POLICY PAPER

How the bioeconomy can boost a **European Recovery**

BioAdvantage Europe's mission

The bioeconomy has enormous potential to accelerate a green recovery and realise a European Green Deal. BioAdvantage Europe galvanises leading businesses across the bioeconomy value chain to create a unified and constructive dialogue with EU policymakers on how to achieve this potential.

This is the first of a series of policy papers BioAdvantage Europe will publish in 2020, highlighting how the bioeconomy can contribute to a better model of growth that supports specific policy areas in Europe's Green Deal and recovery.

Introduction

With EU leaders having agreed upon the long-term budget for 2021-2027, which includes a new Recovery Instrument to mitigate the socio-economic consequences of Covid-19, there is a once-in-a-generation opportunity to restart and strengthen the European economy. The budget is historic in its size and climate-relevance – around €1.8 trillion in scale with 30% earmarked for climate related initiatives – and will be pivotal in helping support the aims of the European Green Deal.

This paper focuses on how realising the untapped potential of the European bioeconomy can kickstart growth in the aftermath of Covid-19, achieve a sustainable, low-carbon economy and put Europe on the path to net zero emissions by 2050.

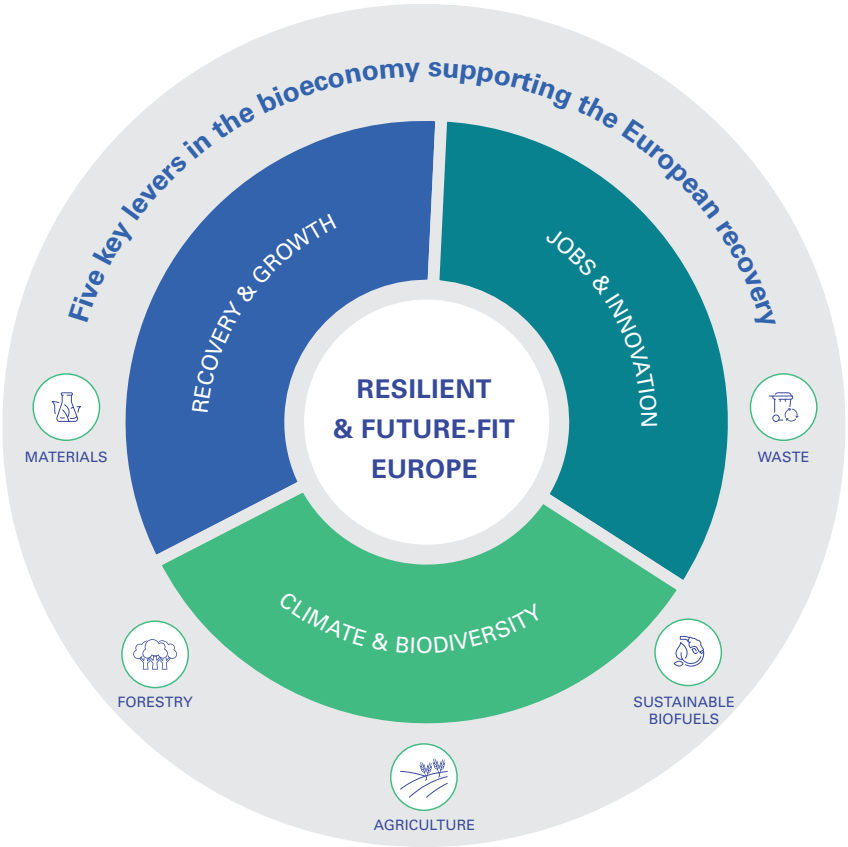
How the bioeconomy can contribute to a European recovery

The bioeconomy is an important sector for Europe. It employs around 18 million Europeans today, around 9% of the total workforce; and adds €600 billion of economic value, equal to the GDP of Switzerland. It spans agriculture, aquaculture, forestry, and all the products and waste streams that arise from these activities, including food and feed, forest and crop residues, sewage and manure, bioenergy, biofuels, and bio-based chemicals and materials.

Through the extension of existing EU budgetary programmes and funding of national recovery and resilience plans, the bioeconomy has the potential to: **support a quick recovery and inclusive growth; boost jobs and innovation; and protect the climate and biodiversity.**

Policymakers can use five key levers within the bioeconomy to support the European Recovery Plan:

1. Invest in low-carbon, high-productivity agriculture;
2. Invest in sustainable forestry management;
3. Increase the production and use of sustainable biofuels;
4. Make better use of bio-based waste;
5. Support the development and deployment of high-value bio-based materials.



For each lever, we provide evidence-based descriptions of how the bioeconomy can contribute to fulfilling EU policymakers' ambitions; examples of scalable concepts that are already developed or in deployment; and immediate actionable policy recommendations for member states to include in their national recovery and resilience plans, strengthening the impact of the bioeconomy.

Five key areas for the bioeconomy to contribute to recovery goals

Invest in climate-friendly, productive agriculture

to support farmers and protect food systems

Although modern industrial farming systems have made huge improvements in the last decades in order to feed a growing population, they can also cause natural capital loss and soil degradation, the latter of which is estimated to cost human health up to €45 billion per year in the EU.[1] Investing in climate-friendly, productive agriculture is an immediate solution to abate these impacts. This can also support the goals of a just transition and rural development in 'left behind' regions.

Best practice application of **low carbon, nitrate-based fertilisers** can increase crop yield while reducing carbon footprint by more than 50% compared to typical imported products.[2] Furthermore, fertilisers can be used to add minerals into the food chain to improve human and animal health.[3] **Regenerative farming methods** in Europe, which have been limited to date due to short-term financial and production-related concerns, hold the key to significant long-term economic and ecological benefits. Studies show that regenerative practices (such as no-till farming which can reduce soil erosion and improve bio-sequestration of carbon) can reduce farmer input costs by 30%, increase income through diversification and yield stability, while boosting carbon sequestration and crop resilience to extreme changes in climate.[4] A combination of these approaches, including **productivity-boosting precision technology** and increasing sustainable biomass availability, can improve farmer livelihoods, enable lower land use and reduce greenhouse gas emissions by between 16-36% by 2030,[5] as well as meeting the needs of a growing global population.

Existing business-led solutions

1. **Improving nutrient uptake:** Novozymes is developing innovative solutions based on naturally occurring soil microbes to improve nutrient uptake in crops. For example, Jumpstart is a commercially available product that has been shown to increase yields by up to 4% and reduce the carbon intensity of corn by up to 15%.
2. **From field to fork:** Lantmännen and Yara have launched a pilot project to reduce the carbon footprint of food production using mineral fertilisers produced from renewable energy. This will reduce emissions from food production and increase demand for renewable energy.
3. **Enhancing plant-based products:** Avril and DSM have joined forces to produce a plant-based (canola) protein for the global food market, which enhances vegan and vegetarian products – part of the solution to the growing demand for meat and dairy alternatives.[6]

Policy Proposals

- **Reward environmental services:** Create incentives and mechanisms to reward the deployment of environmental services that improve the climate, biodiversity and soil performance of agriculture, and protect human and animal health (for example, ensuring lower carbon scores are realised where better inputs or less inputs drive down greenhouse gas emissions).
- **Sustain agricultural communities:** Stimulate high quality job growth and generational renewal in agriculture through skills development, apprenticeships and business support to ensure an aging agricultural community remains dynamic and makes best use of technological transformations.
- **Support changing agricultural practices:** Use recovery funding to reduce the risk and cost barriers related to changing agricultural practices. For example, support for better manure handling; help selling offsets for carbon reduction or capture including support to cover base-line calculations, subsequent measuring and validation; access to facilitatory tools and technology (drones, digital imaging etc); providing extra labour required for managing cover crops etc.

Invest in sustainable forestry management

to create more green jobs and improve carbon sinks

The forestry sector directly employs 500,000 people in the EU and creates a further 3 million jobs in forest-based industries.[i] However, Covid-19 has put these industries under strain and climate change is adding further stresses to forests with droughts and wildfires. Developing a stronger, more sustainable, forestry sector can create high skilled jobs, increase the sustainability of materials and chemicals used in Europe, and mitigate climate change. The current annual mitigation effect of EU forests via contributions to the forest sink, material substitution and energy substitution is estimated at 569 Mt CO_2/year, or 13% of total current EU emissions. With better forest management, it should be possible to nearly double European forests' sink capacity by 2050.[7]

Improved forest management in existing forests and wood chains, for example making use of productive forests with high growth rates and using agroforestry techniques, can increase carbon sequestration and resilience to climate change.[8] So too can **afforesting abandoned farmland**, while also creating new bio-economy opportunities in rural areas unprofitable for agriculture. With over 150,000 km^2 of farmland expected to be abandoned in the EU by 2030,[9] an area equivalent to half of Italy's land mass, supporting forest expansion would increase the pool of harvested wood products available for industry. **Using harvested wood products and residues** as substitutes for fossil-based products plays a significant role in climate change mitigation – for example, using wood as a construction material instead of carbon-intensive materials like steel and cement can avoid up to 2 tonnes of CO_2 emissions per tonne of wood products used.[10] It also has major growth potential – with a 1% increase of European wood-based products in the market share of the global construction, textile and plastics markets, the European wood-based bioeconomy could generate additional revenue in the scale of €10 to €60 billion (depending on the assumptions made).[11] All of these measures can create high-skilled jobs in rural and urban regions. This will rely heavily on education and skills development in the forest-based and waste industries.

Existing business-led solutions

1. **Boosting carbon capture:** Yara offers specialised fertiliser for Boreal forests that improves yield, both in terms of quality and volume, and increases long-term carbon capture capacity.
2. **Massive wood construction:** Stora Enso use engineered wood, such as cross-laminated timber (CLT), laminated veneer lumber (LVL) and glulam, for large-scale and tall building projects. Wood stores carbon and replaces the need for steel, concrete and other fossil-based materials.
3. **Preventing soil damage:** Södra, as part of an EU funded project, provide industry-specific training programmes for contracted machine operators, with a focus on preventing soil damage in forestry operations.

Policy Proposals

- **Help forest owners innovate:** Provide land and forest owners with access to advice and training on innovative forest management strategies, helping foster skill development and diversification.
- **Support sustainable wood products:** Incentivise the use of responsibly sourced and sustainable wood products that create environmental benefits, particularly in carbon-intensive sectors that have previously relied on fossil fuel products, to support the EU Circular Economy Strategy and Resource Efficiency Strategy.
- **Waste not, wood not:** Extend EU waste management policies to ensure wood residues and post-consumer wood are collected for reuse as a secondary raw material.

[i] Forest-based Industries include the woodworking industries, the industries manufacturing pulp, paper and paper products, the furniture industry, the printing industry and the bio-energy industry.

Increase the production and use of sustainable biofuels

to improve energy security, drive decarbonisation and increase rural job opportunities

If Europe is to halve emissions in transport by 2030, then the EU needs to rapidly increase the share of sustainable biofuels[ii] in its fuel consumption, given existing vehicles with internal combustion engines will continue to be used for at least two more decades while electric and hydrogen vehicles gradually gain market share.[12] Given that 96% of EU's crude oil needs are currently met by imports,[13] sustainable biofuels also present a immediately available solution to reducing import dependence and protecting consumers from energy insecurity.

Incentivising the production of sustainable biofuels can create new revenue streams for farmers and stimulate employment. The biofuels industry is the most important sub-sector of renewable energy in terms of employment, as a result of its labour-intensive nature, with the highest investment to job ratios. For every million dollars of investment made in the biofuels industry, between 15-30 jobs are created, many in rural areas.[14] In Eastern European regions that have depended heavily on coal, **utilising low productivity and marginalised land** to grow bio-based feedstocks for biofuels can also facilitate a just transition. With over 7,500km^2 of land (an area equivalent to the size of Cyprus) no longer suitable for growing food crops, there is an opportunity to cultivate feedstocks and integrate with regional industrial clusters, promoting circular bioeconomy initiatives. **Investment in existing European biorefineries** to utilise spare capacity (up to 40%)[15] and create sustainable biofuels and biochemicals can help replace fossil fuels and meet near-term emission reduction targets. Bioethanol produced with European sourced feedstock provides audited emission reductions of 72% compared to fossil fuels[16] and produces animal feed as a by-product, reducing the need for protein imports. From effectively processed waste and residues, sustainable biofuels can also generate up to €15bn of additional revenues for Europe's rural economy annually.[17]

ii By sustainable biofuels, this initiative means biofuels that produce substantially less greenhouse gases than fossil fuels when all their impacts are accounted for throughout the product's lifecycle; and are produced in a way that does not cause significant damage to biodiversity, ecosystems, soil health and areas of high conservation value; and does not pose competition to food.

Existing business-led solutions

1. **Fossil-free biofuels:** Avril produce a first-generation sustainable biofuel (B100) made entirely from French rapeseed, which reduces CO_2 emissions by at least 60% compared to fossil diesel, and fine particle emissions by up to 80%.
2. **Reducing transport emissions:** Scania and Lantmannen are collaborating to promote climate-smart heavy transport solutions using ethanol as a biofuel (ED95), which can reduce carbon emissions by 90% compared with diesel.[18] The ethanol is produced from local feedstock, such as wheat and residues from the food industry.[19]
3. **Advanced aviation biofuels:** Neste uses 100% renewable waste and residues (e.g. cooking oil and animal waste fat) to create sustainable biofuels for aviation. The MY Renewable Jet Fuel can achieve up to 80% reduction in greenhouse gas emissions compared to fossil jet fuel.

Policy Proposals

- **Specific sustainability assessments and thresholds:** Put greenhouse gas reduction performance at the centre of the EU's Renewable Energy Directive by rewarding more strongly the biofuels that achieve the highest greenhouse gas emissions reductions; and enable accounting for the origin and growing technique of each feedstock source to incentivise better practices and eliminate ones that are unsustainable.
- **Consider all sustainable solutions:** To ensure that Europe as a whole meets the targets set by the European Green Deal, we must urgently consider all available sustainable and technically advanced solutions, and revise current restrictions and caps. This would allow all sustainable biofuels to contribute to renewable energy targets if they fulfil the emission and sustainability criteria, excluding those with a high ILUC risk.[iii]
- **Well-to-wheel approach:** Acknowledge the use of sustainable biofuels when setting up CO_2 standards for vehicles and road charging, basing the emission reductions on a 'well-to-wheel' approach. This is a more holistic way to provide consumers with real information of different vehicles' climate effects and allows for deeper greenhouse gas emission reductions compared to only efficiency/fuel consumption-based regulation.

[iii] If new advanced feedstocks will be added to Annex IX Part A or B, the respective 3.5% and 1.7 % caps must be increased accordingly.

Make better use of bio-based waste

to create valuable feedstocks, reducing extractive activity and stimulating job growth

Around 900 million tonnes of wastepaper, food, wood and plant material are generated in Europe annually.[20] Much of this resource is already used as low-value inputs for industrial and agricultural processes, however, there is great potential to create high quality secondary raw materials and valuable feedstocks. Better waste management protects the environment and human health, and is essential if the EU is to meet its objective of recycling 65% of municipal waste by 2035. Furthermore, it could generate employment benefits: making better use of these wastes and residues could create approximately 300,000 new jobs by 2030.[21]

Converting waste and residues into products such as biodegradable plastics and fertiliser keeps resources at their highest possible value for as long as possible, and contributes to a thriving circular economy – currently generating almost €147bn in value added.[22] **Improved segregation, collection and use of municipal waste** reduces inefficient end-of-life disposal or incineration, cutting unnecessary greenhouse gas emissions and increasing the amount of food and garden waste available for recycling. In 2017, only 43% of the 86 million tonnes of bio-waste produced in the EU was separated.[23] **Better use of forestry and agricultural residues** in a carbon-responsible way could see nearly 180 million tonnes directed towards bio-based products,[24] helping replace fossil demand and encouraging innovative business models and SMEs to close local biomaterial loops.

Existing business-led solutions

1. **Circular economy solutions:** 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 in Limay, France, produces 30,000 tonnes of recycled PET pellets and provides stable employment for 80 people in the area.
2. **Eliminating fossil fuels:** Ikea and Neste are scaling the production of bioplastics from waste and residue raw materials, such as cooking oil, for IKEA products, eliminating the need for extraction of fossil fuel for the purpose of making new plastics.
3. **Reusing construction waste:** Suez helps Swedish construction company, Peab, to recycle or reuse 88.9% of construction waste on their worksites, reducing operating costs thanks to reduced waste related costs. This exceeds the 70% recovery rate for building and demolition waste set by the European Union for 2020.

Policy Proposals

- **Collection systems change**: Expand and standardise municipal waste collection systems across the EU to enable industry to make more efficient use of bio-based waste as well as recycled fossil materials in and across geographies.
- **Innovation in waste**: Leverage the EU ETS Innovation Fund, Horizon Europe and the new EU budget to stimulate innovation in, and production of, sustainable advanced and waste-based fossil replacements for materials, chemicals and transport fuels.
- **Circular carbon neutral clusters:** Invest in bioeconomy focused industrial zones to create carbon neutral clusters, which support the cooperation between companies for collective or circular use of resources, including waste.[25]

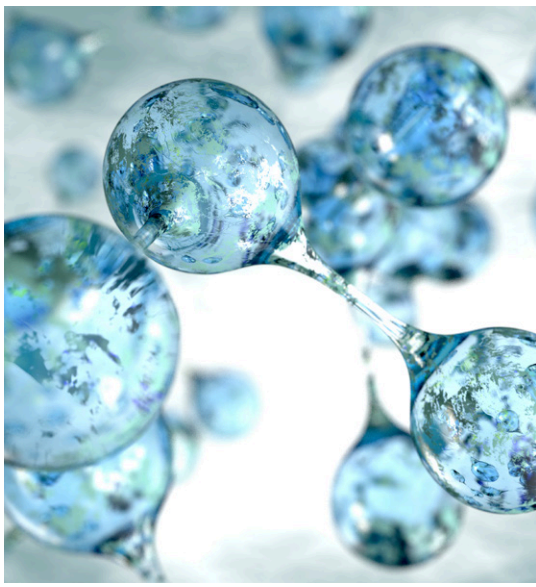
Support the development and deployment

of high-value, bio-based materials and chemicals to create new jobs and drive innovation

Supporting the adoption of high-value bio-based materials and chemicals in European industry and agriculture through policy and incentives can spur greater innovation and employment opportunities. With the right policy framework and incentives, the impact of a growing industrial biotechnology sector can create up to €100bn in added value and 1 million new jobs in Europe by 2030,[26] many based around bio-based materials and chemicals.

Investing in skills and technology can foster highly skilled jobs and embed circular bioeconomy principles into industry and agriculture, as demonstrated in 2015, when the bio-based chemicals sector created the highest number of jobs of all bioeconomy sectors,[27] largely as a result of capitalising on the unprecedented advances in life sciences and biotechnology . **Securing commitment from major industry players** in bio-based materials and chemicals to use biomass feedstock, waste and residues over fossil materials can play a valuable role in decarbonisation, as well as in creating employment opportunities. Currently, 20% of Europe's 1.4 billion tonnes of agricultural and forestry biomass supplies goes to the high-value activity of making biomaterials, with the remaining 80% going to food, feed and bioenergy.[28] However, using biomass to produce materials can support 5-10 times more employment and generate 4-9 times more value added than if used for energy, due to the longer, more complex supply chains for material use. **Research and innovation in the bio-based materials sector** can accelerate the transition to alternative raw materials and reduce Europe's dependence on fossil fuels, enhancing strategic autonomy and reducing carbon footprint.

Existing business-led solutions



1. **Sustainable industrial lubricant:** Neste has created a bio-based industrial lubricant produced entirely from waste and residue oils and fats, helping reduce fossil oil-based emissions. It is a climate-friendly solution that can be used in all industrial, automotive, DIY applications.
2. **Using CO_2 for fizz:** Lantmännen's biorefinery, Agroetanol, is using carbon capture and utilization technology in its biorefining process to capture much of the CO_2 produced during the ethanol fermentation process. The CO_2 is then purified, cleaned and sold as renewable carbonic acid to the manufacturing industry, primarily beverages, replacing the imported fossil version.[29]
3. **Environmentally friendly solvents:** Typically, solvents in the metal cleaning industry are made from fossil-based petrochemicals with high VOC emissions. Avril produce organic ester solvents derived from renewable raw materials (vegetable oils and animal fats), which are environmentally friendly and more cost effective.

Policy Proposals

- **Biomass blend-in mandate**: Create an EU blend-in mandate for the proportion of biomass feedstocks required in production of materials and chemicals.
- **Bio-based procurement**: Support introduction of bio-based products and materials in forthcoming EU policy initiatives, given their ability to store carbon. This could include actions such as the use of biomaterials in construction through the EU's 'Renovation Wave'; new biomaterial criteria in green public procurement rules, the Product Environmental Footprint (PEF) and EU Ecolabel.
- **Secondary raw materials market**: Promote and invest in creating a well-functioning secondary raw materials market, in which there is a high availability of bio-based materials at a competitive price that exhibit the best sustainability performance.

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

BioAdvantage Europe, with the support of Scania, Avril, Lantmännen, Novozymes, Neste and 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; and supporting policymakers to develop policies that deliver cuts in CO2 emissions at scale, as well as rural growth, jobs, innovation and biodiversity. 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 circular economy, and we call on policymakers to work with us to create a policy framework that enables this.

SCANIA Avril novozymes Lantmännen NESTE

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