairy Processing Wastewater Using a Circular Economy Approach (Newtrients)*

Why research was funded:



There are pressing economic and environmental concerns regarding the imbalance between resource consumption and regeneration. Many valuable resources are currently lost through wasteful production processes, which generate waste streams where treatment, not recovery, is the primary focus. Circular economy models focus on closed-loop production patterns. Waste valorisation is an area in which there are tangible opportunities for resource recovery while lowering waste remediation costs, reducing greenhouse gas emissions and instigating innovative business models.

In Ireland, dairy processing wastewater represents a significant waste stream and a financial and technological challenge for the industry. The Newtrients project successfully demonstrated a paradigm shift in how wastewater is treated by developing a pioneering cascading system for valorisation of dairy wastewater, based on circular economy principles.

What does it tell us?

- Newtrients has successfully developed an integrated system coupling microbial-based technologies of anaerobic digestion and aerobic dynamic feeding with duckweed cultivation and facilitates a new closed-loop rural animal feedstock industry.
- The Newtrients cascading system:
  - (1) is resource efficient
  - (2) generates value-added and marketable products, and
  - (3) reduces dependence on finite fossil fuel resources
  - (4) treats dairy processing wastewater to discharge standard

How might the research be used?

Industries are in the process of developing zero-carbon, circular economy-based operational models. Yet, there is an urgent need to underpin policy-inspired initiatives with tangible, technical examples of how companies can achieve circularity.

The research has successfully demonstrated the potential for developing novel, practical and financially attractive solutions to pressing environmental challenges.

The cascading system results in the effective remediation of dairy wastewater while generating products that can strengthen the local economy and create intricate new relationships between farmers, dairy processors and innovative rural industries.

These solutions can inspire further development of circular economy approaches within commercial, policy and public arenas.

Link to the Report: Research_Report_411.pdf (epa.ie) (published 2022)

Authors: Éamonn Walsh, Lekha Margassery, Neil Coughlan, Roisin Broughton, Holger Kühnhold, Arno Fricke, Gavin Burnell, Maria O'Mahoney, David Wall, Paul Bolger, Niall O'Leary and Marcel A.K. Jansen

EPA Research report 440: Advances in Sustainable Nutrient Recovery for the Management of Nitrogen-rich Residue Streams (REFERT)

Why research was funded:

Across the EU, anthropogenic sources of nitrogen (N) threaten water and air quality. Agriculture is also a significant source of N and GHG emissions linked to climate change. N for crops is sourced from mineral fertilisers, livestock manures and anaerobic digestion digestates. Landfill leachates also generate N and GHG emissions. The EPA funded this research to identify cost-effective methods to mitigate the release of N and GHGs from ammoniacal streams.

What does it tell us?

This research identified:

- Cost-effective methods to mitigate the release of N and GHGs from ammoniacal streams.
- Suitable technological solutions and a business model demonstrating *inter alia:*
    - a scalable, modular treatment system;
    - showing that effluents could be treated to substantially reduce N, relative to current practices;
    - that solids could be conditioned to recover renewable energy.

How might the research be used?

A community-based "hub and spoke" business model was proposed to aggregate slurries from the fragmented farm supply chain. Introduction of a sustainable nutrient certification scheme was proposed to engage farmers in more sustainable slurry management consistent with new EU Common Agricultural Policy objectives and EU and national policy objectives related to agriculture, the environment, energy, climate change and the economy.

Link to the Report: EPA Research report 440 (published 2024)

Authors: Bart Bonsall, Donncha Haverty, Corine Nzeteu, Pádraic Ó hUiginn and Vincent O'Flaherty

Appendix II.

Ongoing EPA Research Projects relevant to Biomethane Strategy

EPA Research Project 2021-GCE-1037: *Towards a bio-based all-island economy: urban bio-waste conversion to carboxylates, nutrient products and renewable energy (UrBioPro)*

Abstract

Led by NUI Galway, University of Limerick and Queens University Belfast, the proposed UrBioPro project will work with the Irish Nutrient Sustainability Platform (INSP) to: develop a stakeholder-led transformative change model for the urban biowaste sustainability on the island; (ii) demonstrate the recovery of carboxylate platform chemicals, nutrients and biogas from urban biowaste and their valorisation to high value-added products as an appropriate technological cascade to enable system-wide change towards Irish urban biowaste sustainability; and (iii) develop an enhanced support capacity, through the, to develop and implement urban biowaste conversion projects in Irish cities and towns, north and south.

Challenges addressed by the proposed project include accessing international knowledge and best practice, alignment of local cognate interests, seeding collaborations and technology demonstration. By leveraging the membership of INSP, an international network and the technological capacity of NUIG, UL and QUB, we propose to work with industry partners and other key stakeholders to create new value chains based on urban biowaste in order to:

1. Identify and address impediments and barriers to urban biowaste conversion into safe, effective and valuable commercial bio-based products;
2. Develop our project support tools and plans by developing additional capacity within the universities and INSP including expertise in regulation, financing and public engagement that will facilitate and support the development and implementation of projects in Irish urban locations.
3. Leverage the scientific work of the last 5 years at NUIG and QUB to further develop and validate an innovative urban biowaste biorefinery technology configuration based on an enhanced anaerobic digestion core, with carboxylate and nutrient product recovery from source separated urban biowastes.
4. Evaluate the suitability and sustainability of blended municipal-solid-waste-compost and wastewater-recovered-struvite composite as a sustainable alternative to conventional chemical granular fertiliser for use in commercial forestry. Validate the novel fertiliser products as a safe, efficient and sustainable replacement for conventional granular/chemical fertilisers in conifer forest plantations.
5. Assess the economic, social and environmental impacts of the developed carboxylate, fertiliser and biogas products and processes using life-cycle assessment methodologies based on accepted and validated approaches, to include public acceptance.
6. Disseminate project findings to the scientific community through peer- reviewed publications and conference presentations; and to industry, policymakers, regulators and general public through the Irish Nutrient Sustainability Platform and other appropriate channels.

Project Team Leads: Vincent O'Flaherty (NUIG), John McGrath (QUB), David Styles (NUIG)

EPA Research Project 2021-GCE-1040: CircBioCityWaste: Converting urban waste streams into value-added products

Abstract

The CircBioCityWaste project is based on the key principle of a circular bioeconomy focusing on the sustainable, resource-efficient valorisation of three urban biowaste streams (anaerobically digested (AD) sludge from municipal and dairy processing and organic portion from black wastebin).

It aims to develop a first-of-a-kind integrated biorefinery concept in Ireland via cascading, using end-of-waste approach, CircBioCityWaste demonstrates a novel concept of new value chains from urban biowaste biomass sourcing to biobased agrochemicals (biostimulants and biofertiliser) for sustainable agriculture focusing on plant growth and soil health, and bioenergy as a sustainable source of clean energy.

This biorefinery concept will start with the collection of AD sludge from selected biowaste streams followed by developing pretreatment and extraction technologies/processes for recovering fine agrochemical (biostimulants). The residual waste will be combusted at low temperature using fluidised bed combustion to produce bioenergy. This process significantly reduces waste volume, destroys persistent organic pollutants and lead to mineralisation and concentration of phosphorus and other nutrients in the resultant ash, that will be explored as biofertilser. The impact of agrochemicals on growth of economically important crops will be assessed in pot trials. CircBioCityWaste will evaluate the sustainability of multiproduct biorefinery and assesses the economic, social and environmental impacts of the developed products/materials or processes using life-cycle assessment methodologies.

To effectively generate a comprehensive perspective on the opportunity of exploiting urban biowaste as a valuable resource, the CircBioCityWaste project has assembled a very strong interdisciplinary team from three Irish universities and expert/representatives/advisors from industry and local authorities, balanced across discipline, expertise and gender. Leveraging partners knowledge, resources and relationships, CircBioCityWaste will build on prior state-of-the art research, and aims at delivering a number of outcomes including:

1) Develop technologies to produce three agrochemicals from urban biowaste, opening up new possibilities for their production and marketing on large scale in Ireland;
2) Generation of clean bioenergy replacing fossil fuels; and
3) The de-carbonisation of urban biowaste management with, amongst others, a strong component of long-term carbon sequestration. The CircBioCityWaste project will advance the Irish waste management and recycling sector diversification which will deliver significant environmental, economic and societal benefits in high-quality jobs and economic growth in the region whilst in tandem supporting circular bioeconomy development.

Project Team Leads: Anushree Priyadarshini TUD, Marzena Kwapinsk UL

EPA Research Project 2021-GCE-1035: Identifying the Sources and Scale of Plastic in Compost Derived from Household and Commercial FoodWaste

Abstract

In a recent study for the EPA it was determined that the greatest risk to achieving a compost and digestate standard is contamination of the input feedstock. The results of the study will be most likely be used as a reference standard in the development of a future National End of Waste position for compost and digestate. If adopted, the standard will set limits for impurities (glass, plastic, metal, stones) based on size. Due to the practicalities of testing, the minimum measurable size of impurities in composts and digestates globally is 2mm. Since they cannot currently be economically and efficiently extracted or identified, any impurities smaller than 2mm present in compost and digestate will be released into the environment.

In order to best develop strategies to reduce contamination before it reaches the organic recycling system it is essential to know exactly what the sources of contamination are, e.g. specific packaging formats and their quantity. Furthermore, comparatively little is known about the plastic embedded in food waste. The best known of these specific waste streams are tea/coffee bags and the labels stuck onto fruit and vegetables. The plastic in many styles of tea and coffee bags and fruit labels are such that by the time they have been through composting or digestion processes they will have broken down into small (<2mm) microplastics particles and fibres. Technology is unable to remove such small particles and fibres and therefore once they enter the system as used tea and coffee bags or stuck to peelings, the embedded plastic will enter the environment 'hidden' in otherwise high quality composts and digestates.

Our project concept is as follows:

- Through widespread stakeholder engagement with the global organics industry, identify products which are known to be a visible and invisible contamination concern. Understand different strategies and policies to reduce feedstock contamination at a global level.
- Through nationwide biowaste composition analyses quantify the level of contamination in separately collected household and commercial food waste.
- Through the same composition analyses identify and quantify products within the food waste stream which are considered likely to contain embedded plastic e.g. tea and coffee bags, fruit labels, paper products and have these products independently analysed for plastic content.
- Through comprehensive market research develop an understanding of the quantities of invisible plastic embedded in products highlighted by the waste analyses.
- The market research will also seek to include direct contact with the relevant players in the supply chain and will gather views regarding the necessity of the product i.e. can it be avoided completely and if not what are the barriers and do alternatives products or systems exist and what are the barriers to their adoption.
- Using the information gathered and respecting any confidentiality, we will develop a series of proposals to remove invisible plastics in products which are targeted for organic recycling. The information relating to macro contamination will be shared with the Food Waste Recycling Group for use in any potential future organics quality communications campaign.

Project Team Lead: Percy Foster – Foster Environmental Ltd

EPA Research Project 2019-RE-LS4: Sustainable, biodegradable, compostable and recyclable plastics for packaging and end-of- life-management

Abstract

We will develop biodegradable polymer composites that are suitable for packaging applications, which are completely recyclable, compostable and biodegradable. Currently fossil based plastics such as LDPE and PET are widely used as packaging materials. End-of-life of such products has a profound adverse impact on the environment (6 Kg of CO2 per Kg of plastic burnt) and land fill implications (>100's of years life, methane emissions). The development, optimisation and citizen uptake of biodegradable polymer composites that are recyclable and compostable will drastically reduce negative environmental impacts. BioPost will focus on using commercially available ad novel biodegradable polymers and develop composites and polymer blends, to ensure the full functionality of packaging films and environmental sustainability. We will produce prototype packaging films on pilot scale and evaluate biodegradability (Industrial composting and Anaerobic digestion) and recyclability of these materials under standard industrial conditions.

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