

BioAdvantage
Europe



POLICY PAPER

How the bioeconomy
can contribute to

Jobs and Innovation in Europe

BioAdvantage Europe's mission

The bioeconomy is vital for Europe today. It employs around 18 million people, around 9% of the total workforce; and adds €600 billion of economic value per year, equal to the GDP of Switzerland. It spans agriculture, aquaculture, forestry, and all the products and waste streams that arise from these activities. This includes food and feed, forest and crop residues, sewage and manure, bioenergy, biofuels and bio-based chemicals and materials. The bioeconomy has enormous potential to shape Europe's future, by accelerating a green recovery and contributing to achieving the goals of the European Green Deal.

BioAdvantage Europe is an initiative founded by leading businesses across the bioeconomy to create a unified and constructive dialogue with EU policymakers on how to achieve this potential. This is the third in a series of policy papers being published in 2020, highlighting how the bioeconomy can contribute to: 1) achieving the vision of the European Green Deal and supporting a post-COVID recovery; 2) Europe's biodiversity and climate ambitions; and 3) the jobs and innovation agenda for Europe.

Introduction

The Covid-19 crisis has had a major impact on Europe's labour market, adding another percentage point to pre-Covid unemployment levels and putting many more livelihoods at risk. Nearly 16 million people in the EU-27 are now without jobs, up by 1.8m compared to 2019,¹ and this number is likely to increase as furlough schemes and other social schemes taper off.

Yet this crisis has also stimulated action, demonstrating our capacity to pivot at pace and move towards a new paradigm – low-carbon, efficient, local, and inclusive. The disruptive wave of technological innovations across energy, materials, agriculture, food and information is accelerating; and with the European budget for 2021-2027 totalling nearly €1.8 trillion, we have a huge opportunity to scale cross-industry solutions that work for climate, for biodiversity, for the economy, and for people.

How the bioeconomy can support the jobs and innovation agenda for economic growth and recovery in Europe

The bioeconomy, a sector defined by its relationship with the natural world, is a source of great innovation. However, to realise its full potential and create new, green jobs and future-fit growth in Europe, it requires an integrated, coherent and clear policy framework. This paper highlights four specific areas where bioeconomy solutions can drive innovation and job creation, followed by a series of policy measures that would enable their deployment at scale.

The bioeconomy can:

- 1 Create jobs and boost livelihoods** in forestry, agriculture, waste, chemicals, materials, construction and other sectors
- 2 Support a just transition** by re-invigorating rural areas and regions heavily dependent on legacy industries
- 3 Strengthen Europe's global competitiveness** through innovation across all bio-based sectors
- 4 Contribute to achieving a circular economy** by improving waste management and deriving more value from biowaste





Create jobs and boost livelihoods

in forestry, agriculture, waste, chemicals, materials, construction, and other sectors

Europe will need to transform its primary sectors to address the twin challenges of climate change and biodiversity loss. Greater emphasis on sustainable farming practices and domestic production of bio-based feedstocks (from crops, waste and residues) can reduce import dependency, increase job creation and provide new income opportunities in forestry, agriculture and waste management.²

The bioeconomy can also create high-value research and innovation jobs in sectors including bio-based chemicals and materials. By 2030, the industrial biotechnology sector in Europe is projected to employ 900k people, roughly 400k more than in 2016, driven primarily by the bio-based chemicals, bioplastics and biofuels sectors. With policy incentives that enable bio-based industries to compete more fairly with fossil equivalents, total employment could reach 1.5 million. In bio-based chemicals alone, employment can grow from 5% currently to between 10% and 15% of all jobs in the chemical and pharmaceutical sector by 2030, even as the conventional parts of the sector remain stable.³

Under the title of environmental services employmentⁱ, the value-added per full time equivalent is highest for energy and water supply, sewerage, waste management and remediation activities, generating on average €82,400 per full-time job.⁴ A thriving bioeconomy can drive additional employment in these essential activities, and support regions in transition where demand for high-value, well-remunerated jobs is increasing.

“By adapting our business model to address hidden costs and respond to higher standards, we can create new business opportunities, jobs and competitive advantage in the European bioeconomy.”

Svein Tore Holsether, President and CEO, Yara

Existing business-led solutions

- 1 Expanding the supply chain:** Stora Enso's Oulu Mill in northern Finland produces renewable packaging materials from forest thinnings, pulpwood and wood chips. As a result of increased demand for their products, the supply chain has been expanded and created 100 new jobs in the area, in wood purchase, harvesting, transportation and forestry work. Revenues have increased by approximately €20 million.
- 2 Circular economy employment:** Suez is recycling PET plastics into food packaging, to the same quality as virgin PET, thereby reducing the use of fossil material inputs, water and energy consumption. The plant, established in Limay, France, produces 30,000 tonnes of recycled PET pellets and provides stable employment for 80 people in the area. If the negative externalities of plastic waste are better accounted for, solutions like this can become the norm.
- 3 Indirect employment effects:** Pannonia Ethanol's biorefinery in Dunaföldvár, Hungary employs over 150 people, largely from the surrounding area. Indirectly, the plant is estimated to create ten times as many jobs in the region.⁵



ⁱ Environmental services employment encompasses activities and products that serve either of two purposes: 'environmental protection' — that is, preventing, reducing and eliminating pollution or any other degradation of the environment or 'resource management' — that is, preserving natural resources and safeguarding them against depletion.



Support the just transition

by re-invigorating rural areas and regions heavily dependent on legacy industries

An innovative bioeconomy can put farmers and rural communities once again at the forefront of innovation and progress. A bioeconomy that fosters green jobs and develops rural communities can play a significant role in delivering the EU's Farm to Fork strategy, offering social and economic benefits in agricultural areas that could otherwise be 'left behind'.

The opportunity is especially significant for Eastern and Southwestern Europe, where agricultural productivity in some countries lags behind the European average by up to 40%.⁶ Investing in skills, technology and best-practice implementation in these rural areas can increase feedstock availability, and create new and better livelihoods.⁷ These same investments can also be used to improve the sustainability of the agricultural sector both in terms of its climate impacts and its effects on biodiversity and soil health, by promoting regenerative agricultural approaches and lower-impact techniques such as precision farming.

In countries that are affected by the phaseout of coal and which have large areas of agricultural land at risk,⁸ boosting the bioeconomy can contribute to offsetting the negative social impacts of the energy transition.⁹ In Central and Eastern Europe, where coal regions in transition occupy over 4,600 km² of land (equivalent to half the size of Cyprus),¹⁰ there is potential for the creation of low-carbon innovation clusters and bioeconomy pilot programmes, which can leverage existing infrastructure and abandoned land, and provide high-value jobs in both agriculture and industry.¹¹

“Bioeconomy innovation can bring high skilled jobs to countries in Eastern Europe, transform their economies and reverse the demographic crisis many of the countries in the East have suffered”

Julian Popov, Former Bulgarian Minister of Environment and Water, Fellow at European Climate Foundation

Existing business-led solutions

1 Collaboration for rural growth. Clariant's plant in Southwest Romania, which produces cellulosic ethanol derived from agricultural residues, such as straw, is being supported by an EU-funded project, Lignoflag, to establish collaboration across the entire value chain – from co-products utilization and valorisation (e.g. vinasse as a fertilizer) to advanced bio-ethanol production and product and technology distribution. It will create new green jobs both directly and indirectly, especially in rural areas.

2 Farming of the Future: Lantmännen is using an 880 acre arable farm to test and demonstrate the best precision farming techniques, which can increase yields by over 40% for wheat when combined with digitalisation, optimal management and plant breeding.¹² As well as using technology to improve productivity, the farm is making a contribution to strengthening biodiversity by creating 'lark plots' – undrilled patches in arable fields where skylarks can land and forage.¹³ The techniques being demonstrated create more economic and environmental value than current approaches,

helping to secure and grow agricultural livelihoods into the future.

3 Rewarding environmental practices: Avril has created OleoZE, a digital marketplace that certifies and traces sustainably cultivated sunflower and rapeseeds, rewarding farmers with above-market-prices for efforts to reduce greenhouse gas emissions and store carbon in the soil on their farms.





Strengthen Europe's global competitiveness

through innovation across all bio-based sectors

Innovation in the bioeconomy creates spill-over benefits for other sectors and can boost international competitiveness. Many European-made, high-value, high-technology bio-based products are already achieving commercial success¹⁴ and more are nearing market-readiness.¹⁵ These have qualities that make them attractive for use in sectors as diverse as automotive, construction, medicine and personal care.

With global demand for innovative bio-based products, developing leadership in these sectors creates export markets for Europe that play to its strengths in science, technology, and manufacturing,^{16,17} and have significant revenue potential. For example, a 1% increase in the share of European wood-based plastics (generated from side-streams) in the global plastics market could generate additional revenue in the scale of €7 to €18 billion.¹⁸ At the same time as creating new opportunities to export high-value products, bio-based products reduce Europe's dependence on fossil fuel and enhance the continent's resource security and resilience.

Innovation in bio-based materials and chemicals also supports Europe's environmental goals. Using wood as a construction material instead of carbon-intensive materials like steel and cement can avoid up to 2 tonnes of CO₂ emissions per tonne of wood products used.¹⁹ And taking advantage of by-products such as high-protein animal feedstocks from bioethanol production can reduce the need for imports.

“We are going to adopt a more assertive attitude with new standards, not just for the competitiveness of our own companies, but to protect our environmental integrity.”

Diederik Samsom, Head of Cabinet of EVP Frans Timmermans, European Commission

Existing business-led solutions

- 1 Rapid plastic recycling enzymes:** Novozymes is working to produce a newly-discovered enzyme at scale that can make plastic fully recyclable. The enzyme breaks down PET plastic (found in plastic bottles) into chemical building blocks that can then be used to make new products. The solution has significant commercial potential, given the enzymes costs only 4% of the cost of virgin plastic made from oil.²⁰
- 2 Replacing fish with algae:** fish are essential to our society, but they are under intense pressure. Veramaris, a joint venture by DSM and Evonik, has developed an algae-based alternative to fish oil, which provides an alternative for the animal feed industry to ensure humans can maintain their diet with essential omega-3 fatty acids while reducing use of marine resources. One metric tonne of Veramaris' algal oil is the feed equivalent of oil from 60 tonnes of wild-caught fish.
- 3 Extracting value from waste:** Yara and Veolia are developing new circular agriculture models by recycling nutrients - from urban, agricultural and industrial waste - into high quality fertilizers through

“I am a true believer that sustainability and profitability go hand in hand together. If you do not transform your company to become truly sustainable, you will soon not be relevant. As such, stronger European standards and pressure on sustainability will create stronger European companies.”

Henrik Henriksson, President and CEO, Scania

existing production processes, and locally through recovery, processing and distribution. Their goal is to showcase how nutrient and chemical flows can be optimised through cross-sector industrial symbiosis.



Contribute to achieving a circular economy by improving waste management and deriving more value from biowaste

Generation of excessive waste poses major societal, health and environmental challenges in Europe. However, if well-managed and in the right policy conditions, it can be utilised as a source of innovation and growth, enabling the transition to circularity.

The bioeconomy can offer significant contributions towards Europe's circular economy, and provide additional revenue of up to €15 billion in rural areas by 2030.²¹ With improved valorisation, and by promoting the cascading use of biomass until the end of its life, biowaste and residues from farms and forests, from cities, and from the food sector can be transformed into a range of bio-based products. These include high-value materials and chemicals such as nanocellulose, carbon nanofibres, and advanced textiles, to mid-value chemicals and fertilisers, to lower-value biofuels, and eventually heat and power.²²

New biorefinery concepts and bio-industrial solutions are driving innovation in waste, enabling greater extraction and recovery of high value-added compounds from agricultural residues, and urban and industrial wastewater sludge.²³ Given they still remain largely untapped resources, there is potential to produce sustainable materials, chemicals and biofuels without increasing competition for other bio-based feedstocks.

“The bioeconomy provides great, often unrecognised, potential to contribute to reducing greenhouse gas emissions. There is sufficient biomass available to support the large scale rollout of bio materials and chemicals, for example, we expect that the global waste and residue availability will grow to over 35 million tonnes by 2030.”

Peter Vanacker, President and CEO, Neste Corporation

Existing business-led solutions

- 1 Industrial innovation clusters:** The Kalundborg Symbiosis Centre in Denmark – a cross-industry, bio-based cluster exchanging water, energy, and raw materials – has proven the economic and environmental benefits of industrial collaboration. A lifecycle analysis showed a joint saving of more than €24 million per annum and the creation of socio-economic benefits worth an additional €14 million per annum.²⁴ Novozymes is one of eleven partners.
- 2 Sustainable aviation fuel from waste:** Neste produces sustainable aviation fuel from waste and residues, proven to cut emissions by 80%. Current capacity is 129 million litres per annum, however, with the support of Shell Aviation and other partners, Neste expect to increase this to 1.9 billion litres by 2023.
- 3 Vine to vehicle:** Scania and Citram Aquitaine, a French transport operator, are collaborating to test a bus service running on ED95 (95% ethanol fuel) made of residues from the wine-making process. There is

enough grape production in the region to produce bioethanol to supply 1,000 vehicles locally – a climate neutral fuel that also creates rural job opportunities.²⁵



Policy asks

Activating these four areas and enabling solutions across the bioeconomy value chain to contribute to Europe's jobs and innovation agenda requires an integrated, coherent and clear policy framework, and one that incentivises the use of sustainable, bio-based and circular solutions. We encourage policymakers to consider a range of measures to stimulate innovation and drive job creation in the bioeconomy, split across four areas of policymaking:

Create the right incentives for rapid growth of sustainable products and practices

- 1** Create market signals that reflect the benefits of bio-based solutions and increase their adoption. For example, apply robust and predictable carbon pricing instruments to all bio-based products, so that renewable carbon content, derived from sustainable biomass rather than fossil sources, is valued preferentially in order to safeguard and strengthen investments in low-carbon technologies. And in the upcoming Sustainable Product Initiative, penalise products that fail to meet sustainability criteria to incentivise bio-based solutions that do meet them.
- 2** Ensure that demand-side policies are matched with supply-side policies to support bio-based solutions and markets with large potential for growth, and minimise cost increases for industries in transition. For example, in sectors such as sustainable aviation fuels and advanced biofuels, where volumes are currently small and markets immature, help reduce the cost of fuel production with subsidies or tax breaks, in tandem with existing blending mandates for buyers and disincentives for fossil options.
- 3** Work with farmers and agribusiness to develop a more concrete set of actions under the Farm to Fork Strategy that encourage innovations in order to achieve sustainability targets. This could include greater support for biotechnology development in fields such as genetic modification and improving farming efficiency through precision agriculture.

Provide funding and investments

- 1** Use EU budgetary programmes and funding to incentivise private sector investment in large-scale pilot projects, and those nearing commercialisation, with potential for high value job creation and carbon-neutral growth opportunities, particularly in regions at risk of being left behind. For example, leverage Just Transition and recovery funds to support the transformation of former coal mine regions into industrial innovation clusters around bio-based industries.
- 2** Direct research and development money towards scaling bio-based products with significant commercial potential and climate and biodiversity benefits, in particular those derived from waste. For example, fund further research to build on the commercial success already achieved by European countries in creating advanced materials, compounds, and chemicals from sustainable bio-based feedstocks.
- 3** Ensure funding and the right market-based incentives are provided for small farmers and large agricultural enterprises to take up low-carbon, low-impact farming practices. Practices include efficient use of fertilisers, precision farming, as well as valorising organic waste. In doing so, this can increase income opportunities and contribute to rural development, while benefiting climate and biodiversity.

Build skills, grow awareness, and accelerate knowledge development and sharing

- 1** Enhance rural livelihoods by providing farmers and forest owners, through the new CAP and Farm to Fork strategy, with access to business advice, apprenticeships and skills development to ensure agriculture and forestry sectors remain dynamic, attract younger generations and make the best use of technological transformations and sustainable income-generating opportunities.
- 2** Fund knowledge development and sharing activities in sectors where there is unrealised potential to make use of bio-based products, improve circularity and create jobs, such as construction and waste management. For example, harmonising waste definitions and valorisation criteria across EU member states could enable a better-functioning secondary raw materials market.
- 3** Increase circularity through the use of information campaigns on energy and resource consumption – financed by the EU and member states – aimed at households and enterprises to raise awareness of the interrelations between consumption behaviour, climate change, biodiversity and waste disposal.

Develop a coherent classification and accounting framework to measure costs and benefits across the bioeconomy

- 1** Ensure consistent terminologies, methodologies and standards are adopted across the European bio-based industries, to support growth of markets for bio-based solutions. For example, by implementing a sustainable classification scheme that includes Life Cycle Assessments to determine the sustainability and CO₂ benefits of bio-based solutions and their by-products in comparison to fossil products.
- 2** Monitor material throughput and measure and analyse the full set of economic and environmental impacts and benefits of bio-based solutions, to better inform decision making. Use green financial accounting instruments to do this, such as the UN's Integrated Environmental and Economic Accounting system.
- 3** Guarantee that new regulation will be consistent with existing regulation, to provide business with certainty and the incentive to make long-term investments into bio-based solutions. For example, ensure that the EU Taxonomy Regulation's proposed sustainability criteria for biomass use is aligned with criteria set in the Renewable Energy Directive.



Policy roundtable

8th December 2020

This paper supports BioAdvantage Europe's policy roundtable on Tuesday 8th December 2020, an event designed to: 1) highlight the potential of the bioeconomy to support the jobs and innovation agenda for European growth recovery; and 2) identify priority areas for supporting policy.
Joining the roundtable:



Diederik Samsom
Head of Cabinet of EVP Frans
Timmermans, European
Commission



Henrik Henriksson
President and CEO,
Scania



Svein Tore Holsether
President and CEO,
Yara



Christophe Beaunoir
CEO, Saipol
(Avril Group)



Peter Vanacker
President and CEO,
Neste Corporation



Julian Popov
Former Bulgarian Minister of
Environment and Water, Fellow
at European Climate Foundation



Per Møller
Senior Developer,
Kalundborg Symbiosis



Åsa Pettersson
Head of Public Affairs and
Sustainability, Scania



Philip Smith
EVP UK and Europe Delivers,
Xynteo (Moderator)

Unleashing the potential of the bioeconomy: a cross-sector partnership

BioAdvantage Europe, with the support of Scania, Avril, Lantmännen, Novozymes, Neste, Shell and many others have been working together to identify opportunities for unleashing growth in the bioeconomy in Europe. We represent many different sectors both relevant to the bioeconomy and with business activities in a range of geographies across Europe.

Our work has shown that there is significant potential for the bioeconomy to contribute to more sustainable and inclusive growth in Europe, and that it can play a crucial role in meeting the goals of the European Green Deal. But we also recognise that the bioeconomy needs an integrated, effective, common-sense and fact-based policy framework to meet this potential.

At this important moment in Europe's transition, we are: raising awareness of the potential for the bioeconomy; showcasing best practice in growing, using and re-using bio-based feedstocks; supporting policymakers to develop policies that deliver cuts in CO₂ emissions at scale; protecting and restoring biodiversity; as well as generating rural growth, jobs and innovation. We will do this by demonstrating the bioeconomy in action and its potential across Europe, and highlighting opportunities to improve policy at EU, national and regional levels to achieve this potential.

Achieving the potential for the bioeconomy will yield benefits for the recovery from Covid-19, create jobs and create a more innovative and circular bioeconomy. We call on policymakers to work with us to create a coherent policy framework that enables this.

Avril

novozymes 

 Lantmännen


NESTE



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