



Creating a Rural Hub at the Centre of the Bioeconomy Ecosystem: Repurposing the Lisheen Mine

Professor Kevin O'Connor

UCD School of Biomolecular and Biomedical Science and the UCD Earth Institute and Director of BEACON, the Science Foundation Ireland Bioeconomy Research Centre



SUMMARY

Fossil fuels are a depleting resource and their use has harmful environmental impacts. We have come to depend on the products that come from fossil fuels - energy, dyes, glues and plastics to name but a few. But how can we reduce our dependence on environmentally harmful fossil fuels, while still enjoying the benefits of the products they give us at an affordable price? Professor Kevin O'Connor and his team believe the answer lies in the development of a vibrant bioeconomy.

Professor O'Connor's expertise, research and vision have positioned UCD and Ireland as a European leader in bioeconomy research. Developing from an innovation partnership with Glanbia and his work as part of a taskforce to look at the repurposing of the former Lisheen mine site in Tipperary, Kevin helped to create the Lisheen Bioeconomy Campus which has the potential to create over 1,800 jobs and return €75M to the local area. At the centre of the new bioeconomy hub at Lisheen is the €22M Horizon 2020 AgriChemWhey project led by Glanbia Ireland with UCD as a partner.

This bright new future for Lisheen and the communities in North Tipperary can be linked to the actions of Professor Kevin O'Connor, whose belief in the potential of a vibrant Irish bioeconomy, influenced politicians and Government agencies in Ireland and the European

Union to invest in the vision of Lisheen. His breakthrough ideas and unrelenting drive to see those ideas come to market were key to securing investment in a €17.8M SFI funded National research programme, €6M pilot facilities (EI) and ultimately the Glanbia biorefinery. The latter project, AgriChemWhey, is co-funded by the EU's Biobased Industries Joint Undertaking (BBIJU) and is the largest single award to an Irish partner under the EU's Horizon 2020 programme. The remarkable growth of the Lisheen campus and the recognised potential of Ireland's bioeconomy are testament to Kevin's energy, leadership and passion - and this is only the start.



Professor Kevin O'Connor

Contributing towards the development of the European bio-economy promoting rural growth, competitiveness and job creation.

RESEARCH DESCRIPTION

Professor O'Connor's research has centered on the development of bacteria to convert low value (often waste materials such as plastic) to higher value products such as biodegradable plastics and biodegradable glues. His research has resulted in more than 90 international peer-review articles, in excess of 200 conference contributions, eight filed patents, three technology licenses and two spin-out companies in the areas of biotechnology, biodegradable polymers, and biobased chemicals.

He has been involved in the European Bioeconomy Strategy since 2007 initially through the EU ad hoc advisory group for biobased products and in the last four years as Chairman of the Scientific Committee for the Biobased Industries Joint Undertaking (BBIJU). The BBIJU is a €4 billion European public-private partnership between the EU and the Bio-based Industries Consortium and involves industry and academics working together to seek increased investment in the development of a sustainable bio-based industry sector and a bioeconomy in Europe.

Professor O'Connor worked tirelessly over a number of years to address two major gaps to the development of the Irish Bioeconomy, firstly the lack of pilot scale facilities for bioeconomy that would allow research to move from the lab to industry and secondly, a research programme to support the development of the bioeconomy that would have a structuring effect for the sector.

The Irish agri-food industry employs over 170,000 people and has an annual turnover of €26 billion. Through his research expertise in the area of biotechnology and biobased products and his work with the BBIJU Professor O'Connor saw the opportunity for Ireland to develop a bio-economy ecosystem. He recognised that the sector had the potential to transform its business models through cutting edge research and development that would provide new opportunities for industry and act as a platform for economic development in Ireland.

Glanbia Plc was aware of Professor O'Connor's technological, scientific and European leadership position in the area of Biotechnology and bioeconomy. They approached him to transform a whey based side stream into a value added chemical. This industry collaboration was funded via an Enterprise Ireland Innovation Partnership and the resulting technological solution developed by Professor O'Connor was licensed to Glanbia in 2014. Through this initial collaboration Professor O'Connor and Glanbia formed a good working relationship and he successfully advised Glanbia to join the Biobased Industry consortium so that the company could help to shape the European bioeconomy strategy and associated funding calls.

Pictured (l-r) Jim Bergin, CEO, Glanbia Ireland; Phil Hogan, Commissioner for Agriculture and Rural Development; Philippe Mengal, Executive Director, BBIJU; Prof. Orla Feely, UCD Vice-President for Research, Innovation and Impact and Michael Creed TD, Minister for Agriculture, Food and the Marine (Jason Clarke Photography)





DESCRIPTION OF THE IMPACT

As a result of his leadership position in the bioeconomy in Europe, Professor O'Connor was invited by the owners of the Lisheen mine, Vedanta, in County Tipperary to join a taskforce to seek alternative uses of the mine site which closed in November 2015 with a loss of €50M to the local economy. The taskforce, which included representatives from Tipperary County Council, Vedanta, Enterprise Ireland and the IDA, together with Professor Kevin O'Connor recommended the development of the Lisheen site as a National Bioeconomy Campus with the aim of creating significant employment opportunities presented by the bioeconomy. Professor O'Connor saw the potential of the former Lisheen mine to become "the IFSC of the bioeconomy."

Science Foundation Ireland (SFI) and Enterprise Ireland (EI) provided multi-million Euro support for the development of a €17.8M SFI National Bioeconomy Research Centre (BEACON) and €6M pilot scale facilities (EI). The pilot scale facilities will be located at the Lisheen campus and it will enable industry, entrepreneurs and researchers to scale technologies that convert Ireland's natural resources to products of high value for use in a wide variety of sectors including food and feed ingredients, pharmaceuticals, natural chemicals and biodegradable plastics.

Professor O'Connor used his leadership position in the bioeconomy in Europe to position Ireland's approach as a blueprint for the Bioeconomy. He presented to Commissioner Phil Hogan (the European Commissioner for Agriculture and Rural Development) and his cabinet and also was a key advisor to the Taoiseach's Office on the development of a National Bioeconomy Policy Statement published in February 2018.

Following the licensing of the whey side stream technology by UCD to Glanbia, and subsequent successful scaling trials Glanbia were looking at various sites for the demonstration of the technology at industrial scale. At the same time the European Commission had funding calls seeking innovative new technologies that could add value to Europe's natural resources and create new business opportunities for rural communities. Professor O'Connor together with partners such as Tipperary county council, Glanbia and CMP saw the potential of the Lisheen to act as a hub in a model demonstrator region for Europe which could act as a blue print for innovation in the rural bioeconomy. Professor O'Connor, through his knowledge of European infrastructure and grant applications, helped Tipperary County Council and Glanbia to navigate the application process into Europe for the Model demonstration region for sustainable chemical production and a Flagship Biorefinery project.

In April 2018 €22 million in funding was awarded by the European Commission for a new bioeconomy research project led by Glanbia Ireland with UCD as a partner. The project, called AgriChemWhey is the first dairy industry project

awarded funding under the Bio-Based Industries Joint Undertaking (BBI JU) under the EU Horizon 2020 programme.

The project will explore the development of a new bio-refinery at Lisheen where there will be a world-first process for converting by-products from the dairy industry into high value bio-based products including biodegradable plastics. Growth in milk production is set to continue as a result of increasing demand for whey protein for human and animal nutrition globally and the removal of milk production quotas in the EU in 2015, underscoring the need for new technologies, products and markets to manage the associated waste streams. The AgriChemWhey project has the potential to be replicated in other regions across Europe, contributing towards the development of the European bio-economy promoting rural growth, competitiveness and job creation in line with European sustainability targets.

Partners in the AgriChemWhey project in addition to Glanbia Ireland and UCD include; AMBER (SFI Centre), School of Physics, Trinity College Dublin; Commercial Mushroom Producers Cooperative Society Ltd; PNO Consultants Limited, (UK); GIG Karasek GmbH, (Austria); Tipperary County Council; Teagasc, the Agriculture and Food Development Authority; Pole Greenwin, (Belgium); Katholieke Universiteit Leuven, (Belgium) and EW Biotech GmbH, (Germany).

Phil Hogan, EC Commissioner for Agriculture and Rural Development:

"AgriChemWhey is a highly innovative research project, which if successful, will serve as a flagship for Europe's growing bio-economy, contributing towards a more resource efficient European dairy sector, with enormous potential for replication in other areas across Europe, while also providing a boost to jobs and growth in Europe's rural economy."

Professor Orla Feely, Vice President for Research, Innovation and Impact:

"The funding for the AgriChemWhey project, will not only stimulate regional economic growth in County Tipperary, but will also enhance Ireland's position as a world leader in the development of the bioeconomy and provide the country with an opportunity to lead on issues central to achieving the UN SDGs."

REFERENCES

TAKING BIO-BASED FROM PROMISE TO MARKET: Measures to promote the market introduction of innovative bio-based products. A report from the Ad-hoc Advisory Group for Bio-based Products in the framework of the European Commission's Lead Market Initiative. November 3 2009. DOI: 10.2769/34881

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

Innovating for Sustainable Growth: A Bioeconomy for Europe. [SWD(2012) 11 final]. Brussels, 13.2.2012 COM (2012) 60 final. COM(2011) 615, Annex IV

National Policy Statement on the Bioeconomy. Feb 2018. ISBN - S130/07/43/0004

AgriChemWhey announcement press release, 26th April 2018:

[www.ucd.ie/innovation/newsevents/news/2018/april/
ucdpartneringinnewpartneringinnew30millionbio-refineryresearchprojectledbyglanbiaireland/](http://www.ucd.ie/innovation/newsevents/news/2018/april/ucdpartneringinnewpartneringinnew30millionbio-refineryresearchprojectledbyglanbiaireland/)