



Innovating for the Future: Bioeconomy In the UK and France

March 7, 2018

Key Points

Speakers :

- Lord LLEWELLYN, British Ambassador to France
- Hervé DURAND, Deputy director general for economic and environmental performance of enterprises, Ministry of Agriculture and Food, France
- Damien BONDUELLE, President, French think tank agridéés
- Lionel CLARKE, Co-president of the Synthetic Biotechnology Leadership Forum, Founder and Director, BionerG, UK
- Ian HOLMES, National Contact Point for the Bioeconomy, Innovate UK
- Paul HENDERSON, Head of Bioeconomy Strategy, Department for Business, Energy and Industrial Strategy (BEIS), UK
- Lee BENISTON, Head of Innovation, Biotechnology and Biological Sciences Research Council (BBSRC), UK
- Clémence MEYRUEY, Deputy head of office, Bioeconomy Office, General Directorate for the Economic and Environmental Performance of Enterprises, Ministry of Agriculture and Food, France
- Marc RICO, General Directorate for Business, Ministry of Economy, France
- Ian ARCHER, Technical Director, Industrial Biotechnology Innovation Centre, Edinburg, UK
- Joe ROSS, Director, Biorenewables Development Centre, UK
- Yvonne ARMITAGE, Bioeconomy specialist, Knowledge Transfer Network, Edinburg, UK
- Thierry STADLER, Vice President, Industry and agro-resources cluster (IAR cluster), France
- Christophe RUPP-DAHLEM, Director of Public Affairs, Roquette, France
- Marie-Cécile DAMAVE, Head of Innovation and Markets, think tank agridéés, France

agriD days

RÉFLÉCHIR • PARTAGER • AVANCER

- Daniel JOHNS, Deputy Director in charge of Agricultural Markets, Department for Environment, Food and Rural Affairs (DEFRA), UK
- Jonathan SCURLOCK, Chief Advisor, Renewable Energy and Climate Change, National Farmers Union (NFU), UK
- Olivier DAUGER, farmer, FNSEA (leading French farmers union) contact point for climate, air and energy, France
- Jean-Marc ONNO, pig breeder and biogas producer, France

TABLE OF CONTENTS

Table of contents	2
Strategies and policies: transitioning from fossil energies to renewable resources mobilizing biomass	3
United Kingdom Vision	3
France's Vision	4
Dimensions of the bioéconomie: food and agriculture lead	6
General, economic dimensions of the bioeconomy	6
Agricultural bioeconomy: source of solutions	6
Farmers, key stakeholders in the bioeconomy	6
Cross-cutting approaches and business initiatives for a stronger competitiveness	7
Cross-cutting skills, joint actions	7
Business initiatives for a stronger economic competitiveness	8
Bioeconomy: local innovation	8
Innovation in products, processes, organisations	8
Bioeconomy is crucially local	9
Conclusion: how to develop the bioeconomy?	10

agriD days

RÉFLÉCHIR • PARTAGER • AVANCER

This Franco-British event took place at a time when the British bioeconomy strategy is about to be announced and just a few days after the action plan of the French bioeconomy strategy was made public. Building on France's national bioeconomy strategy and on the work of the French think tank agridées, this Franco-British event presented strategies and policy priorities, industrial initiatives in innovation transfer, and the key role of farming within the bioeconomy, in each country. Lord LLEWELLYN, British Ambassador to France, welcomed this event in his residence.

The main key words of this reflection day were “cross-cutting”, “business”, “innovation”, “competitiveness”, and “local”. All speakers, whether in the political, economic, or scientific arenas, included the bioeconomy in cross-cutting, collective, entrepreneurial initiatives of research, development and innovation, to simultaneously address the challenges of economic competitiveness and reduced dependence on fossil energies.

STRATEGIES AND POLICIES: TRANSITIONING FROM FOSSIL ENERGIES TO RENEWABLE RESOURCES MOBILIZING BIOMASS

United Kingdom Vision

The UK Bioeconomy Strategy will be announced shortly, as part of a wider policy landscape where the main priorities are energy, the environment, waste and resources, and clean growth, as Paul HENDERSON indicated. In October 2017, the United Kingdom adopted **Clean Growth Strategy** that targets Government fundings of £2.5 billion mainly to accelerate the shift to low carbon transport (33%) and deliver clean, smart, and flexible power (25%).

In November 2017, the United Kingdom also adopted an **Industrial Strategy**¹ based on ideas (innovation is central to the economy), people (maintaining workers jobs and earning power), upgrading infrastructure (all over the UK), a favourable environment to start and grow business, and places. The main grand challenges identified in this industrial strategy are artificial intelligence and data economy (including synthetic biology and industrial biotechnology, which are key dimensions of the bioeconomy), clean growth (in particular with biobased chemistry, and biobased materials, which belong to the bioeconomy), the future of mobility, and the ageing society.

¹ Industrial Strategy: building a Britain fit for the future <https://www.gov.uk/government/publications/industrial-strategy-building-a-britain-fit-for-the-future>

agriD days

RÉFLÉCHIR • PARTAGER • AVANCER

In January 2018, the United Kingdom released a **25 Year Environment Plan**², which focuses principally on: using and managing land sustainably, recovering nature and enhancing the beauty of landscapes, connecting people with the environment to improve health and wellbeing, increasing resource efficiency and reducing pollution and waste, and protecting and improving the global environment.

In this context, Paul HENDERSON explained that the UK **Bioeconomy Strategy**'s main goal will be to « remove our reliance on finite fossil resources whilst increasing productivity across all our towns, cities and communities ». Under the British vision, the bioeconomy represents the economic potential of harnessing the power of bioscience using renewable biological resources to replace fossil resources in innovative products, processes and services. In the UK, bioeconomy is considered as an opportunity for the country to become a global leader in developing, manufacturing, using and exporting bio-based solutions, strengthening the UK economy and moving towards a low carbon future. The strategy will also aim to make the most of the feedstocks available.

The UK strategy is based on an ambitious forecast in the bioeconomy growth from 2017 to 2022, when global biorefineries market is set to grow from £350 billion to £550 billion, global market for bioplastics is expected to grow from £13 billion to £33 billion, and global market for agricultural biotechnology is set to grow from £22 billion to £40 billion.

France's Vision

The French national bioeconomy strategy was launched in January 2017, and an **action plan**³ **was just released**. Clémence MERUEY detailed the latter. The Ministry of agriculture and food has the lead in this inter-ministerial strategy, which is more focused on mobilising resources than the UK strategy, where the Department for Business, Energy and Industrial Strategy (BEIS) has the lead.

The five priorities of the action plan are the following: improving knowledge (and more specifically on the available resources); promoting the bioeconomy and its products to the public (notably with a European « biobased product » label); creating conditions to balance supply and demand (for example through the public procurement of biobased products, and supporting innovation in the French funding Programme Investissement d'Avenir - PIA⁴ - or in public-private partnerships favoured by the Bio-Based Industries Consortium - BBI⁵); sustainably producing,

² A Green Future : Our 25 Year Plan to Improve the Environment

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/673203/25-year-environment-plan.pdf

³ Une stratégie bioéconomie pour la France - Plan d'action 2018-2020 <http://agriculture.gouv.fr/une-strategie-bioeconomie-pour-la-france-plan-daction-2018-2020>

⁴ <http://www.caissedesdepots.fr/investissements-davenir>

⁵ <https://www.bbi-europe.eu/>

mobilising and manufacturing bioresources; lifting barriers and mobilising funding (for example incentivising biogas projects).

Marc RICO indicated that the French bioeconomy strategy is part of a wider framework of France's industrial strategy named "New Industrial France" (in French, "**La Nouvelle France industrielle**"⁶) that is managed by the Ministry of Economy and Finance. It aims to succeed in reindustrialise the country modernising industry equipments and supporting the digital transformation of business models. The data economy, smart devices, digital trust, smart food, new resources, sustainable cities, ecological mobility, future transport and future medicine are the nine solutions identified in "La Nouvelle France industrielle". Plant-based chemistry is part of the « new resources » priority, aiming to develop more efficient processes with emerging new materials, using renewable resources, monetizing waste and « circular economy » in general.

The General Directorate for Business (Direction Générale des Entreprises - DGE) in the Ministry of Economy and Finance is engaged in the French Bioeconomy strategy. DGE has set up ten Strategic Industry Committees (in French, « **Comités Stratégiques de Filières** » - CSF), that represent strategic industries in France to identify the key challenges and reciprocal Government and Industry commitments, to recommend concrete actions and monitor their implementation⁷. Marc RICO underlined that one of the CSF focuses on chemistry and materials. One of its actions is to clarify the potential of plant-based chemistry by 2030 identifying technology regulation, and economic drivers making its development possible.

The Ministry of Economy and Finance is involved in different ways in developing the bioeconomy. A concrete achievement is the incentive to use bioplastic bags, according to Marc RICO. The law on Energy Transition for Green Growth imposes the ban on single use plastic bags, and the decree ending disposable plastic bags⁸ was published on March 31, 2016. Since January 1, 2017, for bags other than carrier bags, such as bags for fresh products, bulk products or any other product packed at the point of sale, only bags that are **biobased** (including a minimum required content in plant material that is rising over time) and **compostable** in domestic compost can be used.

Finally, the Ministry of Economy and Finance made a study comparing support to biobased products through public procurement⁹ in 8 different countries, benchmarking the U.S. "BiopREFERRED" mechanism. Industries identified in priority include paints and detergents. This is consistent with the action plan of the French national bioeconomy strategy.

⁶ <https://www.economie.gouv.fr/nouvelle-france-industrielle/accueil>

⁷ <https://www.entreprises.gouv.fr/conseil-national-industrie/comites-strategiques-filiere>

⁸ <https://www.economie.gouv.fr/dgccrf/sacs-en-plastique-jetables-cest-fini> et <https://www.ecologique-solaire.gouv.fr/fin-des-sacs-plastique>

⁹ https://www.entreprises.gouv.fr/files/files/directions_services/secteurs-professionnels/industrie/chimie/produits-biosources.pdf

DIMENSIONS OF THE BIOÉCONOMY: FOOD AND AGRICULTURE LEAD

Economic dimensions of the bioeconomy

France and the UK are leaders in the bioeconomy in Europe, with a turnover of €300 and €250 billion, respectively. Other European leaders include Germany (€380 billion) and Italy (€260 billion). Bioeconomy totals 1.9 billion jobs in France and 1 million jobs in the UK.

In each country, **the food industry and agriculture account for major parts of the bioeconomy**. Food industry is the leader with 56% of the turnover in France and 39% in the UK, while agriculture accounts for 24% in France and 19% in the UK.

Christophe RUPP-DAHLEM therefore underlined the **importance of the food industry in the bioeconomy**, which is sometimes neglected for the benefit of non-food industries and new biomass conversion pathways. Hence it is necessary to articulate biomass uses among old and new, food and non-food industries. There innovation non-food uses, but not only. Roquette is embarking in the development of innovative plant-based proteins for food use, e.g. including pea proteins.

Agricultural bioeconomy: source of solutions

According to Hervé DURAND, agriculture becomes a source of solutions to address a diversity of challenges while producing more with less. For Thierry STADLER, **sustainable resource management**, with a resilient agriculture, belongs to the bioeconomy. This explains why the IAR French technology cluster IAR brings together all stakeholders of the value chain including those in farm production, to initiate projects in the bioeconomy. British and French speakers shared the objective to make farm production more sustainable.

Olivier DAUGER insisted on the **positive externalities** of agriculture and forestry: these are the only industries able to capture greenhouse gases, while all other industries can only emit this gases. Thus, agriculture brings solutions, more specifically to address the challenges of climate change, if producing more with less. Olivier DAUGER recalled that **farmers contribute to the energy mix**, as they supply biofuels, solar electricity, and biogas production, among others.

In this agriDay, stakeholders involved in farm production are willing to be involved in the bioeconomy as long as it provides income opportunities for them.

Farmers, key stakeholders in the bioeconomy

Farmers have three roles in the bioeconomy:

- They **store** carbon in soils, plants, animals, thanks to photosynthesis, which is a real carbon pump, as Olivier DAUGER recalled.
- They **supply** biobased products (animal and plant productions for the food industry, the plant-based chemistry, bioenergy, biomaterials). These are not low-value, but high quality feedstocks that need to be paid as such, Olivier DAUGER insisted.
- They **value** biobased products (digestates from biogas plants, bioplastics composts, biocontrol products). For Jean-Marc ONNO, digestates are high-quality organic fertilizers substituting for synthetic chemistry products for fertilizing soils.

For Jonathan SCURLOCK, the National Farmers Union (NFU) has been involved in the work of the European farmers and cooperatives organisation (COPA-COGECA) on the bioeconomy, contributing to the stakeholders manifesto. This opportunity becomes a reality if units of a certain **scale** can be developed. In the UK, large biogas units are close to be competitive.

Daniel JOHNS presented the directions of the future British farm policy that will succeed the Common Agricultural Policy after the UK exits the European Union. The principle of this new policy would be to provide **public funding for the public goods** farmers bring to the society in general (such as Payments for Environmental Services), and not to provide them payments per hectare.

CROSS-CUTTING APPROACHES AND BUSINESS INITIATIVES FOR A STRONGER COMPETITIVENESS

Cross-cutting skills, joint actions

Bioeconomy requires numerous skills, diverse types of stakeholders, to address multiple challenges (sustainable farm and food production, energy, waste, carbon footprint, economic growth...). For Lionel CLARKE, bioeconomy is **multidimensional**. Ian HOLMES recalled that the bioeconomy is not a sector but **cross-cutting** and **cross-sectorial**. For Lee BENISTON, it is **interdisciplinary**.

agriD days

RÉFLÉCHIR • PARTAGER • AVANCER

Paul HENDERSON and Clémence MERUEY insisted on the fact that the French and British strategies derive from **joint initiatives** of several Ministries, stakeholders (Research and Industry), and representatives of the society.

Thierry STADLER insisted on the need for **diverse skills**, as the bioeconomy brings together chemistry and biology. This results in new jobs in industrial biotechnology and synthetic biology in particular, in the French cluster “Industrie et Agro-Ressources” (IAR).

Business initiatives for a stronger economic competitiveness

Hervé DURAND insisted on **businesses involvement** in the bioeconomy to address collective challenges including energy and ecological transition and climate change. For him, the bioeconomy makes it possible to gain new opportunities of economic growth. It belongs to the market economy that targets profitable benefits. Economic development is a key objective of the French national bioeconomy strategy, highlighting that the bioeconomy is based on local jobs that cannot be relocated.

Some farmers engage in the bioeconomy as business leaders, looking for economic, environmental, and societal value. There is a growing number of biogas projects. Jean-Marc ONNO is a biogas pioneer, and has adopted a business approach for 15 year years, and currently representing 27 direct jobs. It includes biogas production from animal waste, urban waste and industry vegetables, from which electricity is produced for his own farm as well as those of his farmer neighbours, as well as organic mushroom and spirulina production.

BIOECONOMY: LOCAL INNOVATION

Innovation in products, processes, organisations

Several British speakers insisted on the key role of research, development and innovation in **synthetic biology**¹⁰ to develop the bioeconomy. Lionel CLARKE presented the British policy framework including the 2012 roadmap (UK Synthetic Biology Roadmap) that set up several interdisciplinary research hubs in synthetic biology in the UK, thanks to public and private investments. Synthetic biology is an emerging industry, for Lee BENISTON.

¹⁰ [http://www.inra.fr/Chercheurs-etudiants/Economie-et-sciences-sociales/Tous-les-dossiers/biologie-de-synthese-et-sciences-sociales/Definir-la-biologie-de-synthese-un-premier-enjeu-de-debat/\(key\)/2](http://www.inra.fr/Chercheurs-etudiants/Economie-et-sciences-sociales/Tous-les-dossiers/biologie-de-synthese-et-sciences-sociales/Definir-la-biologie-de-synthese-un-premier-enjeu-de-debat/(key)/2)

Ian HOLMES presented the role of the **AgriTech centres** that were detailed at the agriDay of October 2016 “Future of Farming: Big data and precision agriculture”¹¹.

Lee BENISTON underlined that the bioeconomy¹², that mobilises all the power of biology, requires **ecosystems of innovation** be in place for research projects on food, chemicals and materials, energy production, health, environmental protection, enabling technologies, and a better understanding of successful bioeconomies.

Christophe RUPP-DAHLEM insisted on the high share of the Roquette group’s (a starch industry leader) turnover dedicated to research and development (2 to 3%), above average in the food industry. He mentioned two innovation priorities: the development of **innovative plant-based proteins for the food market and biopolymers as sustainable solutions for biobased and biodegradable bioplastics**. They are still a niche in the global market for polymers, which is expected to increase from 240 million tonnes in 2010 to 366 million tonnes in 2030. At the same time, the growth of biopolymers market is anticipated to be sharper, from 1 to 7 million tonnes.

Bioeconomy is crucially local

For Hervé DURAND, bioeconomy starts locally.

Yvonne ARMITAGE highlighted the ambitious objective of UK industrial strategy to strengthen R&D spendings from 1.7 to 2.4% by 2027. Innovate UK is the British innovation agency, funding innovation transfer programmes, often through public-private partnerships, and involving **regional and national innovation stakeholders**.

The Biorenewables Development Centre is an R&D centre of the University of York that works at the interface of Academia and the industry in innovation transfer projects. Joe ROSS insisted on the local community basis of this centre, and presented a recent study mapping bioeconomy stakeholders of the **North of England** involved in mobilising available feedstocks (waste, losses, food industry coproducts), processing in biorefineries (producing chemicals and materials for example). Joe ROSS also described **THYME** (Teeside, Hull and York - Mobilising Bioeconomy Knowledge Exchange), a regional project connecting stakeholders of the bioeconomy in a dynamic innovation ecosystem.

The Industrial Biotechnology Innovation Centre represented by Ian ARCHER was set up by the Government of **Scotland** and concentrates on this region. It put together a mapping model of feedstocks (such as municipal waste, food by-products and agriculture residues) and chemicals

¹¹ <https://www.agridees.com/publication/points-cles-de-lagriday-fermes-du-futur-big-data-et-agriculture-de-precision/>

¹² <https://www.bbsrc.ac.uk/research/briefings/bioeconomy/>

of interest. For example, next-generation biofuels are processed from whiskey industry by-products¹³.

For Thierry STADLER, both national and regional bioeconomy strategies are necessary. They can be part of the 2014-2020 European **Smart Specialisation Strategy** for research and d'innovation¹⁴.

Industrial demonstrators are located in the regions of the IAR bioeconomy cluster in France. They are dedicated to plant-based proteins (Protéines France project aiming to formulate substitutes for meat), plant-based oils (PIVERT project), and advanced biofuels (BioTFuel and Futurol projects) in particular.

CONCLUSION: HOW TO DEVELOP THE BIOECONOMY?

In the end, many speakers agreed on the **necessary clarification and improved consistency among the national, regional, and international policies and strategies**, both in France and in the UK, in order for the bioeconomy to develop. Some regret there are too many. Feedstock production and processing stakeholders called for **more stable regulations and policies**, for better mid-term visibility and invest in manufacturing tools with more confidence.

Developing the bioeconomy is only possible if supply and demand are stimulated. On the supply side, feedstock quality can be improved with sustainable practices, smart production, a better mapping of available biomass, payments for environmental services, encouraging bioenergy production, stimulating research, development and innovation transfer. Stimulating demand includes engaging a dialogue with representatives of the civil society, training and informing on the realities of the bioeconomy, developing the use of bioplastics and of plant-based proteins adapted to consumer demand, and stimulating demand for bioenergies in public procurement.

After all, the bioeconomy cannot be a reality with no economic and operational vision, and therefore address food security, climate and energy challenges.

Debates can be found on Twitter with #agriday #bioéconomie #bioeconomy @SAFThinkTank

Marie-Cécile Damave
Responsable innovations et marchés

¹³ <http://www.celtic-renewables.com/>

¹⁴ <http://www.europe-en-france.gouv.fr/Centre-de-ressources/Actualites/La-S3-c-est-quoi>

agriDⁱays

RÉFLÉCHIR • PARTAGER • AVANCER

agriDées
RÉFLÉCHIR • PARTAGER • AVANCER