

IN THE NAME OF INNOVATION

INDUSTRY CONTROLS BILLIONS IN EU RESEARCH FUNDING, DE-PRIORITISES THE PUBLIC INTEREST

REPORT 2 (OF 2)

Research and destroy:
the factories of the
industrial bioeconomy
threaten the climate and
biodiversity



Corporate
Europe
Observatory

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Summary

The Bio-based Industries Joint Undertaking (BBI) was created in 2014 following a lengthy corporate lobby campaign, particularly by the biotech, forestry, and chemical industries. This market creation and support package is given by the European Commission to these industries to implement the EU's 'bioeconomy' strategy. The BBI was to receive €975 million from the EU's budget, representing 21.8 percent of all the money spent by the EU in the second "Societal Challenge" identified by the EU's 2014-2020 Research Framework Programme, Horizon 2020: "Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bioeconomy".

The general idea behind the industrial bioeconomy is to partially replace fossil fuels with 'biomass' (biological matter, mainly the output of agriculture and forestry) in industrial processes, under the premise that 'biological' equals 'circular' which in turn equals 'sustainable'. This however is not necessarily the case. Indeed, the production of biomass in Europe has been plateauing over the past 15 years, and most of the current production is only achieved through unsustainable farming and forestry practices. The additional demand triggered by this industrial 'bioeconomy' can only be met at the expense of food production and the integrity of the remaining functioning ecosystems in Europe and abroad. Despite the BBI's insistence that its projects do not compete with food production, 24% of the projects it funded are based on agricultural biomass, 60% more than what was originally planned.

BBI's objectives include to "contribute to a more resource efficient and sustainable low-carbon economy", but it ignores the destructive consequences of its projects on Europe's terrestrial carbon sinks, soils and forests. Increasing biomass extraction without imposing reductions in the use of fossil fuels combines the worst of both worlds: eliminating existing carbon sinks while emitting even more CO₂. Only 10 percent of all BBI-funded project coordinators predicted that their initiatives would have a positive impact on biodiversity, and only 27 percent anticipated having a positive impact on the sustainable management of natural resources. EU-15 countries got the lion's share of the total BBI funding, with 87.8 per cent of the participants coming from these countries versus 8.8 per cent from the EU-13.

Building a European industry that feeds on biomass without sufficient domestic supply means a considerably increased risk of resource grabs elsewhere, particularly in the Global South where most of the planet's biomass is found. Should the path toward European sustainability really be about neocolonial imports of wood, oil, and sugar from the tropics at the expense of the climate, biodiversity, and livelihoods of the people living there?

BBI has dedicated more than 70% of its budget to date to funding pre-commercial and commercial-scale industrial projects for the production of various biomass-based items such as plastics and fuels. This is questionable: should pre-commercial and commercial-scale factories really be eligible for EU research funding, meant to fund research that is too risky for the private sector, when these projects have already been tested at the demonstrator scale, when the technology-related risks are minimal, and when the amounts involved are so significant? BBI also supports projects that include regulatory, lobbying, and public relations work to sway EU regulators and public perception to favour bio-based industries' priorities and products. Why should any of this be supported with public research funding?

Due to a lack of transparency, the results of the research projects funded by the BBI are difficult to evaluate. Companies systematically privatise results and data regarding their projects, and the evaluation indicators used are so narrow that they at least initially completely failed to take social and environmental impacts into account.

While all BBI projects were supposed to be funded by both public money and industry's in-kind and financial support, the latest figures available show that participating companies had only paid a small amount of what they had promised. Thus when the European Commission had already paid 27 per cent (€264,6 million) of their pledged cash contributions, industry partners had only paid 3 percent of theirs, along with just 3.7% percent of their auditable in-kind contributions. These companies are also opposed to disclosing the data that would enable a proper evaluation of these in-kind contributions.

The European Commission's DG Research is well aware of these failures, but has so far only slightly reduced its overall financial funding to BBI and continues to support the creation of the body's successor, 'Circular Bio-based Europe'.

While all this could point to cases of industry abusing the system, they are also consistent with the way in which the BBI was set up: its overall research agenda as well as its annual work plan have been authored by industry. Given such a set-up, that participating companies would divert BBI's resources for their own pre-existing priorities, instead of meeting societal challenges, was to be expected. This set-up is however expected to remain unchanged for BBI's successor: industry has already started drafting its Strategic Research Agenda until 2030.

Member states and the European Commission are currently negotiating the EU's 2021-2027 budget, in particular Horizon Europe, the next EU Framework Programme for Research and Innovation. Meanwhile the corporate lobby groups interested in the development of the industrial bioeconomy – led by EuropaBio, the European lobby group of the biotech industry – are lobbying for 'Circular Bio-based Europe' to be renewed. Given the central role that member states expect the EU's Bioeconomy strategy to play in the upcoming European Green Deal, and the support for 'Circular Bio-based Europe' expressed by the European Commission in its recent Circular Economy Action Plan, it is unfortunately quite possible that the bioeconomy lobby will prevail.

Introduction

Thanks to massive youth mobilizations throughout 2019, the climate change emergency has finally created the headlines it merits. The new European Commission, presided over by Ursula von der Leyen, has tried to respond with its proposal for a 'European Green Deal'. But as any lobbyist will tell you, the devil is in the details.

For many years, big business has been pushing for its own climate 'solutions', usually painting their existing activities green in order to keep their assets in operation.

One of these patently false climate solutions is the case of agrofuels, fuels made from cultivated plants. Industry however prefers the term 'biofuels', which sounds better and incorporates fuels made from other more marginal sources, such as used cooking oils.

In 2009, after heavy lobbying by car manufacturers, biotech companies and the oil industry,¹ gathered among other places in an EU-funded lobby group called the European Biofuels Technology Platform, the EU adopted its Renewable Energy Directive. This legislation included a biofuels target that forced EU countries to use at least 10 per cent 'renewable' energy sources in transport by 2020.²

The results have been catastrophic: the opening of this massive new market triggered a rush to cut forests and to plant palm oil trees in their stead. In 2018, 65 per cent of the total amount of palm oil imported into the EU was used for energy, and more than half was burned as biodiesel in cars and trucks.

According to the European Commission's own research, 45 per cent of global palm oil expansion in the past two decades has caused deforestation, a major producer of CO₂ emissions.³

This means that the average climate impact of biodiesel made from palm oil is in fact *three times* that of fossil diesel.⁴ According to the NGO Transport & Environment, "EU food-based biodiesel will lead to around 80 per cent higher emissions than the fossil diesel it replaces by 2020."⁵

The deforestation resulting from palm oil tree plantations has been particularly catastrophic in Malaysia and Indonesia, where irreplaceable primary rainforests are being destroyed. In Borneo, for example, more than half of the rainforests are already gone.⁶ These 130-140 million year old tracts where dinosaurs once roamed were among the world's most ancient forests, containing as much biodiversity as the Amazon or New Guinea. The orangutans who live in these forests have been listed as 'Critically Endangered' by the IUCN since 2016.⁷ Palm oil plantations have also multiplied in South America and some African countries.⁸

The mounting evidence around climate change and biodiversity damage, the ripping off of EU taxpayers, coupled with the risk of competition with food production through the additional demand for farmland for bioenergy, ultimately spurred a change in course. In July 2018, the EU mandated all Member States to completely phase out support for food-based biofuels by 2030. The institution nonetheless drew criticism⁹ for allowing this catastrophic policy to continue for another decade.¹⁰

Indonesia and Malaysia, to give an example, have both developed large palm oil industries since the EU created a market for this. Together with significant sections of the European agribusiness industry and fossil fuel companies fighting to keep their subsidies, these countries have forcefully lobbied the EU against the decision.^{11,12} And now that they have partly lost the battle, they are suing the EU in the World Trade organisation's Dispute Settlement Body.¹³

Both the ecological tragedy and the enormous waste of money were predictable and avoidable. Many researchers and NGOs, including CEO, had issued warnings before the EU biofuels targets were set.¹⁴ And biofuels are not the only example; the EU's bioenergy policy also causes serious damage. Throughout the EU, and particularly in the Carpathian mountains¹⁵ in Central and Eastern Europe; in Estonia and Latvia; in Canada's British Columbia; and in the southeast of the United States, natural forests are being destroyed¹⁶ and shredded into wood pellets¹⁷ to be burned for energy in the EU. And this is entirely lawful, as wood and wood pellets are listed as 'carbon neutral' in the EU. This insane policy, which is currently being attacked at the European Court of Justice by a coalition of citizens and NGOs from Europe and the US,¹⁸ burns down the very forests that help us to fight climate change.

If any policy lesson should be learned from this debacle, it is that the EU must limit the use of biomass to levels that do not compete with the use of land for agriculture, or with the protection and restoration of natural habitats. And that this should be done in combination with a drastic reduction in overall resource use, and particularly the use of fossil fuels.

But will this happen? Will the EU remember this precedent?

This is an important question, not in the least because biomass can be turned into much more than bioenergy. But it looks like the EU is not very good at remembering the disasters it caused; in fact it is structurally supporting various industry schemes to create more infrastructure for the so-called 'bioeconomy'.

First of all, while the EU's Renewable Energy Directive no longer counts biodiesel made from palm oil as a contribution towards EU green fuel targets, the legislation still contains loopholes and has increased the mandatory proportion of energy produced from 'renewable' sources such as biomass.¹⁹ In short, this means that more and more biomass will be needed to meet bioenergy and biofuel targets. And although the directive contains sustainability criteria intended to "minimise the risk of using forest biomass derived from unsustainable production", specialists are unimpressed.

In fact, in December 2019 an international team of scientists identified this legislation as one of the 15 leading global biological conservation issues for 2020.²⁰ A global campaign called the 'Biomass Delusion', involving almost a hundred environmental organisations from all over the world, is urging the ditching of forest wood for large-scale energy production and calls on "governments, financiers, companies and civil society to avoid expansion of the forest biomass based energy industry and move away from its use. Subsidies for forest biomass energy must be eliminated. **Protecting and restoring the world's forests is a climate change solution, burning them is not**"²¹ (emphasis added)

However, a recent EU-funded research project called STAR4BBI (Standards and Regulations for the Bio-based Industry) reached more or less opposite measures as far as extracting biomass from nature is concerned.

It concluded in June 2019 that the EU should “develop an EU Renewable Materials Directive similar to the one existing for biofuels and bioenergy”.²² What exactly does this mean?

STAR4BBI is a small research project that has received about €1 million from the European Commission. It has an unusual purpose for a public-funded research project: to study the “policy and standardization hurdles that bio-based industries face”, and it recommends “a coherent, well-coordinated and favourable regulatory framework that helps develop a cutting-edge bio-based economy for Europe”.

These mandatory targets would force EU Member States and industries to use a certain amount of biomass in the production of certain goods, as the general idea of the underlying ‘bioeconomy’ is to produce what was previously done using fossil fuels out of plant matter: energy and fuels, and also chemicals, textiles, materials and so forth. This could be seen as odd given the disaster created by the EU biofuels policy.

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The project states that it will share its findings with “the EC and industry associations”. Indeed, three industry lobby groups act as members of STAR4BBI’s advisory board: the biotech industry lobby group EuropaBio, the European Forest Institute (EFI) and the French Bioeconomy Cluster (IAR). And these lobby groups’ interests remain the same: produce as much biomass as possible, develop large industry production lines out of it, and pretend the whole operation is sustainable because it’s based on plants.

Essentially, STAR4BBI carries out pre-lobby work of the kind that Brussels-based industry trade associations routinely do: developing common regulatory positions and pushing them towards EU decision makers.

What is remarkable in this case is that these industry associations have found a way to have this work funded by the EU and outsourced to more credible institutions than themselves: the Netherlands Standardization Institute (NEN), Wageningen University in the Netherlands, the Technical University of Berlin, and the Nova Institut für Politische und Ökologische Innovation, a German consultancy.

Why is the EU funding corporate lobby work to develop more uses for biomass when previous attempts have already shown that – given current EU consumption levels – substituting fossil-fuel based products with plant-based ones instead of firstly cutting back on the use of fossil fuels is so devastating?

The answer is that industry has defined the agenda of a €3.7 billion public-private partnership (PPP) between the European Commission and industry, the Bio-Based Industries Joint Undertaking (BBI)

Based on a research including desk and literature reviews, interviews, and Freedom of Information requests to the European Commission, this report will first examine the political origins of the BBI, the economic interests that demanded and obtained its creation, and the questions raised by the ongoing rise of the industrial bioeconomy.

To have a more concrete idea of the sort of projects that the BBI is funding in Europe, and the impact they might have, we will study in more detail some of these projects before looking at the context in which the BBI is operating. In particular, we will try to answer a simple but essential question: how much ‘sustainable biomass’ is there really in Europe?

We will then review and discuss some of the main political justifications for the BBI, before bringing a more general analysis of the partnership itself: do partners fulfil their promises? Are things going according to plan? If not, why?

We will conclude by looking at the BBI’s future, in particular under Horizon Europe, the next EU Research and Innovation Framework Programme 2021-2027, and the European Green Deal.

1. Introducing the BBI

The Bio-Based Industries Joint Undertaking (BBI), a large public-private partnership between the European Commission and ‘bio-based industries’, funds research projects in the EU. Created in 2014 and slated to run until 2024, it operates on a very large €3.7 billion initial budget, of which €975 million was public EU funding and €2.7 billion was intended to be brought in by industry partners, both in kind and in cash. Its last call for project proposals will take place this year, in 2020.²³

In May 2019, the BBI announced that it was funding its 100th research project. By the end of 2018, €602.3 million in EU funding had been spent, and there are €373 million worth of outstanding commitments.²⁴ According to its Executive Director Philippe Mengal, the BBI would be “the largest and most ambitious public-private partnership in the world dedicated to achieving the bioeconomy”.²⁵

The BBI operates out of a white building in Brussels called the Atrium, located in the affluent Louise neighbourhood. Its programme office employs 23 employees in charge of coordinating general strategy, managing calls for proposals, evaluating projects and communicating results to EU decision makers. **The organisation’s Strategic Research Agenda²⁶ was written by industry in 2013 and updated in 2017; both versions of the document were endorsed by the European Commission. Its annual work plans are also drafted by industry before being approved by the BBI’s Governing Board, half of which is composed of industry representatives and the other half of officials from the European Commission. The BBI then issues calls for project proposals based on the topics listed in the annual work plans.**

The project proposals themselves are usually generated by consortia involving companies, academics and consultants, and are evaluated by anonymous reviewers paid for by the European Commission. Each selected project is funded by the EU, and participating companies are meant to also provide in-kind and financial contributions.

1.1 Why and how was the BBI created?

The BBI was created as an implementing tool for the EU’s Bioeconomy strategy (first developed in 2005 under the name ‘Knowledge-Based Bio-Economy’). This strategy was itself the result of various factors: the important developments in European biotechnology in the 1990s and 2000s and the new possibilities they created, new societal demands around sustainability, and a strong push from the biotechnology industry lobby group EuropaBio as well as from the Finnish government.²⁷

A broader EU framework of public-private partnerships for industrial technology development

The idea that the EU should fund industry’s research priorities when it comes to technology development is not specific to biomass, however: there are seven such Joint Undertakings (JUs), and together they have received over €7 billion under the current EU Research Framework Programme, Horizon 2020.²⁸ This represents almost 10 per cent of the programme’s total budget of €79 billion. The funding for JUs comes primarily from Horizon 2020’s largest pillar, which is dedicated to funding research addressing the ‘Societal Challenge’ faced by the EU (with a total budget of €29.7 billion). Horizon 2020 has two other pillars: ‘Industrial Leadership’ (€17 billion), which funds market-driven research and technology development, and ‘Excellent Science’ (€24.4 billion), which supports fundamental research.²⁹

The first European Commission-funded public-private partnerships tasked with developing industry-driven research agendas for technology development, called European Technology Platforms (ETPs),³⁰ were created as implementing tools for the EU's Lisbon Strategy adopted back in 2000. The Joint Technology Initiatives (JTI),³¹ restructured as Joint Undertakings under Horizon 2020 in 2014, were created to implement the Strategic Research Agendas developed by these ETPs. But they were also given substantial funding, since public-private partnerships are a key policy tool for the implementation of Horizon 2020. Article 25 of the regulation stipulates that:

“Horizon 2020 may be implemented through public-private partnerships where all the partners concerned commit to supporting the development and implementation of pre-competitive research and of innovation activities of strategic importance to the Union's competitiveness and industrial leadership or to addressing specific societal challenges.”³²

As the Horizon 2020 regulation explains, “during the technology transfer and start-up phase, new companies face a ‘valley of death’ where public research grants stop and it is not possible to attract private finance”.

Research public-private partnerships are a simple solution to this industry problem. By convincing EU decision makers that the EU's research funding programme should bear the main risks involved with industry's R&D projects, they are able to pass on their costs to taxpayers until profitability is secure enough to draw in private finance. As the BBI put it in 2018: “The model of the public-private partnership has been successful as a new approach to supporting research and innovation and de-risking investment in Europe.”

This approach suited the interests of big business well, as MEPs from the Industry and Research Committee discovered just prior to the vote on this issue in April 2012. On that day, they received an email from a lobbyist from BusinessEurope, the EU's employers federation, asking them not to touch the “essential elements” of the Commission's draft Horizon 2020 regulation related to public-private partnerships. Apparently **BusinessEurope was already happy enough with what the European Commission had done with these elements.**

Sujet : BUSINESSEUROPE note on PPPs + position on Horizon 2020

De : @businesseurope.eu>

Date : 23/04/12 17:31

Pour : "undisclosed-recipients" <undisclosed-recipients;:>

Dear ITRE Members and Substitutes,

BUSINESSEUROPE is following with interest the debate about Horizon 2020 and is **supportive of the EU institutions' effort to set in place an effective EU framework programme for research and innovation.** For your information, please find attached our position paper highlighting key messages on the dossier.

In the light of ongoing discussions in the European Parliament, we believe it could be useful to clarify some aspects covered by Horizon 2020, in particular with reference to the topic of **Public Private Partnerships (PPPs).**

While there is certainly some room for improvement in the structure and management of PPPs, European companies recommend **NOT** to amend the essential elements of the Commission's proposal for Horizon 2020 in this regard.

Moreover, when deciding on the legal basis for Horizon 2020, the European Commission chose³³ to use Article 173 of the EU Treaty,³⁴ under the Treaty's Industry title, which states that:

“The Union and the Member States shall ensure that the conditions necessary for the competitiveness of the Union's industry exist. For that purpose, in accordance with a system of open and competitive markets, their action shall be aimed at ... fostering better exploitation of the industrial potential of policies of innovation, research and technological development.”

This move meant that the entire programme was legally bound to follow an objective of industry competitiveness, whereas it would have been more logical to base it on Article 179, under the Treaty's title on Research and Technological Development and Space, which also refers to industry competitiveness but within a broader and open-ended framework:

“The Union shall have the objective of strengthening its scientific and technological bases by achieving a European research area in which researchers, scientific knowledge and technology circulate freely, and encouraging it to become more competitive, including in its industry, while promoting all the research activities deemed necessary by virtue of other Chapters of the Treaties.”

This can be explained by the political context of Horizon 2020, as this programme was meant to be one of the main European Union instruments for achieving an ‘Innovation Union’, one of the goals of the European Commission's overarching ‘Europe 2020’ 2010-2020 strategy for economic growth developed after the 2007-8 financial crisis.³⁵

The EU funding industry's R&D for competitiveness is an old story

The story of the Commission using its research funding programme to try to boost industry's competitiveness is an old one.

Back in 2007, then EU Research Commissioner Janez Potočnik justified the existence of European Technology Platforms with arguments for industry competitiveness:

“The private sector is fundamental if research is to become innovation. European Technology Platforms have been conceived as a means to help realise the Lisbon Strategy. The platforms can play a key role in better incorporating industry's needs into EU research priorities by bringing together stakeholders, led by industry, to define a Strategic Research Agenda and to suggest possible directions for its implementation. This is the underlying rationale for the deliberate industrial focus of technology platforms [...] To remain competitive, European industry needs to increase the high-technology content of its activity, and transform this technology into highly competitive marketable products and services in an environmentally sustainable way.”³⁶

The creation of the BBI Joint Technology Initiative (thereafter known as BBI), announced in 2013 by the European Commission,³⁷ was justified along similar lines. After the Commission identified industrial biotechnology as a “key enabling technology” for implementing the EU's 2012 Bioeconomy Strategy,³⁸ it defined the goals of the BBI as to “develop new and competitive bio-based value chains that replace the need for fossil fuels and have a strong impact on rural development”. The BBI was legally created thanks to a Council regulation in May 2014.³⁹

With the BBI creation, the biotech industry lobby obtained something it had long desired

Industry was understandably pleased. In July 2014, on the day of the BBI's formal launch, biotech industry lobby EuropaBio Director Nathalie Mollⁱ explained that "EuropaBio has played a leading role in both the initiation and in the development of the Bio-based Industries PPP and therefore we could not be happier to see it finally launched."⁴⁰

It is important to keep this reaction in mind. With the climate and biodiversity crises becoming more and more impossible to ignore in policy circles, the European Commission's DGs for both Research and Industry are making much greater use of sustainability language.

"EuropaBio has played a leading role in both the initiation and in the development of the Bio-based Industries PPP and therefore we could not be happier to see it finally launched."

N. Moll
Europabio's director, 2014

ⁱ N. Moll is now the director general of the EU lobby of the pharmaceutical industry, EFPIA.

For example, one of the stated main political drivers for setting up the BBI was the climate crisis and the need to decarbonise the economy. The organisation's Strategic Research Agenda describes industry's "vision" underpinning its development, and the objectives sound laudable:

"...leading the transition towards a post-petroleum society while decoupling economic growth from resource depletion and environmental impact. In this vision, the Bio-based Industries will optimise land use and food security..."

But the BBI's proposed means to reach this lofty aim are:

"...through a sustainable, resource-efficient and largely waste-free utilisation of Europe's renewable raw materials for industrial processing into a wide array of bio-based products:

- Advanced transportation fuels
- Chemicals
- Materials
- Food ingredients and feed
- Energy"

Not a word is mentioned about looking at the real-world consequences of developing additional biomass supply chains.

Similarly, the EU regulation⁴¹ that created the BBI manages to repeat the word "sustainable" three times in the same sentence:

"...contribute to a more resource efficient and sustainable low-carbon economy and to increasing economic growth and employment, particularly in rural areas, by developing sustainable and competitive bio-based industries in Europe based on advanced biorefineries that source their biomass sustainably..."

But the means foreseen to reach this aim contain a similar omission:

“...and in particular to:

- (i) Demonstrate technologies that enable new chemical building blocks, new materials, and new consumer products from European biomass which replace the need for fossil-based inputs;
- (ii) Develop business models that integrate economic actors along the whole value chain from supply of biomass to biorefinery plants to consumers of bio-based materials, chemicals and fuels,...; and
- (iii) Set up flagship biorefinery plants that deploy the technologies and business models for bio-based materials, chemicals and fuels and demonstrate cost and performance improvements to levels that are competitive with fossil-based alternatives.”

The BBI's Interim report explains that “BBI intends to de-risk in research, demonstration and commercialization of BBI technologies and to respond to the challenge of creating and maintaining a competitive position of Europe in BBI technologies, especially in the light of the growing number of demonstration size facilities being implemented in US and Asia.”⁴² It is a bit blunt to say that the real aim of the BBI is to make the building of biorefineries in Europe cheaper for interested companies, but this is probably more in line with reality.

Burning questions

But what about resource depletion? And the fact that thus far the vast majority of production efficiency gains have systematically translated into additional production, *not* a reduction of resource use? This is the famous rebound effect,⁴³ also known as Jevons' Paradox:⁴⁴ it is documented for example that the development of renewable energies has added power production capacity to the grid, but, at the global level, this has only marginally replaced fossil fuels.⁴⁵ In fact, the global consumption of fossil fuels continues to grow.⁴⁶ Disturbingly, **it appears that the ‘moral licence’ created through the use of ‘green’ energy might actually increase total energy use.**⁴⁷

The EU likes to describe itself as a continent that is busy reducing its CO₂ emissions, with a 22 per cent reduction between 1990 and 2017.⁴⁸ Yet this decrease is an illusion, based on a policy artifice in which imports and exports are not accounted for. When they are included (and they should),⁴⁹ the real story emerges: Europe would have actually increased its CO₂ emissions by 11 per cent between 1995 and 2009.⁵⁰

The very first sentence of the European Commission's updated Bioeconomy Strategy of 2018 was: “We live in a world of limited resources”.⁵¹

Similarly, Recital 14 of the Regulation setting up the BBI states that:

“The objective of the BBI Initiative is to implement a programme of research and innovation activities in Europe that will assess the availability of renewable biological resources that can be used for the production of bio-based materials, and on that basis support the establishment of sustainable bio-based value chains.”

Unfortunately, a reference to the need to assess the availability of biomass in Europe before increasing the demand for it did not make it to the binding section of the regulation's text.

In fact, the only binding objectives of the BBI are to demonstrate technologies, to develop business models and to set up flagship biorefinery plants. In other words, to expand production of bio-based products, and therefore demand for biomass.

Even more worrying is that when CEO asked DG Research whether there were research projects investigating these issues, its (honest) response was that there were no “projects in Societal Challenge 2 looking at the potential demand for natural resources triggered by the development of the bio-based industries”.⁵²

At least the Commission's in-house research service, the Joint Resource Centre, has a Knowledge Centre for the Bioeconomy that recently carried out an integrated assessment of biomass supply, demand and flows as well as its impacts both in Europe and globally. This groundbreaking research, first published in 2018,⁵³ did not previously exist and contains crucial findings (see Section 3: How much ‘sustainable biomass’ does Europe really have?).

But will the European Commission take these into account in its policy-making, at the risk of displeasing industry and undermining the projects it funds? Its recent track record in that respect, for example in the case of the Dieselgate scandal (car manufacturers building cheating devices in cars to flout anti-pollution tests),⁵⁴ or when New York Times journalists were investigating the disastrous environmental impacts of CAP subsidies,⁵⁵ calls for vigilance.

1.2 A new lobby group for the corporate bioeconomy and the leading driver of the BBI's priorities: the Bio-Based Industries Consortium (BIC)

With the creation of the BBI, industry players needed to create a formal structure to coordinate their work and their contribution to the partnership. To this end, the various companies and lobby groups involved in the relevant European Technology Platforms (ETPs) created a new organisation, the Bio-Based Industries Consortium (BIC). The BIC wrote the BBI's Strategic Research Agenda (SRA) in 2013, a document outlining the partnership's overall objectives.⁵⁶

BIC was [registered](#) as a Brussels-based international non-profit association (AISBL) in March 2013 by 38 large corporations from the energy, chemicals, agribusiness and biotech sectors. These companies include Abengoa, Cargill, Clariant, Ørsted (formerly DONG Energy), Kemira, Novamont, Novozymes, Repsol, Roquette, Solvay, Stora Enso, and Südzucker. BIC's offices are hosted by the European Forestry House, the EU office of the forestry sector on Place du Luxembourg, opposite the European Parliament in Brussels.

BIC also counts among its membership national cluster organisations such as the French platform Industries & Agro-Ressources (IAR), the German Cluster Industrielle Biotechnologie, the Dutch Biorefinery Cluster and the Finnish Bioeconomy Cluster.

The organisation's [statutes](#) mention that beyond acting as the private partner in the BBI public-private partnership, it will also be “representing and looking after the interests” of its members. As such, BIC also defines itself as a lobby group (it registered on the EU Lobbying Transparency Register in 2015 but not again since then).⁵⁷

This lobbying role is mentioned in the description of BIC's working group on Public Affairs & Public Relations, the purpose of which is to engage with key decision makers "for a favourable political, legal, social and economic environment for bio-based industries in Europe", and for "mainstreaming the bioeconomy concept beyond the research and innovation policy".⁵⁸

The first elected board of BIC had the following members:

- Christophe Luguel, representing the French Industries & Agro-Ressources cluster
- Kåre Riis Nielsen, Head of Public Affairs & Communication at Novozymes
- Ulrich Kettling, then Head of R&D, Group Biotechnology at Clariant Biotechnology Center
- Mikael Karl Johan Hannus, Vice-President Biorefinery and Bioenergy at Stora Enso, who was also elected president of BIC
- Carmen Millan, from Abengoa Bioenergy New Technologies
- Camille Burel, then Manager for Innovation Affairs at Roquette

BIC's Board of Directors in January 2020 gathered executives from large and very large companies (Sappi Europe, Cargill, Novozymes, IAR, Glanbia, Royal Cosun, Metsä Group, Clariant and Novamont). The two SME exceptions were Process Design Center and MetGen.⁵⁹

The five BIC representatives on the BBI's Governing Board are executives from the two above-mentioned SMEs as well as from Sappi Europe (a global pulp and paper company), Glanbia (a large Irish dairy and nutrition company) and Clariant (a chemical company).⁶⁰

Since its launch, BIC's membership has almost tripled to include more than 100 members representing over 200 companies. Other big names in biotech, energy, petrochemicals, agribusiness and beyond have joined, such as BASF, Total, AB InBev, DuPont, P&G, Unilever and ENI Versalis.

BIC's description of its membership benefits offer an explanation for this popularity; engagement enables members to help in "driving the Bioeconomy Agenda" and in getting "a head start in winning BBI funding".⁶¹ BIC explains:

"Since BIC members develop the Annual Work Plan, they have access to information early before the official publication of the call for proposals. This increases their chance of writing successful project proposals. 64% of BIC large enterprises, SMEs and SME clusters are represented in granted BBI projects (2014-2017)."

BIC insists that: "This input has a direct influence on the development of the EU bioeconomy." And the BBI's 2017 interim evaluation also confirms not only that companies can have a lot influence, but that the Commission itself does not seem very keen to steer the work: "The Commission had not taken an active role in programming of BBI work programmes thus far."

"Since BIC members develop the Annual Work Plan, they have access to information early before the official publication of the call for proposals. This increases their chance of writing successful project proposals".

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BIC

1.3 The European Bioeconomy Alliance: corporate lobbying to turn the bioeconomy into an industry

The various industrial sectors trying to steer EU funding and policies in the direction of an industrial bioeconomy have also set up a broader structure: the European Bioeconomy Alliance. This consortium includes BIC as well as other pre-existing corporate lobby groups.

Created in 2014, just after the launch of the BBI, the Alliance describes itself as “informal” and indeed it is not legally registered in Belgium. It appears to be led by EuropaBio, the biotech industry’s EU lobby group (the bioeconomyalliance.eu domain name was purchased in November 2014 by EuropaBio, which also hosts the website).⁶² It presents itself as “a unique cross sector alliance dedicated to mainstreaming and realising the potential of the bioeconomy in Europe”, and describes its mission as to “lead the transition towards a post-petroleum society”.

More prosaically, the alliance’s objective has been to convince the EU to create a new market for an industrial bioeconomy. Their first position paper on ‘market-creation measure’⁶³ was very explicit in that sense and requested the European Commission to:

1. Frame the debate by implying that the industrial bioeconomy would be circular, and thus sustainable (*“Better emphasise synergies and links between the development of bioeconomy and the circular economy, both through the development of new policy and in communications and public pronouncements”*);
2. Legally enable the production of large amounts of cheap raw materials for industrial use (*“Legislation and policies should promote the availability and mobilisation of EU-grown renewable raw materials in sufficient quantities at a suitable quality and at equitable prices”*);

3. Provide industry with large amounts of public research funding for developing new technologies and industrial facilities without necessitating them to take risks (*“Continue to stimulate and enhance innovation and the development of technology. Increase public funding for demonstration projects and stimulate the construction of demonstrators via Public Private Partnerships”*);
4. Organise and control the market through standardisation (*“Continue to develop and apply clear and unambiguous European and international standards. The standards help to verify claims about biobased products in the future (e.g. biodegradability, biobased content, recyclability, and sustainability of biobased products)”*); and
5. Secure a captive demand for their products (*“Encourage contracting authorities in all EU Member States to give preference to biobased products in tender specifications”*).

The creation of the BBI has already met some of these demands, in particular the third one on subsidies for new technologies and the building of factories. But for others, like securing enough supply or captive demand, other policy areas will need to be drawn in such as the CAP, climate legislation and, more recently, the EU Green Deal and its multiple components.

The position papers published by the European Bioeconomy Alliance and sent to EU decision-makers keep pushing the argument that “the bioeconomy is a major opportunity to help build a carbon neutral future”. They also promise all sorts of benefits, for example in this letter to Frans Timmermans, the Commission’s Executive Vice-President for the European Green Deal:

“Sustainably and efficiently produced biomass from the agricultural, forestry and marine sectors (‘producing more and better’), and valorising side-stream and bio-waste can contribute significantly to Europe’s climate commitments. A strong bioeconomy will create jobs, stimulate growth and rejuvenate rural areas as well as reducing Europe’s dependence on imports while increasing the security of supply. In addition, it can enhance biodiversity through sustainable management of land and resources.”⁶⁴

This report will show that most of these claimed benefits are unfortunately largely overblown. Given the current context, the claim to carbon neutrality, in particular, is false (see Section 4.3). Current biomass production in Europe is unsustainable, and cannot realistically be expanded much in the European farming and forestry sectors given their current structure and practices. Furthermore, biomass extraction from nature most certainly does not enhance biodiversity (see Section 3).

While the Alliance portrays the ‘bioeconomy’ as a new concept, the interests it defends are not at all new: sugar, starch and vegetable oil mass production, industrial forestry resulting in paper and timber, and a few downstream industries that can process these raw materials with the technologies provided by the biotech industry. The following 12 lobby groups are gathered under the umbrella of the European Bioeconomy Alliance:

- BIC – the Bio-based Industries Consortium
- CEFS – the European Association of Sugar Manufacturers
- CEPF – the Confederation of European Forest Owners
- CEPI – the Confederation of European Paper Industries
- COPA-COGECA – European Farmers and European Agri-Cooperatives
- ePURE – the European Renewable Ethanol Association
- EuropaBio – the European Association for Bioindustries
- EUBP – European Bioplastics
- FEDIOL – the European Vegetable Oil and Protein Meal Industry
- FTP – the Forest-based Sector Technology Platform
- PFP – Primary Food Processors
- Starch Europe – the European Starch Industry Association

The Alliance states that it represents about 4,700 companies, 12 million farm holdings and 16 million forest owners, and that it employs a total of 29 million people.⁶⁵ However, it appears that this structure has never registered in the EU lobbying transparency register,⁶⁶ and its name does not appear among the registered meetings with EU Commissioners.

2. Spotlight on selected projects funded by the BBI

As the BBI funds more than 100 research projects, reviewing all of them would not be feasible in the context of this report (the BBI website provides basic details for each project it funds). But a couple of examples do cast an interesting light on what is eligible for funding in the name of ‘innovation’ in the ‘bioeconomy’.

2.1 Public research funding for helping industry’s lobbying

The BBI’s three stated objectives are to demonstrate technologies, to develop business models and to set up flagship biorefinery plants. However, some of the projects have a different goal: to remove regulatory ‘barriers’ and to convince decision makers and the public that embracing bio-based products would necessarily be a good thing for the environment. What these projects actually do is use public funding – and public researchers – to serve the lobbying and PR goals of industry.

In the introduction to this report we met STAR4BBI,⁶⁷ a €1 million project run between 2016 and 2019 by three universities to establish “a coherent, well-coordinated and favourable regulatory framework that helps develop a cutting-edge bio-based economy for Europe”. In other words, this initiative put public researchers to work in support of industry’s strategic goals.

The first recommendation in STAR4BBI’s final “regulation action plan” is to “integrate a fossil carbon tax at EU level”. The authors offer the valid observation that bio-based products suffer from unfair competition from fossil fuels-based industries because “costs for externalities of fossil based products (e.g. damage to environment) are paid by society, and not by the producer/buyer of the product.”⁶⁸ They also note that “bio-based products have to prove that they are environmental[ly] friendly whereas fossil based do not”. Perhaps this is because there is not much left to prove in terms of the damage caused by fossil fuels-based products?

In any case, the project’s policy recommendations include introducing a carbon tax, accompanied by a discussion on the pros and cons of a tax on fossil carbon versus one on CO₂ emissions. Taxing fossils fuels to discourage their use has been long debated in climate policy circles. Yet despite its appeal, the concept has shortcomings – some argue quite convincingly that policy interventions, for example restricting the overall use of fossil fuels or even banning some of them, would be more effective than a tax or market-based mechanisms.⁶⁹ But the price of fossil carbon is in any case a fundamental parameter for the entire biomass industry: as long as fossil fuels remain cheaper than biomass, biomass-based industries can only survive thanks to public intervention. And this leads to an absurd situation: if the BBI succeeds in creating an entire industry that feeds on plant matter within a context where there is no consideration for limiting consumption, the only protection for forests and soils in Europe and beyond will be cheap oil prices.

The project's second recommendation is to change EN 13432, the existing standard for compostability, in such a way that companies producing compost with household waste would have to start accepting certain bio-plastic products in their processes, which they have so far refused. STAR4BBI's project partners "recommend to agree on certain product groups with co-benefits that should be accepted by the composting facilities. To have the desired result this should happen in cooperation with the government to make these product groups mandatory compostable."

This condition would help to secure a market for bio-based plastics. Ignoring current trends in environmental policy around the world,⁷⁰ STAR4BBI authors start from the assumption that "society will need plastic packaging in the future".⁷¹ They elaborate complex scenarios and regulations to "support transition to bio-based plastic packaging", and their recommendations recycle old lobbying lines from the packaging industry such as "littering indeed is a consumer issue, not a material issue".⁷² The fact that the entire bottling industry, to give an example, dropped recyclable glass bottles with deposits in order to use more profitable and polluting plastic ones is not mentioned anywhere. And the fact that bioplastics are not necessarily more biodegradable nor less toxic than fossil-fuels-based ones (see Section 2.5) was also not discussed.

STAR4BBI's third recommendation was to establish a legal framework for "renewable materials" (another word for biomass in this context) "similar to the one existing for biofuels/bioenergy to level the playing field". This would consist in "binding targets" that would force EU Member States to impose a certain amount of biomass to be used in the production of specific goods.

Referring to the EU's biofuels policy could be seen as an odd recommendation given the disaster that this legislation caused ([see Introduction](#)). A possible explanation could be that the companies and lobby groups (biotech, oil, chemicals and agribusiness) that imposed the 2009 EU biofuels targets are largely the same ones involved in STAR4BBI's advisory group, and more broadly in the BBI. And the interests of these groups remain to process as much biomass as possible.

The last recommendation, which addresses the development of an "effective End-of-Life" (EOL) scheme, is more interesting in that it tries to bring a more holistic and circular approach to the production chain. STAR4BBI proposes "multi-component approach" that includes design for recycling, the stimulation of recycle quality rather than quantity, design standards for recycle quality, the establishment of an independent organisation responsible for balanced life cycle impact data, recycling targets for overall life cycle impact, and the establishment of an independent authority for End-of-Life.

2.2 Public research funding for corporate PR

STAR4BBI's report on 'market barriers' explained that the biofuels sector is responsible for the negative image of the bio-based sector.⁷³

This debate has been caused by the strong incentives for biofuels and their perceived negative impacts on food security and biodiversity, but the bio-based material industry gets hit by it as well – even though the scales are much smaller and there are no public subsidies or mandatory use.

Yet such incentives are precisely what they propose to introduce for the bio-based materials industry.

The report suggested that the core issues for the industry are “complexity of information, emotionality, NGO campaigns, certification and labelling as well as greenwashing – all of which are solvable through legislation and standardisation only to a very limited extent”. NGOs are blamed for emotionality when they run campaigns that warn about the impacts of biofuels made from agricultural crops on food security (the report does not cite other examples). As such ‘negative information’ is perceived by industry as a ‘market barrier’, the BBI is funding a couple of projects to address the issue.

For example BIOBRIDGES, launched in 2018, received about €1 million to spend up until 2020 to “improve the marketability and market acceptance of bio-based products” by “fostering close cooperation and partnerships among bio-based industries, brand owners and consumers’ representatives”. However, although there is no shortage of PR consultants in the consortium, not a single consumer organisation seems to have been included among the project participants.⁷⁴ The recommendations of the BIOBRIDGES report on enhancing “collaboration between industry, brand owners and consumers” focused solely on how to communicate success stories to consumers, and how to make bio-based products recognisable. None of its conclusions included the involvement of a true consumer representation, nor tried to define what sustainable bio-based products could be.⁷⁵

The BIOWAYS project, which was endowed €965,000 in taxpayer money between 2016 and 2018, promoted “the huge potential of bio-based research results” and planned to “raise public awareness of bio-based products” by producing short videos, serious games and a variety of publications.

The BIOCannDo project, also funded to the tune of €1 million between 2016 and 2019, is also about developing “clear, scientifically sound messages about bio-based products that can be easily understood by a general audience” in order to increase “acceptance of bio-based materials and engage EU citizens in the new bioeconomy.”

In sum, all of these lavishly-funded activities are about creating a positive image. From slick websites and social media to smartphone games about the bioeconomy, they aim to encourage consumers to choose bio-based products. We were not however able to find information either on these sites or in the videos mentioning the consequences that added demand for plant-based materials could have on already strained ecosystems, in Europe and throughout the world.

2.3 Public research funding to help with GMO deregulation

Among the policy recommendations published by the STAR4BBI project, a report published in February 2019 states that safety regulations for ‘breakthrough technologies’, notably gene editing, need to be holloled out.^{76,77} The report proposes “to exclude new genome editing techniques (e.g. CRISPR-Cas) from the strict regulation of GMO, when applied to bio-based products” and suggests that products obtained from these techniques should either be totally deregulated, or subjected to specific and distinct new rules.

This message is certainly well-timed: it comes at a moment when the European Commission is under massive pressure from the biotech industry, the US and other trading partners to re-open the EU's GMO laws in order to exempt products obtained with new gene editing techniques like CRISPR-Cas from these rules.⁷⁸ In other words, industry does not want these new GMOs to be tested, monitored or labelled, to the detriment of the environment, food safety and consumers.

Some of the projects funded by BBI include the development of GMOs, and some particularly require regulatory caution as they pose biosafety risks. For example, the MAGNIFICENT project, with partners including fossil giant Total, aims to develop genetically modified species of algae⁷⁹ for the production of food, feed and cosmetic ingredients.

As Biofuelwatch has pointed out, GM microalgae could become a kind of “living pollution’ that is impossible to recall”.⁸⁰ The possibility that GM microalgae escapes from cultivation facilities, which includes the risk of invasive algae outcompeting native species, is an issue that requires serious attention.⁸¹

“Exclude new genome editing techniques (e.g. CRISPR-Cas) from the strict regulation of GMO, when applied to bio-based products”

STAR4BBI project

The biotechnology industry and EU GMO rules: a regulatory battle at the heart of the industrial bioeconomy

The re-engineering of various life forms, in particular microorganisms, is a key 'enabling technology' for the industrial bioeconomy. From the genetically modified plants at the start of the chain for BIOFOREVER's high cellulose content poplars to the MAGNIFICENT project's GM microalgae for biofuels production and the various microorganisms used in the 'biorefineries' funded by the BBI, there are hopes that biotechnology might enable the chemical and energy industries to process plant matter into all sorts of products. As such, it makes sense that the main driving force behind the creation of the BBI is EuropaBio, the biotechnology industry's lobby group.

The outcome of the bitter regulatory battles that have been raging around agricultural GMOs over the past 20 years in Europe⁸² is therefore of paramount importance for the development of the industrial bioeconomy. GMOs have systemic risks; they are self-replicating living beings that never occurred before in natural ecosystems. As such, "their risks cannot be localized".⁸³ Like most domesticated species, most GMOs are too weak to survive in nature, but there are precedents of GMOs escaping human control and spreading into the wild, or at least disseminating their genetic material. For instance, a Round-up resistant GM grass originally intended for golf courses has been spreading for fifteen years in Oregon, USA.^{84,85} Also, as early as 2001, contamination of traditional maize varieties with the DNA of GM maize was found in two remote regions in Mexico, the centre of origin and diversity for this crucial food crop.⁸⁶

Another main cause for the controversy around GMOs is "the characteristics and objectives they are given via the type of new traits introduced, from the context in which they are inserted and ... the way they are used".⁸⁷ For instance, by industry's own account,⁸⁸ GM soy (used to feed animals in unsustainable factory farming)⁸⁹ accounted for half of all GM crops grown globally, and 88 per cent of GM crops grown around the world in 2018 were engineered to tolerate wide-spectrum herbicides that kill nearly all plants (46 per cent with herbicide tolerance and 42 per cent with herbicide tolerance in combination with insecticide production). These crops have entrenched monocropping and thereby accelerated biodiversity destruction. Socio-economic impacts such as dominance over the food chain, notably through patents granted to GM crops, have further added to the controversy.

While the seed and chemical companies selling these GMOs profit, as do some farmers for whom cultivation is made simpler, there are few tangible benefits for citizens and significant environmental destruction. On the other hand, the use of biotechnology in the medical sector, with numerous applications such as gene testing and the production of human insulin and antibiotics, has not given rise to much controversy in Europe since the late 1990s. This is probably because these processes are essentially confined to laboratories and benefits are more apparent.⁹⁰

(Continued overleaf)

The use of biotechnology for industrial applications ('white biotechnology'), which is typically what biorefineries try to do, lands somewhere in between these two poles; while its intended use is not at the scale of agricultural biotechnology, strict containment is unrealistic. For instance, several biorefineries trying to produce ethanol have been plagued by process contamination by external microorganisms (see Section 2.4).

In the EU, GMOs used in open or contained environments alike must be submitted to safety and environmental risk assessments, must be traceable, and, when ending up in food products, must nearly always be labelled.⁹¹ Over the last decade, new genetic engineering techniques (including 'genome editing'), like CRISPR-Cas or oligonucleotide-directed mutagenesis (ODM), have been developed and are being applied in labs to food crops, trees, farm animals and insects. Dozens of patents have already been filed in this field by large agrochemical corporations like Bayer-Monsanto, BASF and Dow AgroSciences (Corteva).

This has led to a new regulatory battle. The biotech industry has been strongly lobbying the EU to completely remove health and environmental safeguards for the GMOs obtained through these new techniques. Such regulatory changes would mean no evaluation of risks to health or environment, no post-market surveillance, and no freedom of choice for consumers, farmers and breeders as there would be no labelling, no traceability and no control.⁹²

Farmers and environmental groups published a joint position in February 2017 calling for the application of the EU's GMO rules to new GMOs.⁹³ The European Network of Scientists for Social and Environmental Responsibility (ENSSER) also published a statement explaining why products from new (and potentially much more powerful) GM techniques like gene editing need to remain regulated.⁹⁴ There are risks and uncertainties associated with each of the new GM techniques, some of which are common to all of them. Given that many of these techniques are new, it is not yet possible to fully evaluate the potential for adverse effects. The fact that they can be used in combination and multiple times means that these effects could be significant even when individual use may be low risk. As yet, there has been little or no assessment of the biosafety implications of combining the techniques. In 2016, the Transatlantic Consumer Dialogue adopted a resolution stating that risks must be assessed and products must also be labelled in accordance with consumers' right to know.⁹⁵

This battle intensified after a key ruling by the European Court of Justice (ECJ) in July 2018.⁹⁶ This decision, which was in line with the precautionary principle, said that the current GMO regulations must be applied to all products produced from new genetic engineering techniques that have been developed mainly since 2001 and do not have a long safety record. This ruling sparked an even fiercer lobby campaign from industry, as well as strong pressure from countries such as the USA on the EU to change its GMO regulations.⁹⁷

2.4 Public research funding for commercial-scale ‘biorefineries’

BIOSKOH (€21.5 million, 2016-2021), LIGNOFLAG (€24.7 million, 2017-2022), BIOFOREVER (€9.9 million, 2016-2019) and SWEETWOODS (€20,96 million, 2018-2022) are some of the BBI’s flagship projects. Flagship projects are awarded the most funding and aim to build ‘biorefineries’ and factories turning biomass into fuels, chemicals, materials such as plastics or other products.

BIOSKOH, for instance, wants to produce “biobased ethanol in Slovakia for global chemical and energy markets” using “abundant, secure, ILUC-free (that do not cause indirect land use change), low-cost biomass” produced mainly from agriculture “residues” (wheat, rye, barley, corn stover, rapeseed and soy straw), woody biomass and cultivated energy crops (miscanthus, switchgrass and sorghum) on “marginal/degraded” land.⁹⁸

This project will use the PROESA™ technology developed by Beta Renewables. This company is a joint venture between Biochemtex, a subsidiary of Italian chemicals company M&G, and Novozymes, a large Danish biotech company that describes itself as the “world’s largest provider of enzyme and microbial technologies”.⁹⁹

The EU has already pumped dozens of millions of euros into the development of this technology under FP7 (€8.6 million and another nearly €18 million through the BIOLYFE and COMETHA projects respectively) to develop two biorefineries in Italy. However, reports from the project were very mixed; in particular, the operation was “plagued with pre-treatment issues” (the raw biomass was not “clean” enough and other microbes kept disrupting the fermentation process).¹⁰⁰ The refineries were bought in 2018 by Versalis,¹⁰¹ a subsidiary of Italian oil giant ENI, after M&G went bankrupt (for other reasons).

It is worth noting that several biorefinery projects around the world aiming to produce ethanol from cellulose have been terminated in recent years.¹⁰² Dupont¹⁰³ and BP¹⁰⁴ sold plants comparable to these following unsatisfactory results, and several other projects elsewhere meant to be using the PROESA technology failed to materialise.¹⁰⁵

However, the failures experienced by these two previous plants with the PROESA technology are not mentioned on the BIOSKOH project website. On the contrary, the project aims to set up a “first-of-its kind commercial-scale second-generation biorefinery” producing 55 kilotons per year of cellulosic ethanol, with plans to expand to 110 kilotons per year in a second stage. As the two Italian ‘pre-commercial’ biorefineries were meant to produce 40 and 80 kilotons per year respectively, BIOSKOH looks like a slightly bigger repetition of the previous unsuccessful projects. It has similar objectives and participants and uses the same technology, yet there is no acknowledgement that these past projects have flopped.

CEO’s emails to BIOSKOH about how much bioethanol had so far been produced in the plant and from which source of biomass remained unanswered at the time of writing. However, representatives from the project who were attending a Brussels stakeholders event in December 2019 explained that the construction of the plant had not yet been completed, three years after the start date. Any mention of using woody biomass and agricultural “residues” seems to have disappeared in the projects’s latest communication material, with only “dedicated crops grown on marginal land” being mentioned.¹⁰⁶

The LIGNOFLAG project, whose purpose is to build a “first-of-a-kind commercial flagship facility for lignocellulosic feedstock to ethanol conversion” in Podari, Romania, seems to experience fewer pre-treatment issues. The basis of the process is wheat straw, first sterilised and softened with pressurised steam, and the technology used in the plant, called ‘sunliquid’, was developed by one of the biggest specialty chemicals companies in the world, the Switzerland-headquartered Clariant. Sunliquid uses microorganisms selected through high-throughput screening that produce feedstock-specific enzymes to decompose the cellulose contained in the straw into simpler sugars.¹⁰⁷

These sugars are in turn used to feed other “proprietary fermentation microorganisms” to produce the ethanol. The lignin leftovers are used as a fuel to power the whole process, and the leftovers (ash, proteins, fat, undigestible sugars) are used to produce biogas.

LIGNOFLAG’s ethanol is meant to be used as a biofuel in the transport sector, with an advertised ratio of four to five tons of straw for one ton of ethanol.

The removal of all straw from the soil after harvest risks organic matter depletion. A LIGNOFLAG representative¹⁰⁸ explained that only plant parts higher than 30 centimetres are used for the project, with the rest remaining on the field. Yet a farmer interviewed by Clariant for a promotional video¹⁰⁹ explains that the LIGNOFLAG approach enables him to have a “clear” field as he can “get rid” of the straw. Furthermore, a Clariant engineer explains that removing all of the straw residues reduces the risk of diseases being transmitted from one crop to another.

As many farmers engaged in soil conservation practices know, not ploughing the soil and leaving precisely this type of dead organic matter on the fields as a mulch is very important for feeding it and preventing its erosion and mineralisation, as well as for maintaining moisture levels.¹¹⁰ Restoring and increasing the carbon sink role and resilience of agricultural soils is not a small issue in times of climate crisis, but there is no short-term economic incentive today for farmers to perform these practices (the economic benefits of a healthier soil only materialise after a couple of years). The issue is all the more sensitive as topsoils in Romania (and Southeastern Europe in general) already have low soil organic carbon content (an average of 1.36%).¹¹¹

Furthermore there already are competing uses for straw. In Europe, livestock farmers often use wheat straw as animal bedding – which is considered a strong condition for farm animals’ welfare.¹¹² Recurring droughts have put pressure on the straw supply in recent years, and the new market created by Clariant’s technology would create additional demand for this resource, driving prices up.

From the moment the plant starts operations, it will mobilise up to 300,000 tons of wheat straw annually for ethanol production. Based on Romania’s 2018 wheat harvest figures (10.2 million tons),¹¹³ that represents about 2% of the total production of wheat straw in Romania for one single plant.¹¹⁴ And even if “residue sustainable removal rates” were embedded in the project, as some EU research on “maximising the yield of biomass from residues of agricultural crops” suggests,¹¹⁵ how will these theoretical rates survive the economic incentive to disrespect them in order to maximise short-term profit?

Clariant makes no mystery of the fact that it wants to sell this technology to farmers all over the world so that they can value their lignocellulosic “agricultural residues”: the straw and husks from rice paddies in Asia, the harvest residues and bagasse from sugar cane in South America, the corn stovers in the US, and so forth. This only serves to multiply the threat to soils’ resilience all over the world.

BIOFOREVER, a consortium of 14 participants coordinated by the Dutch food multinational corporation DSM, is “establishing ligno-cellulosic biomass as a feedstock for the chemical industry”.¹¹⁶ The company is currently testing the commercial viability of processing five woody biomass feedstocks into materials the chemical industry can use (the project explains that it will “target spruce, poplar and wood waste but will also assess other LC feedstocks in order to achieve the most commercially viable and sustainable value chains”).

Here again, participating companies receive EU public research funding to build plants, including a €1.5 million contribution for a pilot biorefinery built by the Dutch company Avantium (originally a spin-off from Shell). This plant, which opened in July 2018,ⁱⁱ uses the company’s proprietary DAWN technology[™] to convert various types of biomass into industrial sugars and lignin.¹¹⁷

ii With an interesting promotion video featuring a young woman enthusiastically drumming on various elements of the new plant, surrounded with smoke and lighting effects. Don’t miss it.

As the EU funding covers the entire supply chain, research efforts are also put into the biomass supply. While the deliverables of the project include an acknowledgement that a key success factor and one of the “main challenges” will be “securing long term supply of large quantities of sustainable biomass at competitive prices”, it isn’t clear what efforts are being made to document the sustainability of the supply beyond the usual approach of increasing yields in monoculture plantations. Questions by CEO on the nature of the biomass used in this project and the performance of the technology remained unanswered. But the activities of another member of the BIOFOREVER consortium, the German biotech company Phytowelt Green Technologies, provide some clues. Phytowelt received €613,722 so that it could continue developing ‘improved’ poplars¹¹⁸ (which the company insists should not be considered as GMOs under EU law). Phytowelt claims that these poplars, which it had already bred using protoplast fusion technology, show increased biomass production.¹¹⁹ They plan to engineer new poplar varieties with “improved wood quality (lignin content, energetic properties)”; in other words more cellulose and less lignin.

SWEETWOODS is a project that aims to establish a “unique wood fractionation Flagship plant and demonstrate novel value-chains based on sustainable hardwood resource[s]”. It is coordinated by the Estonian company Graanul Invest, which is the largest producer of wood pellets in Europe. Graanul receives €10.5 million out of the total €21 million contribution from the EU, for a total project budget valued at about €43 million.¹²⁰

SWEETWOOD is an important project in the sense that one of its participants seems to have found a way to better value lignin, the very compound that the afore-mentioned Phytowelt is trying to reduce the proportion of in its ‘improved’ poplars.

Lignin is a very complex compound found in the cell walls of plants. It protects plants against insects and makes them rigid, and was a key step in the evolution of terrestrial life as it provided plants with the “physical rigidity to stand upright, strengthened the water-conducting cells for long-distance water transport, and allowed plants to expand significantly in body size”.¹²¹ But lignin has long been a problem for the biomass industry, as earlier described¹²² in a biofuels industry publication:

“...the meanest, toughest hombre of a material that ever came out of the ground, it's the Yosemite Sam of the advanced bioeconomy – unreliable, inconsistent, grumpy, fiery, strident, incapable of improvement, impossible to do anything with, and impossible to ignore.”

Generally considered as a waste product, lignin was usually only used as a fuel (such as in the LIGNOFLAG project).

In the words of the CEO of MetGen, a Finnish company benefiting from the SWEETWOODS project to the tune of €6.6 million, “we truly believe that anything that can be done with oil can be done with wood”.¹²³ Beyond the slogan, MetGen claims to have achieved a technical breakthrough, using a series of enzymes from the laccase family that are able to degrade lignin in nature. According to the documents produced by the company, these enzymes would be able to “oxidise bulk biorefinery lignin” (once the lignin has been separated from the cellulose in plant cells) “at its water-soluble state at pH 10,5 – without mediators, solvents or heavy metals” into various polymers and monomers. This takes place under “outstanding operational conditions, such as temperatures over 80°C and pH up to 11”.¹²⁴ SWEETWOODS states¹²⁵ that this “will lead to wood-based biomaterials being produced on an industrial scale for the first time”.

Although this would be great news for these companies, it is perhaps less promising for the forests that would be sacrificed in the name of cutting back on fossil fuel consumption. Indeed, while tree plantations deliver homogenous timber that is usually used for woodwork, chances are high that, just as in the case of pellets,¹²⁶ the main source for this project's wood is firstly mixed forests. The diversity of these forests makes them less profitable for the wood industry to exploit, but their role in providing carbon sinks is far superior (see Section 3). That said, if the result of wood processing were to become more profitable than timber thanks to the new technologies developed within SWEETWOODS, tree plantations could then also be used to feed these new industrial processes.

Perhaps an indication of where the project's priorities lie, the project description on the BBI website lists six “core objectives” for the project, the first being to “show the successful and profitable production – on an industrial scale – of high-purity lignin along with penta- and hexa-carbon carbohydrates from hardwood” and the last to “evaluate the environmental and socio-economic performance of the SWEETWOODS plant process and of the developed products through a Life Cycle Sustainability Assessment, as well as a viability analysis.”

But on the project website itself, only five objectives are left. Environmental and socio-economic performance did not make the final cut.¹²⁷

2.5 Public research funding to greenwash the plastics and packaging industries?

Some of the other projects funded by the BBI, such as PEFerence, BioBarr and FRESH, are direct subsidies for companies to find bio-based replacements for disposable plastic products. However, these bioplastics could be just as damaging as fossil fuel-based plastics as they are not necessarily more biodegradable nor less toxic. They do nothing to reduce plastic consumption levels, nor do they address business models based on disposable packaging.

PEFerence is a €25 million flagship project. It aims to build in Antwerp, Belgium a biorefinery plant that turns plant-based sugars (apparently fructose) into FDCA (furan dicarboxylic acid).¹²⁸ FDCA is the building block for a new polymer called PEF, which can be used to produce plastic bottles or films. PEFerence partners are all big plastic producers or users, and include BASF, Nestlé and Lego. Another partner, Avantium Chemicals (also involved in BIOFOREVER), is a R&D partner of Coca-Cola for its so-called 'Plant BottleTM',¹²⁹ a plastic bottle containing up to 30 per cent bio-based carbon. The project was coordinated by Synvania, a joint venture between Avantium and BASF, and aimed to become a market leader in both FDCA and PEF production until BASF withdrew from the joint venture and Synvania became wholly-owned by Avantium. According to the BBI's director, the project has now been restructured and was given more time to adapt to this new situation.¹³⁰

But while the bioplastic PEF is described as having a superior performance to PET,¹³¹ being “sustainable and also completely recyclable”, its proponents neglect to mention that it is not biodegradable,¹³² and will therefore add to the global plastics waste problem. Furthermore, the evaluation of its products' environmental and socio-economic performance will only be carried out at the end of the project in 2022, making its sustainability claim a bit premature.ⁱⁱⁱ

And there is the substitution issue. PEFerence states that “PEF's excellent barrier properties and its calculated cost price indicate that it can compete with traditional, multi-million tonne, packaging products such as aluminium cans, multilayer packaging and small size multilayer PET bottles, on price and performance when produced at scale.”¹³³ By 2020, the global production of PEF's fossil fuels-based equivalent PET alone will be approximately 73.5 million metric tons.¹³⁴ Where will all the necessary fructose for PEF products come from if PEF is to replace PET, not to mention all of the aluminium packaging?

The **BioBarr** project, supported by the Commission with €3.25 million in funding, also plans to produce food packaging using bioplastics.¹³⁵ Specifically, the project will develop “new bio-based and biodegradable food packaging materials by improving the barrier function of the biopolymer PHAs (polyhydroxyalkanoates)”. But since PHAs – one of the two main types of bioplastics – are not effective barriers against oxygen and water, one of BioBarr's activities will consist of combining them with other bioplastics, PLA (polylactic acids).

iii According to the BBI's Director, Life Cycle Analysis (LCAs) are only performed at the end of projects (when it is requested, see section 2.2)

However, unlike PHAs, PLA does not biodegrade in the environment, nor is it recyclable (it only breaks down in industrial composters at high temperatures) unless it is depolymerised and then repolymerised (which takes additional energy and more PLA). Moreover, the German research project PlastX¹³⁶ has found that PLA, like several (but not all) fossil fuels-based plastics, can be quite toxic to humans.

And, be it for PEFerence or Biobarr, what is at stake is only switching from fossil fuels to plants as industrial feedstock: it does not change the many other problems posed by the massive use of plastics, starting with the human and environmental health problems caused by plastic waste.¹³⁷ For instance, raw plastics are hardly ever used alone; they are combined with other chemicals, additives, to obtain the desired properties. But these additives can also cause serious environmental and human health problems.

The **FRESH** project aims to create “fully bio-based and bio-degradable ready meal packaging”. This sounds promising, as annual ready meal consumption in Europe is at “6.5 billion and growing”, and is creating “vast quantities of waste, many of which go for landfill”.¹³⁸ The resulting fibre-based tray, manufactured by the global food packaging company Huhtamäki (from Finland) is now being tested in the UK supermarket chain Waitrose, and the material comes from the Swedish wood company Södra (whose motto is “the future is made of trees”). But whilst biodegradable packaging for ready meals might be better than oil-based plastic packaging, should we not be considering whether we really need (or should encourage) this steady increase in the consumption of processed ready meals, which is associated with overweight and a decrease in cooking skills?¹³⁹ And where will all the trees come from for these 9 million disposable trays to be sold by the end of 2019 in this pilot project, and the many more to follow if this takes off?¹⁴⁰

“The future is made of trees.”

Södra, a Swedish wood company
participating in the FRESH project

3. How much ‘sustainable biomass’ is there really in Europe?

This is a key question in all of the cases presented so far in this report. After all, humanity relied almost exclusively on natural resources before the fossil fuels era, and hundreds of millions of people still do. And for hundreds of thousands of years humans managed to survive without completely wiping out the ecosystems supporting them (although the extinct mammoths and other large mammals of the Pleistocene megafauna might beg to differ).¹⁴¹ But this was before Western countries developed a civilization based on the massive use of fossil fuels, and plundered the rest of the world to create the living standards that everyone else now aims to emulate.

This situation echoes the age-old debate between Malthusians (who worry about the consequences of humanity’s needs overwhelming natural resources, a strong trend in political ecology) and Cornucopians (who believe that human ingenuity, science and technology will always find solutions to scarcity problems; this line of thinking suits mainstream economics and corporate interests as well as technology believers such as transhumanists or ecomodernists).

“We truly believe that anything that can be done with oil can be done with wood.”

Metgen, a Finnish biotech company sitting on the BBI’s governing board

As journalist Charles C. Mann put it in his 2018 article entitled *Can Planet Earth Feed 10 Billion People? Humanity has 30 years to find out*:

“...it is as if humankind were packed into a bus racing through an impenetrable fog. Somewhere ahead is a cliff: a calamitous reversal of humanity’s fortunes. Nobody can see exactly where it is, but everyone knows that at some point the bus will have to turn. Problem is, [Cornucopians] and [Malthusians] disagree about which way to yank the wheel. Each is certain that following the other’s ideas will send the bus over the cliff. As they squabble, the number of passengers keeps rising.”¹⁴²

Indeed, this question has also been played out in the drawn-out battle in the realm of agricultural policy: how can we feed the many more people who are expected to live on the planet in the future? The discussion is particularly pertinent given that today’s already strained ecosystems will be stressed considerably further in the future with climate change. And these people are our children, so the choices we make today in answering this question will have profound consequences for them. In fact, children are starting to accuse today’s decision makers of undermining their future, and rightly so.

One thing is for sure: if producing enough food on Planet Earth is already making scientists scratch their heads, the EU's 'bioeconomy' policy of funding projects that aim to make potentially everything made today with fossil fuels out of plants in the future adds enormous additional pressure to the problem. This is particularly the case if there is no serious plan in place to reduce the EU's overall resource use. Recent EU legislation and regulations on the bioeconomy systematically stress the need to be wary of the potential impact on food prices.^{iv}

But even if biomass production were to be developed exclusively on lands not used for food production, this would not come close to solving the issue. Firstly, today's farmers have a strong incentive to grow only the most profitable crops suiting their local conditions. Secondly, 27 per cent of the biomass used for bioenergy in the EU already came from agriculture in 2016.¹⁴³ Before it was ever portrayed as a renewable source of energy or an industrial feedstock, environmental scientists used the term 'biomass' as a measurement of the total organic matter (both living and dead) in a given area. 'Biomass' really is life on Earth itself.

It's a simple matter of proportions.

In 2017, the total consumption of biomass for energy in the EU was assessed by Bioenergy Europe, the Brussels-based umbrella lobby group for the bioenergy industry, at 144 Mtoe (millions of tonnes of oil equivalent), including imports.¹⁴⁴ The Commission's Joint Research Centre (JRC) found a similar figure of 140 Mtoe in 2016, of which 96 per cent was produced domestically and 4 per cent was imported.¹⁴⁵

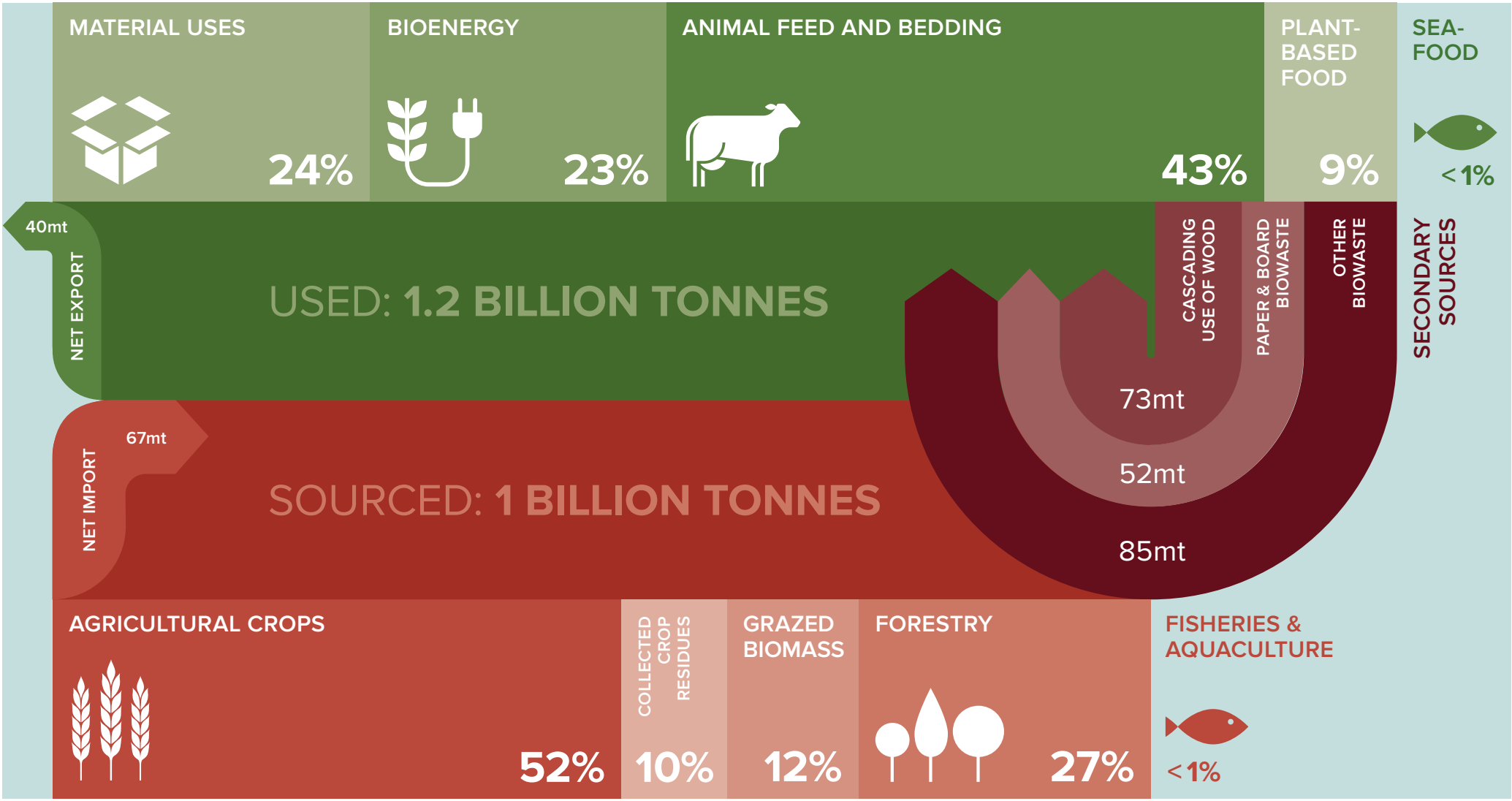
That same year, the EU's total energy use was 1,675 Mtoe.¹⁴⁶ Of this amount, according to Eurostat, "72.2 % of all energy in the EU-28 was produced from coals, crude oil and natural gas", and 13.9 per cent came from renewable energies. Biomass accounted for roughly 60 per cent of the total coming from renewables.

This means that **if we were to produce the energy produced from fossil fuels today – a total of 1209.35 Mtoe – from biomass tomorrow we would need to produce more than eight times the amount of biomass currently being produced in Europe.** And that would be just for energy: not chemicals, materials, or, indeed, "anything that can be done with oil". More modestly, the BBI's Director said in December 2019 that among the partnerships's objectives was "the replacement of 30 per cent of oil-based materials with bio-based ones".

Is there sufficient biomass production potential in Europe to cater to such needs?

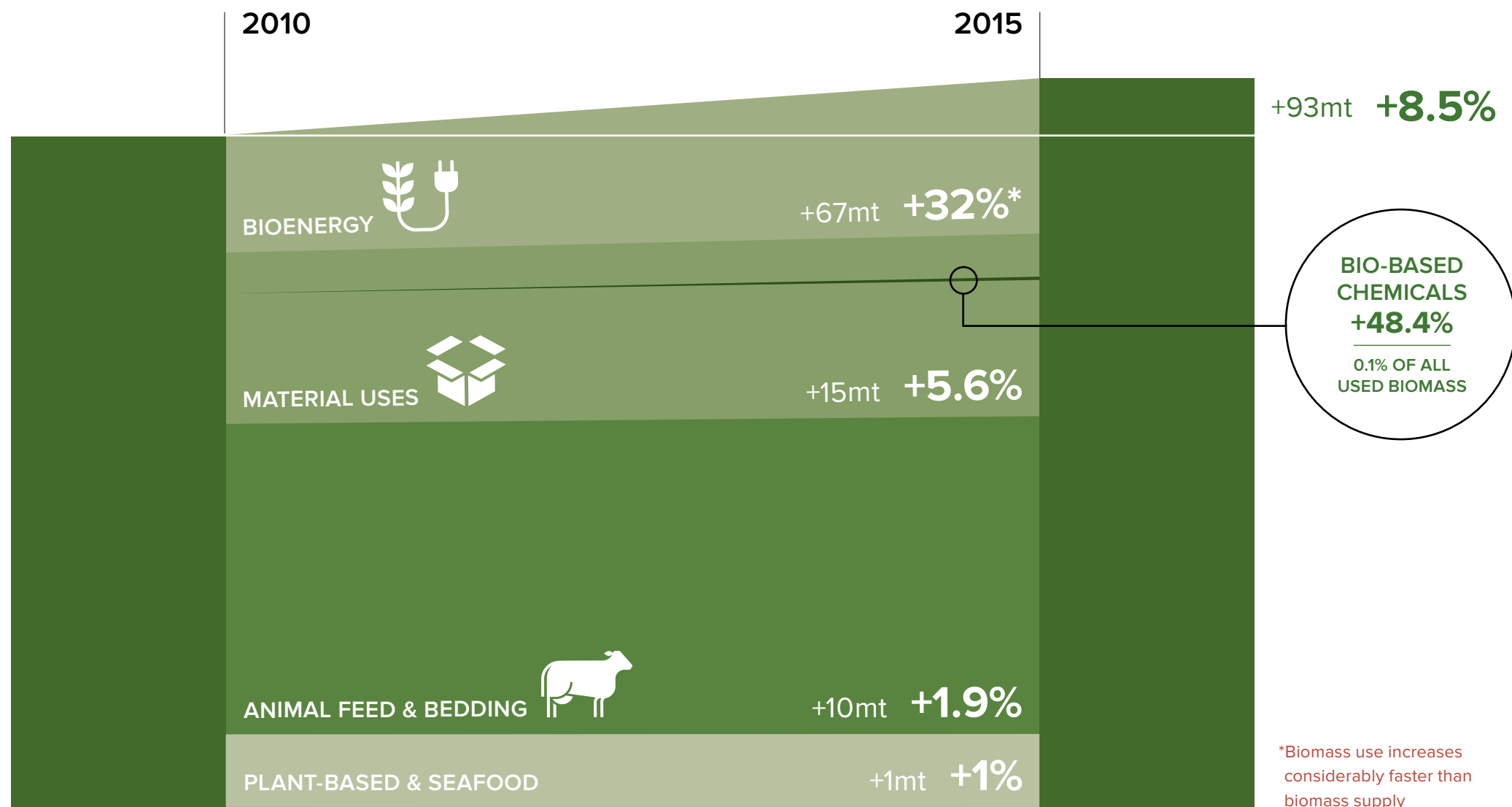
iv The 2018 EU Renewable Energy Directive for instance states that the European Commission "shall, within that framework, pay particular attention to the impact that biofuel, bioliquid and biomass fuel production may have on food prices."

Figure 1: **Sources and uses of biomass in the EU – 2015 figures**



Source: JRC - Joint Research Centre, European Commission, 2019

Figure 2: **How has the use of biomass evolved in the EU?**



Source: JRC - Joint Research Centre, European Commission, 2019

3.1 Biomass from forestry

In 2017, the European Forestry Institute, an international organisation based in Finland with a lobby office in Brussels¹⁴⁷ and whose membership¹⁴⁸ includes universities, public forestry organisations and forestry corporations, published research¹⁴⁹ co-funded by the BBI on forest-based biomass in 39 European countries (thus also including non-EU European countries). The study found an absolute maximum potential amount of 551 Mt (million tons) per year. But this is a “theoretical potential”, which is “higher than what can be supplied from the forest due to environmental, social, technical, and economic constraints on wood supply.” For the authors, a more realistic potential, “most closely aligned to current guidelines of sustainable forest management”,¹⁵⁰ was 401 Mt of dry matter per year.

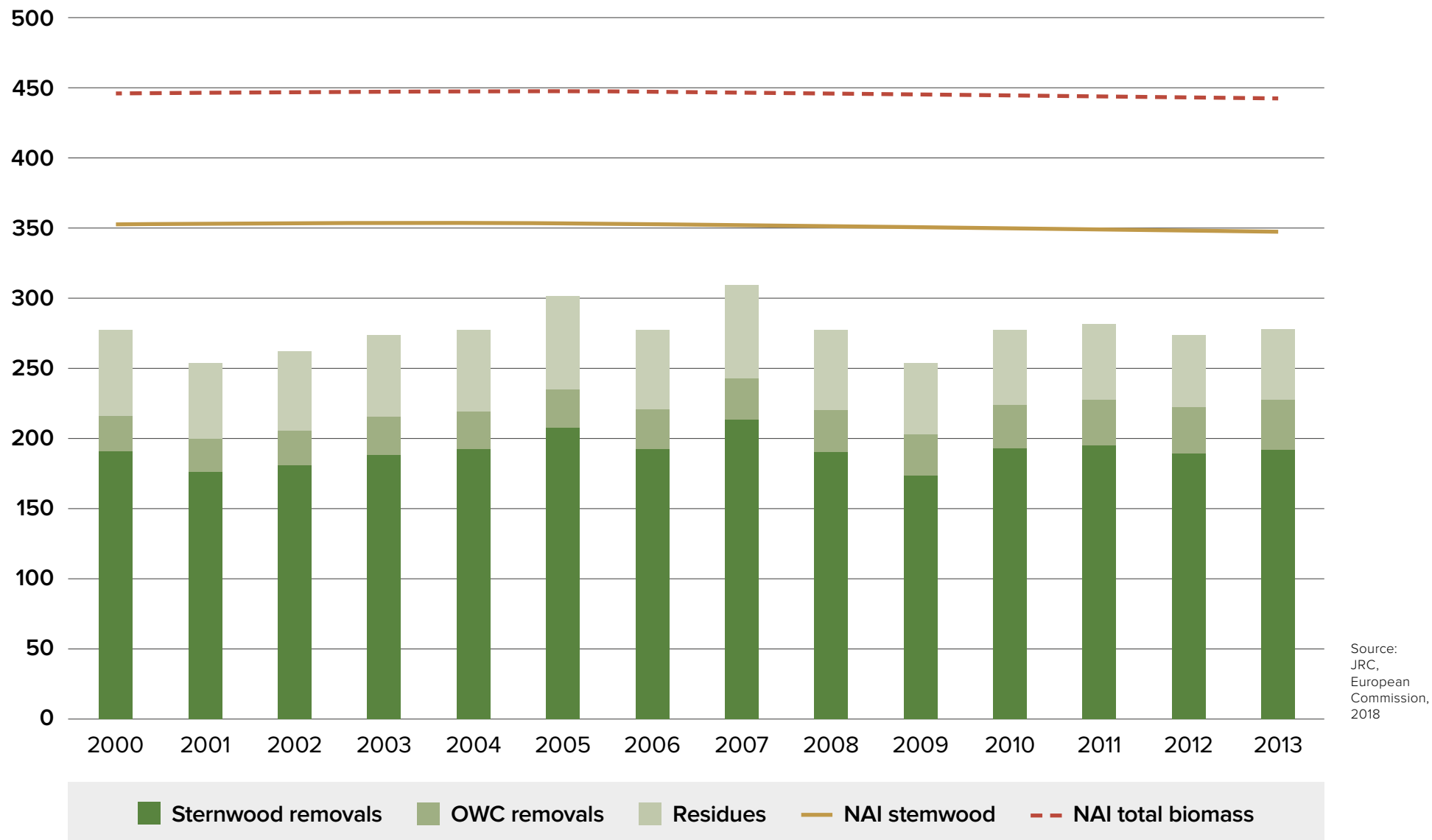
But this is assuming that European citizens and forestry owners would agree to chop down more trees, which would depend in particular on the nature of the forest at stake. Indeed, the authors specify that they “did not consider social factors that may limit mobilisation of woody biomass potentials”, and concluded that “future research on potential biomass availability from European forests should also consider to what extent forest owners would be willing to mobilise additional biomass from their forests and at what costs the estimated potentials could be mobilised”. The European Forestry Institute hosts the Bio-Based Industries Consortium (BIC), BBI’s industry partner.

The European Forest Institute’s numbers are in sharp contrast with the figures reported by the Joint Research Centre (JRC) on the same issue in a groundbreaking report from 2018. According to the JRC, the harvest of wood in EU forests did not increase between 2000 and 2013.¹⁵¹ An average of 224Mt was harvested each year during the period between 2004 and 2013. In 2013, 46 per cent of the wood used for energy in the EU was directly burned, 30 per cent came from wood processing by-products, and the rest was used through various processes – wood pellets represented about 10% of the energy obtained from wood in the EU at that time. The JRC insists these numbers are estimates and contain uncertainties, but the trends and scales are sufficient to draw an already rather reliable overall picture. Importantly, the JRC remarks that **EU forests act overall as a carbon sink, thanks to the harvest ratio remaining below 100 per cent of the Net Annual Increment (NAI), but they also observe that this carbon sink role is in decline.**

“The decrease is mainly due to a decline in the forest sink, e.g. because of increased biomass use but also to forest fires.”

European Commission report, 31 October 2019

Figure 3: **Harvesting and net annual increment of EU-28 forest area available for wood supply; woody biomass in Mt dry weight**



Although European forests still currently absorb more CO₂ than they release, an October 2019 report¹⁵² from the European Commission found the “worrying trend” that:

“...removals of CO₂ from the atmosphere have declined over the past five years. In net accounted CO₂ removals, the decrease amounts to 40% of the total accounted sink. The decrease is mainly due to a decline in the forest sink, e.g. because of increased biomass use but also to forest fires.”

This is all the more meaningful given that, as the European Commission’s Green Deal projects indicate, there is currently a political willingness to keep intact or increase the carbon sink function of European forests.¹⁵³

In fact, **not only is there hardly any potential for increased biomass supply from forests, but current production is already achieved through unsustainable methods.** Recent EU-funded research led by PriceWaterHouseCoopers found that **if all the forest biomass used for energy generation in the EU were to comply with a Sustainable Forestry Management (SFM) certification by 2030, this would achieve meaningful greenhouse gas emissions reductions (a 4.4 per cent reduction) but also that the forest biomass supply would decrease by 26 per cent!**¹⁵⁴

When existing certification schemes such as the Forest Stewardship Council (FSC) or the Programme for the Endorsement of Forest Certification (PEFC) are being criticised¹⁵⁵ for being insufficient¹⁵⁶ from an ecological and social perspective,¹⁵⁷ and more generally SFM certification schemes are coming under fire for being unfit to deal with problems of increasing demand and limited supply,¹⁵⁸ this sends a clear message about current forestry practices in Europe.

An increase in the extraction of forest biomass in current economic conditions would amplify the ongoing trend of replacing mixed forests with tree plantations, which is the main cause for European forests’ decreasing carbon sink role: in the long run, tree plantations would only absorb 2.5 per cent of the CO₂ absorbed by a natural forest!¹⁵⁹ In France, for example, 51 per cent of the country’s ‘forests’ would in fact be monospecific tree plantations,¹⁶⁰ and 80 per cent of French ‘forests’ are less than a century old – the country is now among those in Europe experiencing protests against conifer plantations.^v Tree monocultures damage rural communities,¹⁶¹ as well as soils,¹⁶² waterways and biodiversity.

Mixed and natural forests are however far more productive, in absolute terms, than tree plantations. Another research project funded by the EU has found that “mixed forests have been associated with an approximately 24% higher tree wood production compared to single-species forests. In addition, they are more likely to be able to buffer negative impacts on key species. Mixed forests are, however, more difficult and costly to manage.”¹⁶³

Mixed forests (natural forests are very rare in Europe) offer other functions – water and biodiversity protection, economic production, and social and spiritual uses for people living in and near them – that tree plantations are incapable of replacing.

v A good testimony of the situation, and the importance of better forestry management, is the documentary film by François-Xavier Drouet “Le Temps des Forêts”, shot in 2018 – review: “Le Temps des forêts » : le sapin qui cache le « désert vert »”, Clarisse Fabre, Le Monde, 12 September 2018, https://www.lemonde.fr/cinema/article/2018/09/12/le-temps-des-forets-le-sapin-qui-cache-le-desert-vert_5353783_3476.html

But if forests owners are presented only with short-term market incentives, they will tend to choose unsustainable forestry practices that are more profitable in the short term, and destructive in the medium and long terms. Rather than planning for increasing wood extraction from forests, which can only be done at the expense of climate, biodiversity and the livelihoods of people in Europe and abroad, the priority should be given to supporting sustainable forestry management, extending the lifespan and uses of the limited amount of wood that can be sourced sustainably in Europe, and reducing the need for it – starting with energy efficiency and developing non-carbon-based energy sources.¹⁶⁴

3.2 Biomass from agriculture

As far as agriculture is concerned, the JRC found that an annual average of 956 Mt of biomass was produced between 2006 and 2015.¹⁶⁵ Of this total, 54 per cent consisted of primary products with an intrinsic economic value (economic production) and 46 per cent was “residue production” (leaves, stems, etc.) that might have an economic value (e.g. straw for animal bedding, bioenergy production). The authors insist that “residues are also essential for other uses including ecosystem services such as maintaining soil organic carbon levels in the soil or preventing soil erosion.” In 2013, another 119 Mt were grazed in pastures.

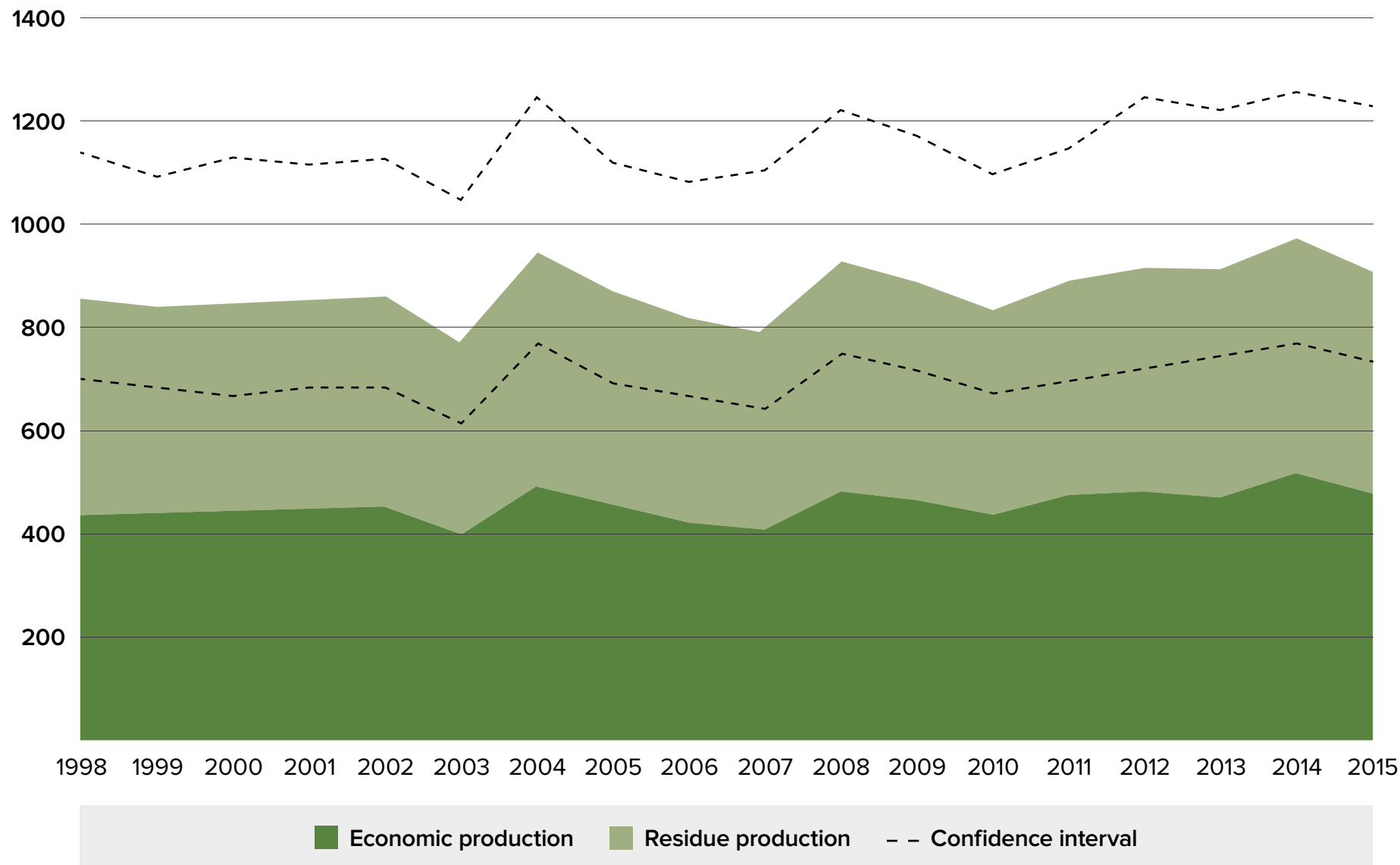
Of the total agricultural production of biomass in 2013, about 80 per cent was used as food and feed, with 15 per cent being directly consumed by humans as plant-based food and 65 per cent being used as animal feed, mostly for the production of animal-based food. This is considerable, and shows how much room for manoeuvre there is in reducing the overall consumption of animal products in European diets.

This is particularly the case with beef and sheep, which use by far the most space and resources in proportion of the nutrients they provide.¹⁶⁶ Around 98 Mt (17 per cent) of the biomass produced annually in agriculture was exported, and the rest was used as either biofuel, biomaterial or waste.

All of these figures are subject to a wide ‘confidence interval’, which means that they are just estimates. Yet the most obvious result is important: that **total biomass production in agriculture only marginally increased over the period** (thanks to yield increases in certain cereals such as maize, as well as the expansion in cultivation of oil seeds). Furthermore, the biomass obtained from fisheries and aquaculture has thus far been negligible (1.5 Mt of dry mass per year). And there is little debate that **the current production is obtained thanks to industrial farming practices that are not sustainable** as they damage agricultural soils¹⁶⁷ and biodiversity,¹⁶⁸ and therefore undermine food security itself in the long run.

The recent above-mentioned research commissioned by the European Commission looking into different scenarios for biomass production in Europe found¹⁶⁹ that the largest source of potential additional biomass for energy was to come from second generation high yield lignocellulosic crops (grassy crops such as miscanthus and short rotation coppice) as well as agricultural biogas. The usual questions about the sustainability of the farming practices involved must be asked.

Figure 4: **Evolution of agricultural biomass production (economic production and residues in Mt dry matter per year) in the EU-28 from 1998 to 2015**



Source:
JRC,
European
Commission,
2018

Could better farming practices lead to increased production in a more sustainable way? It has been showed many times in the literature that, on average, smaller farms have a higher land productivity than larger farms, but that large farms have a much higher labour productivity (with the difference increasing with economic development), destroying rural employment.¹⁷⁰ If higher land productivity is to be achieved in sustainable conditions, a first obvious measure should be to reverse the decades-old EU policy to subsidise land ownership and total output, and support rural employment and research and training into ecological farming instead. This could, in fact, support mixed farming practices that substantially increase the total biomass produced per hectare compared to industrial monocultures, and are usually more sustainable too. But that is not the direction the EU's Common Agricultural Policy seems ready to take, as it is feeding powerful economic and political interests whose concentration provides them with a much better access and influence over national and EU decision-makers¹⁷¹ than the rural communities and the environment being destroyed by their current practices.¹⁷²

“Bio-based systems have the potential to cause trade-offs between climate change mitigation and negative impacts on biodiversity or ecosystem services. This should be investigated more thoroughly.”

JRC, 2018

3.3 Policy implications

From a policy perspective, it is important to note the stagnation of the total biomass supply over the past 10-15 years in the EU. It implies that **unless massive yield increases are achieved on agricultural land already dedicated to biomass production, any growth in the domestic biomass supply for feeding the ‘bioeconomy’, either from agriculture or forestry, can only be achieved at the expense of other uses.** Without any serious planning and regulation, market-based mechanisms will result in cascading impacts on the prices of land, food, wood and all bio-based materials, as well as causing additional negative ecological and social impacts. And this comes at a time when the current dominant farming and forestry practices in the EU must become much more sustainable in order to improve resilience in times of climate crisis. The function of these resources necessitates far more than a mere carbon accounting approach.^{vi}

One might also observe that agricultural approaches that reintroduce trees in more mixed farming practices (agroforestry)¹⁷³ could probably help, and not only from a greenhouse gas emissions reduction perspective. Unfortunately such techniques remain marginal in mainstream agriculture practices and policy circles.

vi The JRC concluded: “Too often, the focus of environmental impact assessment of bio-based systems has been solely on climate change and carbon emissions. However, bio-based systems have the potential to cause trade-offs between climate change mitigation and negative impacts on biodiversity or ecosystem services. This should be investigated more thoroughly.” (JRC, *Biomass production, supply, uses and flows in the European Union. First results from an integrated assessment*, 2018)

Since the domestic supply of biomass is already unsustainable and will never be sufficient to cover all existing needs, how about trying to reduce these needs? Existing targets for reducing Europe's total energy consumption appear to be far too modest to cover the difference.¹⁷⁴ Moreover, in 2019, the EU was going to fail to meet its 2020 energy efficiency target.¹⁷⁵ As far as other industrial uses of biomass are concerned (production of chemicals, materials etc.), we could not find reduction targets anywhere in EU legislation.

As a result, the 'solutions' likely to emerge will consist either of importing biomass from third countries,¹⁷⁶ with huge risks in particular for countries in the Global South (see Section 2.1), or developing more sources of energy that are actually renewable (wind, solar) but whose exploitation would use enormous amounts of resources and land to cover existing uses (just to have an idea about the scale, it was for example estimated in 2017 that covering 100% of EU27 energy needs with solar energy would require so much land that it would be unfeasible).¹⁷⁷ Or non-CO₂ emitting but non-renewable sources like nuclear, whose use causes well-known but unresolvable problems of waste management and risks of radioactive contamination.

How the situation evolves will fundamentally depend upon the respective prices and attractivity of fossil fuels and biomass as industry feedstocks.

Or will they retain what seems to be the current option: sticking with fossil fuels and wrecking the climate for good in order to maintain current European standards of living for another decade or two? According to the International Energy Agency, US\$47 billion was still invested¹⁷⁸ in European fossil fuels-based energy supply projects in 2018 (notably in gas,¹⁷⁹ but also in oil extraction, for example by Shell)¹⁸⁰, versus US\$51 billion in 'low carbon' projects (probably including nuclear). The 11th annual fossil fuel finance report found that 35 global banks financed fossil fuels with \$2.7 trillion since the Paris Agreement was adopted, with the amount rising yet again in 2019.¹⁸¹

How the situation evolves will fundamentally depend upon the respective prices and attractivity of fossil fuels and biomass as industry feedstocks. For now, the risks of the biomass supply are contained: firstly because biomass cannot compete against fossil fuels without public intervention, and secondly because there is only so much money EU countries are willing to pay to keep these industries afloat.

But if the EU starts to develop a carbon tax,^{vii} or if ongoing regulatory approaches such as the EU's green taxonomy make private financial investments in biomass production and exploitation more attractive,^{viii} the relative competitiveness of biomass-based industries will rise in Europe. Thanks to all of the new biomass-based 'value chains' and industrial processes developed in part through BBI funding, such developments would cause the demand for biomass to explode, bringing prices up and putting considerable pressure on ecosystems in Europe and abroad. It is no small irony that **European forests are currently protected by the relatively low price of fossil fuels.**

Given the scale and nature of the problem, it is truly vital that the EU does not get this 'transition' away from fossil fuels wrong. Unlike fossil fuels, **'biomass' is really nature itself**, and we humans cannot survive without it.

Faced with an impossible dilemma between continuing to use fossil fuels or causing climate havoc, **EU governments must start asking themselves more responsible questions than just perpetuating the fantasy of eternal economic growth while keeping decoupling problems for later.** How can they significantly reduce the overall consumption of resources in their countries in absolute terms? How to share these resources in society? One thing is certain: delegating the responsibility to answer these questions to hypothetical technological breakthroughs and 'leap frogs' delivered by organisations whose legal mandate is to maximise profit extraction in the next quarter is not a responsible strategy.

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- vii EU plans for a carbon tax seemed sufficiently credible to the Trump administration that it felt the need to threaten the EU with trade retaliation measures in January 2020 would it introduce one, see <https://www.afr.com/world/north-america/us-threatens-retaliation-against-eu-over-carbon-tax-20200127-p53uya>
Despite these threats, the European Commission launched an Inception Impact Assessment for a "carbon border adjustment mechanism" as part of the European Green Deal on 4th of March 2020 in order to explore how to "counteract" the risk of "carbon leakage" ("when companies transfer production to countries that are less strict about emissions") by "putting a carbon price on imports of certain goods from outside the EU". <https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12228-Carbon-Border-Adjustment-Mechanism>
Large companies are currently using the Coronavirus pandemic as an argument to lobby the European Commission and demand additional exemptions and loopholes to the EU Emissions Trading Scheme (ETS) to make sure that this policy instrument does not start impacting their competitiveness. https://www.contexte.com/article/energie/coronavirus-les-grandes-entreprises-francaises-profitent-de-la-crise-pour-repousser-les-mesures-du-green-deal_114113.html
More on the flaws and loopholes of carbon trading as an effective climate policy instrument: see <https://greenafinanceobservatory.org/2019/03/11/50-shades/>
- viii The European Commission's Technical Expert Group (TEG) on Sustainable Finance has published its draft report for a new EU Green Taxonomy in June 2019, detailing their proposals for an EU classification system for environmentally sustainable economic activities. "Management practices" in Agriculture, Forestry and Fisheries have been listed in this report as measures contributing to Climate Change Mitigation, and as such are going to be driving future investments. Whether the practices included in this list, and their proper combination, are able to actually help with the real-world sustainability of farming, forestry and fishing practices is going to be absolutely key. See https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/190618-sustainable-finance-teg-report-taxonomy_en.pdf

4. Political justifications and limitations for the BBI

4.1 The biomass-based ‘Bioeconomy Strategy’: a framework to justify the BBI’s creation at the heart of the European Green Deal, with real neo-colonial consequences

Back in 2012, when the EU’s current research funding programme Horizon 2020 and the EU’s Common Agricultural Policy (CAP) were negotiated, CEO documented how DG Research (RTD) was fighting with DG Agriculture about the control and use of funds for agricultural research.¹⁸² This was at a time when DG Agriculture, under the leadership of Commissioner Dacian Cioloş, an agronomist by training, was finally trying to tackle the environmental crisis caused by current farming practices. While DG Agriculture tried to promote research into more sustainable agronomical approaches, DG RTD was pushing a ‘bioeconomy’^{ix} vision based on ‘biomass’ as a raw material for production lines currently fed with fossil fuels. RTD’s idea had the growth and competitiveness of European industries as priorities while claiming that it would also be a solution to the environmental crisis.

ix Before being reinterpreted by DG Research and other public and private institutions for their own purposes, “bioeconomy” was mainly known as a concept developed in the 1970s and 1980s by the Romanian-American economist N. Georgescu-Roegen to describe a very novel, radical, pessimist – and apparently partly mistaken – sustainability-driven approach to economics. In this approach, he argued that “economic scarcity is rooted in physical reality; that all natural resources are irreversibly degraded when put to use in economic activity; that the carrying capacity of earth – that is, earth’s capacity to sustain human populations and consumption levels – is bound to decrease some time in the future as earth’s finite stock of mineral resources is being extracted and put to use; and consequently, that the world economy as a whole is heading towards an inevitable future collapse” (wikipedia)

‘Biomass’ was first coined as a biological concept describing the mass of living organisms in a given area or ecosystem at a given time. But using DG RTD’s definition, biomass has been disembedded from ecosystems to simply become a raw material, the output of agriculture, forestry, fisheries and other downstream economic activities based on the transformation and reuse of these primary sectors of the economy.

‘Bioeconomy’ as a concept can be useful in that it is a broader, more holistic category enabling new connections between activities. But it can also be a mere rebranding of existing economic activities, with the risk of disguising their uglier aspects. Indeed, there is nothing more inherently sustainable or circular about the ‘bioeconomy’ than there is about contemporary agriculture, forestry, fisheries and the industries using their products. In short, this new emphasis on the bioeconomy should not overshadow the urgent need to reduce the damage to nature and people caused by all of these industries.

But whereas DG Agriculture eventually managed to secure some financial support for its own research priorities with the creation of the European Innovation Partnership for Agricultural productivity and Sustainability (EIP-AGRI), DG RTD, in charge of Horizon 2020’s implementation, got the lion’s share of the funding.

The EU’s Bioeconomy Strategy,¹⁸³ adopted in 2012, had grandiose objectives. It aimed to be “a comprehensive approach to address the ecological, environmental, energy, food supply and natural resource challenges that Europe and indeed the world are facing already today”.

The vision it outlined was the following:

“...the sustainable production and exploitation of biological resources will allow the production of more from less, including from waste, while limiting negative impacts on the environment and reducing the heavy dependency on fossil resources, mitigating climate change and moving Europe towards a post-petroleum society to address a wide variety of issues including climate change, food security, job creation and competitiveness.”

The EU Bioeconomy Strategy got implemented as an instrument driven solely by DG Research, following an action plan focused on investment in research and innovation, subsidizing markets and competitiveness. And the BBI became its main instrument for implementation.

The Bioeconomy Strategy gets an update

Following the upsurge of the climate issue in policy circles following the 2015 Paris Agreement among others, the European Commission reviewed its Bioeconomy Strategy.

As part of the review process, the Commission set up an expert group with an advisory role. The BBI was generously represented in this group.¹⁸⁴ Among the 11 experts appointed by the Commission (all in their ‘personal capacity’), one belonged to the BBI’s Scientific Committee (Lena Lange), another belonged to the expert group leading the BBI’s interim evaluation (Tiina Pursula) and a third was BIC’s Executive Director himself, Dirk Carrez. Also present was Michael Carus, Director of Nova Institut GmbH, a private research institute that is a BIC associate member and participates in at least five BBI projects.¹⁸⁵ In addition, the institute produces research for clients including the chemicals industry lobby CEFIC, BASF, Honeywell, Arizona Chemical and several car manufacturers.¹⁸⁶

This expert group’s report was, perhaps unsurprisingly, very positive about the EU’s Bioeconomy Strategy. A few tweaks were suggested, and the “setting-up of the public-private partnership BBI” was described as “one of the most successful actions implemented” as the “BBI is a world leader in upscaling bio-based demonstration projects”.¹⁸⁷ The report also called for more investment in innovation and the introduction of new bio-based products^x into the market. However, it also identified “risks that should not be underestimated and carefully assessed”. For the experts, these included “competing uses of biomass (e.g. food-fuel), land use change and loss of habitat, or those that lead to more emissions. Hence, it is important to emphasise and assess sustainability, ecosystem services, biodiversity and habitat.”

Another input to the Commission’s review of the Bioeconomy Strategy came from the EU’s Bioeconomy Stakeholders Panel, whose members include EuropaBio, CEFIC and Novamont (represented on BBI’s governing board), as well as various other trade associations, NGOs and research organisations. One NGO member, FERN, refused to sign onto the resulting manifesto, which failed to include the environmental principle of cascading use (prioritizing long-term material use of biomass, such as wood used for building, over the use of biomass for energy), but adopted the position of EuropaBio which explicitly objected to such prioritisation.¹⁸⁸ Although the Commission did mention the principle in its updated strategy, “it is not declared as binding”.¹⁸⁹ FERN had hoped that the review of the Bioeconomy Strategy would be an opportunity to emphasise the “environmental and human risks of seeking to replace all fossil-fuel-based products with bio-based materials while consumption continues to grow overall”,¹⁹⁰ but this did not happen in the updated strategy, which was published in 2018.

x Defined as “products that are made from renewable, biological raw materials such as plants and trees”.

The text of the new strategy¹⁹¹ proposed a description of the bioeconomy which was less grandiose and more factual:

“The bioeconomy covers all sectors and systems that rely on biological resources (animals, plants, micro-organisms and derived biomass, including organic waste), their functions and principles. It includes and interlinks: land and marine ecosystems and the services they provide; all primary production sectors that use and produce biological resources (agriculture, forestry, fisheries and aquaculture); and all economic and industrial sectors that use biological resources and processes to produce food, feed, bio-based products, energy and services. To be successful, the European bioeconomy needs to have sustainability and circularity at its heart. This will drive the renewal of our industries, the modernisation of our primary production systems, the protection of the environment and will enhance biodiversity.”

It started by acknowledging that:

“We live in a world of limited resources. Global challenges like climate change, land and ecosystem degradation, coupled with a growing population force us to seek new ways of producing and consuming that respect the ecological boundaries of our planet.”

But the Communication then reverted to wishful language, with elements that were worryingly delusional.

It started by saying that: “The EU is already a global leader in the sustainable use of natural resources within an efficient bioeconomy, which is essential to most of the Sustainable Development Goals.”

Simply put, this is false. While EU policies may have more ambitious environmental targets than those of the US, for instance, EU countries taken collectively (there are large discrepancies among them in this regard) have among the highest ecological footprint per inhabitant in the world. In 2019, the European Environment Agency soberly stated¹⁹² that European citizens’ “constantly increasing ecological footprint has resulted in an ever larger biocapacity deficit which may have negative consequences for the environment both within and outside Europe”.

The Communication continued its argument with: “A sustainable European bioeconomy is necessary to build a carbon neutral future in line with the climate objectives of the Paris Agreement”. But the means indicated as examples – wood is great in buildings, bioenergy will help to make Europe’s energy mix less CO₂ heavy, and forests are carbon sinks – to reach that objective were not even remotely at the level needed (see Section 3).

The Communication further explains that “the deployment of a sustainable European bioeconomy would lead to the creation of jobs, particularly in coastal and rural areas.... In the bio-based industries one million new jobs could be created by 2030”. Yet the only source referred to is “industry estimates”, in this case a 2016 report by EuropaBio, the EU biotech industry lobby. There was no apparent effort to double check this single attempt to quantify the jobs creation promise.¹⁹³

The document continues to weave a naive story in which technological innovations solve one societal problem after the other: “The bioeconomy can contribute to restoring ecosystems, for instance achieving plastic-free seas and oceans.”

As we have just seen, non-degradable ‘bioplastics’ are precisely among the projects funded by the BBI – and this will certainly not remove the estimated 5 trillion plastic pieces currently floating on the surface of the world’s oceans¹⁹⁴ and whose removal cost has been estimated in the \$150 billion range.¹⁹⁵

One might wonder: for this to happen, public action is warranted. Indeed, this has also been noted by the Commission:

“Realising this potential will not happen on its own. It requires investments, innovation, developing strategies and implementing systemic changes.... enhancing our capacity to translate opportunities from all types of innovation into new products and services on the market, creating new jobs locally.”

But will there be any changes in the regulations? In fact, the only point in the text where regulations are mentioned is an explanation that they need to be “friendly”: “regulation and financing must be innovation friendly for Europe to become a front-runner in market creating innovation”.

The EU’s vision for the bioeconomy has remained very straightforward since its creation: enabling industries to do with biological material what they’ve done with fossil fuels in the past.

“Research and innovation and the deployment of innovative solutions for the production of new and sustainable bio-based products (such as bio-chemicals, bio-fuels, etc.) will also enhance our capacity to substitute fossil raw materials in very significant parts of European industry (e.g. construction, packaging, textiles, chemicals, cosmetics, pharma ingredients, consumer goods).”

The next step is then to change the market conditions in order to increase the proportion of these bio-based products in the total economy.

But what about the fact that Europe does not and cannot produce enough biomass to enable this? Why is there is nothing on the imposition of regulations, for instance, to reduce the absolute quantity of fossil fuels Europe is using or to prohibit the most polluting and toxic products? What about avoiding the risks of increased destruction of natural areas and displacement of food production? Why, in sum, so many loose ends and gaps in a strategy that aims at building a more ‘circular’ economy?

The strategy stresses that the intention is to carry all of this out “the European way: being economically viable with sustainability and circularity in the driver’s seat”. But given Europe’s track record in terms of ecological destruction at home and abroad, and the contradictions between such lofty aims and the reality of a growth ambition driven by technology development and the conquest of market shares in the absence of a cap in resources use, how seriously can this be taken?

Indeed, the real story of the ‘bioeconomy’ may not unfold in Europe, where the production of biomass is already unsustainable, where public opinion is wary of further environmental destruction, and where political regimes are still enabling public protests against blatantly destructive projects. In fact, the real story of biomass may be played out in the form of resource appropriation on other continents.

Behind DG Research's vision of the bioeconomy: a technology-driven resource grab by the powerful at the expense of nature and the poor

First of all, not everybody in the European Commission agrees on the current framing of the 'bioeconomy'. Internal alarm bells went off about EU policy around biofuels and bioenergy, and the looming precedents of false 'green solutions' pushed by industry. As a report by the European Green Foundation notes, interviews with Commission officials suggest that there are "different visions on the bioeconomy" within the European Commission.¹⁹⁶

Yet there is little doubt that the very industrial and disembodied vision of the bioeconomy being pushed through the BBI, with biomass reduced to a commodity, a feedstock, comes from industry. After all, DG Research outsourced the setting of the overarching research agenda and the drafting of annual work plans to the private sector (see Section 5.2). And although one would expect DG Environment to be closely associated with a policy instrument that includes sustainability among its major political justifications, it is apparently neither represented nor directly inputting into the BBI's processes. In fact, the two EU officials in the BBI's Governing Board that are not from DG Research come from DG AGRI and DG GROW (Internal Market and Industry).^{xi} In the decision-making body of this partnership tasked with contributing to "a more resource efficient and sustainable low-carbon economy", nobody's job is to defend nature.

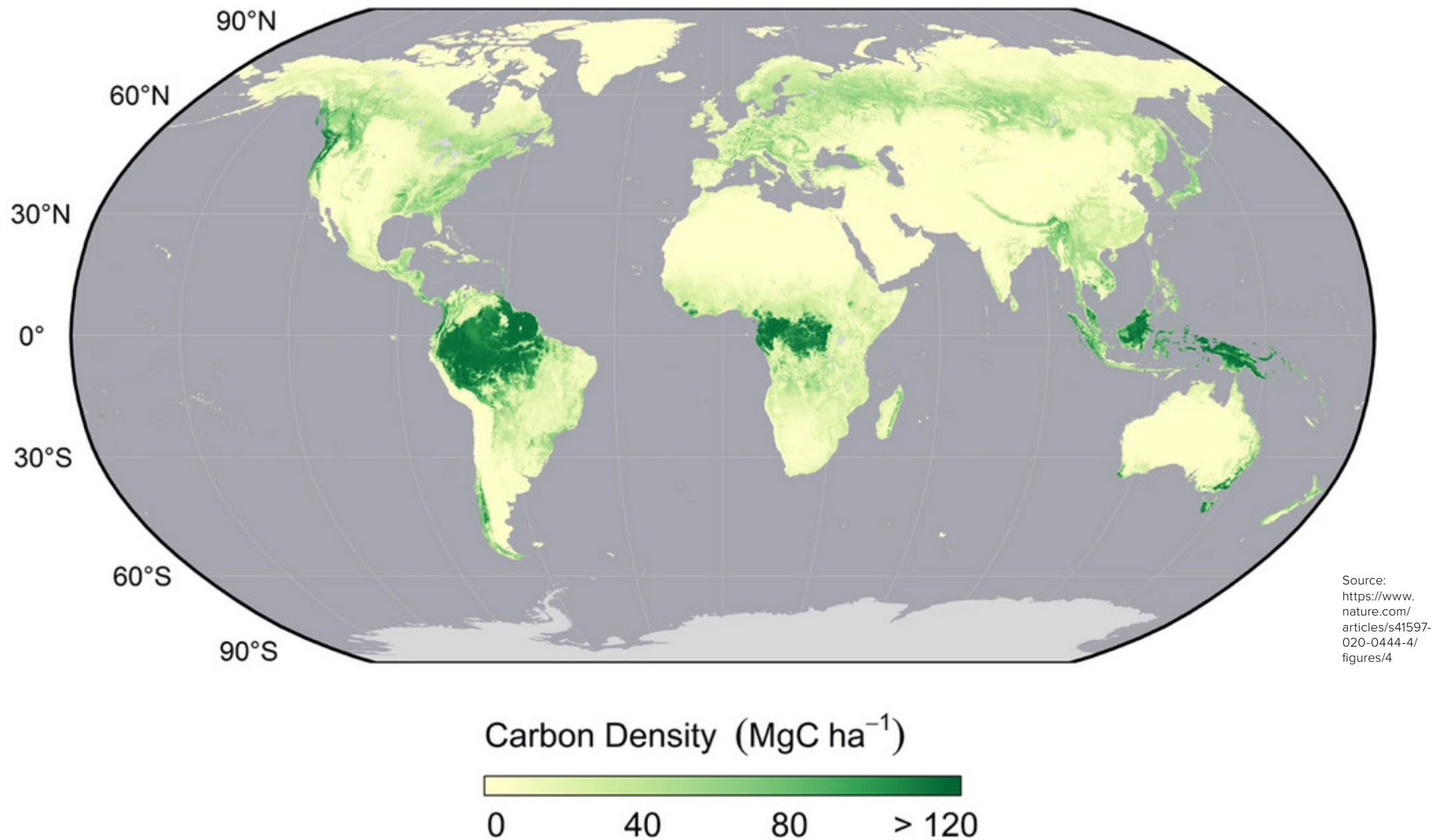
xi According to DG Research, "While DG ENV is not officially represented in the BBI Governing Board, there is... strong coordination between the European Commission's services for the definition of the EU strategy in this area. DG ENV was duly consulted at the time of the establishment of the BBI and is one of the co-authors of the recent update of the European Bioeconomy strategy aiming to accelerate the deployment of a sustainable European Bioeconomy" (Letter from Dg RD to CEO, May 2019).

The regulation that created the BBI listed the challenges faced by bio-based industries hoping to develop in the EU. First of all, "accessing sufficient sustainable feedstock". This was confirmed to us by the Director of BBI, who stressed at length in our meeting with him that having sufficient access to raw materials was an essential criterion for projects to be supported by the PPP.¹⁹⁷

There is a good reason for why this is an obstacle. As we saw, current biomass production in Europe has reached a ceiling; production methods are not sustainable; there is nowhere enough of it to replace fossil fuels to a significant degree; and, above all, 86 per cent of the planet's biomass is located in tropical and sub-tropical regions.¹⁹⁸ While a large number of BBI participants come from Southern Europe's agricultural powerhouses, Spain and Italy, the World Economic Forum foresees that "the biggest biomass export hubs are expected to be Brazil, Africa and North America".¹⁹⁹

When the European Commission's Director General for Energy, Ditte Juul-Jørgensen, explained in early February 2020 that she wanted the EU, as part of its 'European Green Deal', to "strengthen our international partnerships with Africa and work closely with African Union countries on energy issues and green transition", or when the European Commission's deputy director-general for climate action, Clara de la Torre, said that if the EU was to meet its climate goals it needed to "invest in climate science", "including biofuels, bioeconomy and sustainable agriculture" according to the journalist reporting the story, they most probably do so with these ideas in mind too.²⁰⁰

Figure 5: **Map of aboveground biomass carbon density, 2010²⁰¹**



The companies involved in the BBI know this very well. For example, Industries & Agro-Ressources (IAR), the French Bioeconomy Cluster member of BIC, set up a ‘Brazil club’ in 2014 in order to “help [with] developing a Franco-Brazilian bioeconomy value chain” as the country was identified as “attractive for bioeconomy stakeholders” due to its “competitively priced and abundant biomass, rich in biodiversity, major businesses innovating in the sector, a large consumer market...”

Other members of BIC that have clear interests in expanding biomass extraction in developing countries include for instance:

- Total, the French oil giant, which fought a bitter lobbying battle in France in late 2019-early 2020 to keep its tax break on palm oil.²⁰² The company claims that it invested €300 million to convert an oil refinery into a biorefinery in La Mède in southern France, and that palm oil is part of the feedstock to be used there.
- Cargill, the world’s largest agricultural commodities trader, which runs a biodiesel factory in Ghent, Belgium that uses palm oil among other feedstocks.^{xii} The company is also transforming one of its plants in Germany to produce ethanol (among other outputs) from wheat.²⁰³
- Braskem, a Brazilian company that is the largest petrochemical company in Latin America.

xii Cargill explains the palm oil it uses is certified by the Roundtable on Sustainable Palm Oil, a certification body whose secretariat is based in Kuala Lumpur, Malaysia, and whose [membership](#) includes large palm oil producers as well as conservation NGOs like the WWF or Conservation International. Critics, including many environmental NGOs, indigenous people organisations and labour unions, have [argued](#) for a long time that RSPO standards are weak, poorly enforced, and that the TSPO itself is “an instrument of greenwashing for the industry”.

The leading corporations involved in the BBI are large companies with international activities. They will be able to use and/or sell the technologies they develop in Europe – thanks to EU public research funding – in the countries with the greatest supplies of biomass. For example, the ‘sunliquid’ technology of the Swiss-based Clariant is being brought to industrial scale in the €25 million flagship LIGNOFLAG project, but the company plans to use it for feedstocks from all over the world.

These developments are meeting with fierce resistance on the ground. For example, a 2018 open letter to the Brazilian government signed by 120 organisations stated that “the bioeconomy is simply a cover-up for a significant increase in bioenergy, together with other short lived ‘bio-products’ whose climate credentials are as bad for the climate as bioenergy.”²⁰⁴

The NGO ETC Group, which had published a major report on the bioeconomy called *The New Biomassters*²⁰⁵ back in 2011, argued that the attempt to “shift industrial production feedstocks from fossil fuels not just for liquid fuels but also for production of power, chemicals, plastics and more to the 230 billion tons of ‘biomass’ (living stuff) that the Earth produces every year” risks a “resource grab of the lands, livelihoods, knowledge and resources of peoples in the global South, where most of that biomass is located”.²⁰⁶

The ETC Group also pointed to the role (and risks) of extreme genetic engineering (such as synthetic biology) in this paradigm, as seen by “a wave of high-tech companies partnering with the world’s largest energy, chemical, forestry and agribusiness corporations”.

The ongoing wave of land grabbing by EU-based companies among others in Africa and Latin America in particular must also be seen in this context.²⁰⁷

The BBI states that it is “committed to a supply of feedstock that comes primarily from European sources and is produced and delivered sustainably”, and touts the prospect of job creation and economic development in Europe’s rural areas. The partnership started requiring reporting on social and environmental impacts at a very late stage (see Section 2.2), but the commercial successors to these projects will not have to respect these reporting requirements when using the technology developed by them. There is nothing to hold companies back from sourcing feedstock internationally, even when the CO₂ emissions of biomass international transportation worsen their climate impact.

To deflect the criticism, some BBI-funded projects such as GRACE (GRowing Advanced industrial Crops on marginal lands for bioRefineries), Dendromass4Europe and First2Run focus on biomass production on ‘marginal lands’ in the EU, so as to avoid competition with food production and degradation of ecosystems. But there are still some serious flaws in this reasoning.

First of all, what is considered as marginal land may in fact contain very high levels of biodiversity,²⁰⁸ and could play an essential role in farming systems at the landscape level, both in the EU and abroad.

Secondly, land that not very high in biodiversity or not very productive for agriculture is often not fertile enough for commercial biomass production. The failure of the industrial cultivation of jatropha in Ethiopia on such ‘wastelands’ is an example.²⁰⁹

The third flaw is that this strategy implies that these so-called marginal lands are not used or valued by local communities, an assumption that is almost always false.

As the African Biodiversity Network and other organisations already said²¹⁰ back in 2008:

“There is a widely held assumption that developing countries have vast tracts of wasteland, waiting for someone to put them to good use. But a closer look at these ‘marginal’ lands tells a different story. In most cases, lands defined as ‘marginal’, ‘wasteland’ or ‘idle’ are vital for the livelihoods of small-scale farmers, pastoralists, women and indigenous peoples. What governments or corporations often call ‘marginal’ lands are in fact lands that have been under communal or traditional customary use for generations, and are not privately owned, or under intensive agricultural production. The lives of the peoples living on these lands are all too often ignored.”

From that perspective, this issue is also valid in Europe.

The question is: on whose land should all of the additional raw materials needed by these new ‘bioindustries’ be grown? Whose livelihoods and what biodiversity will be affected? The environmental assessment of biomass production can only be done on a case-by-case basis, and it depends upon site-specific conditions. This makes it a limiting factor from a commercial development perspective. How do we avoid a situation in which land that is defined as marginal is simply the land used by those least able to defend themselves: the poor and all non-human living beings?

4.2 The BBI claims sustainability, but only started evaluating the socio-environmental impacts of the projects it funded after having committed half its budget

BIC and the BBI both use the word ‘sustainable’ profusely in their presentations and brochures. However they took their time before including any measurement of environmental impact in their indicators to evaluate BBI-funded projects.

In its 2017 Strategic Innovation and Research Agenda (SIRA), BIC describes as “level 1 Key Performance Indicators” a “vision of a competitive, innovative and sustainable Europe leading the transition towards a bioeconomy, decoupling economic growth from resource depletion and environmental impact.”

One must differentiate between *relative* decoupling (decline in the resource intensity per unit of economic output, which means the consumption of natural resources keeps growing but more slowly than economic growth) and *absolute* decoupling (decline in resource use in absolute terms while economic output rises; the “more from less” objective in the EU’s 2012 Bioeconomy vision). With absolute decoupling being such a crucial and contested²¹¹ aspect of sustainability policies (there is no evidence that it is yet happening at all, according to critics), wouldn’t one expect that the BBI initiative would be asked to check how it is faring in that respect?

But there isn’t any such requirement, and the SIRA itself explicitly explains why “decoupling economic growth from resource depletion and environmental impact” should not be part of the evaluation: “The BBI Initiative is only one of the means of delivering the vision, ... it should be a combined effort on the part of various bioeconomy advocates in Europe.... Monitoring such Level 1 KPIs does not fall within the scope of this Agenda.” In other words, the evaluation should be performed by others.

What about the more specific and cross-cutting Level 2 Key Performance Indicators (KPIs) then? Do these measure decoupling or, at least, environmental impact? After all, the SIRA specifies that these indicators should help the BBI to answer the question: “Are we doing things right?”

But this is not the case either. The eight Level 2 KPIs stick to a narrow quantitative frame of technical development, counting “new cross-sector interconnections in BBI projects”, “new bio-based value chains created”, “grant agreements signed between the BBI joint undertaking and project consortia”, “new bio-based building blocks”, “new bio-based materials”, “new categories of bio-based ‘consumer’ products or bio-based applications”, “flagship grant agreements signed” and “validated technologies that have realised a ‘TRL gain’ as compared with the level at the start of the project of one level, i.e. from TRL 3 to TRL 4 or TRL 4 to TRL 5”.^{xiii}

xiii Technology Readiness Levels: TRL 1 – basic principles observed; TRL 2 – technology concept formulated; TRL 3 – experimental proof of concept; TRL 4 – technology validated in lab; TRL 5 – technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies); TRL 6 – technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies); TRL 7 – system prototype demonstration in operational environment; TRL 8 – system complete and qualified; TRL 9 – actual system proven in operational environment.

The fact that the BBI's SIRA was written by BIC's industry partners explains this focus excluding social and environmental impacts. The BBI really is about building an industry.

However, this gaping flaw seems to have been at least superficially patched. The Commission explained to CEO that:

“...as of 2018, the BBI Annual Work Programs specifically request that all proposals submitted under BBI calls must ensure that the biomass supply chain is sustainable, can integrate with the food chain and is not in competition with it, and does minimise any direct or indirect land use change (ILUC) or water and soil health imbalances. Compliance with this condition is subsequently ensured both during the proposal evaluation, as well as during the project mid-term evaluation phases, with the assistance of independent experts.”

Indeed, the document explains that the Commission's drive to “foster supply of sustainable biomass feedstock to feed both existing and new value chains” has become a “strategic orientation”. It has not, however, become a Key Performance Indicator.²¹²

To clarify, this means that all projects funded up until the end of 2017 – with public budget commitments to the tune of nearly €500 million – did not have to report their social and environmental impacts.

In April 2019, the BBI's director made a presentation featuring some elements of environmental reporting. Answering to a survey, 71 per cent of the projects coordinators expected to produce “bio-based products with lower GHG emissions versus fossil-based alternatives”, but **only 27 per cent anticipated having a positive impact on the sustainable management of natural resources, and only 10 per cent predicted a positive impact on biodiversity.**²¹³

4.3 Climate friendly? BBI projects threaten to destroy the carbon sinks we need

Measuring the climate impact of the burning of biomass can be complicated. Some biomass applications reduce greenhouse emissions in comparison with the use of fossil fuels, but others, like palm oil-based biofuels, emit much more. Some authors argue that Attributional Life Cycle Assessment (ALCA), a modelling tool used by the European Commission and many other institutions to predict the CO₂ savings of adopting one particular technology in comparison with fossil fuels, cannot really be relied upon because “the method, in fact, is not predictive of real world impacts on climate change, and hence the usual quantitative interpretation of ALCA results is not valid”.²¹⁴ The BBI also measures the climate benefits of its projects by comparing them with their fossil fuel-based equivalents.

But this reasoning is based on a **biased baseline**. The replacement of fossil fuels-based projects with bio-based ones at the required scale and pace would require a public intervention that is currently lacking.²¹⁵ There is compelling evidence in the energy sector that **substitution is not happening anywhere near what would be needed**, and that renewable energy sources are adding to the aggregate energy supply much more than replacing fossil fuels.²¹⁶

The other flawed assumption when comparing the climate benefits of bio-based projects with their fossil fuel equivalents is presuming that these projects would have happened either way. This is tantamount to justifying the destruction you cause by saying that it prevents worse destruction. What about the strategy of not destroying anything in the first place? Instead of, for instance, comparing the CO₂ emissions of a hypothetical project that uses trees for plastic production with the emissions from a fossil fuels-based project making these same plastics, why not compare it with the CO₂ emissions saved by not producing the additional plastic at all?

There are other serious issues with the claimed climate benefits of using biomass when the broader context is ignored. Attempts to quantify average CO₂ emissions from using wood for heat and energy, for instance, point to a median release of 66g of CO₂ per kWh of energy produced when the whole life cycle of wood is included.²¹⁷ This can be compared with 200g for gas or 350-400g for coal.²¹⁸ The argument in favour of the ‘carbon neutrality’ of biomass, or at least its low carbon content, is that the same plants will absorb future CO₂ emissions when they regrow.

Burning wood adds considerable amounts of CO₂ to the atmosphere

But this claim is misleading, as **it neglects the time lapse** between the moment that CO₂ is emitted and the moment that it is re-captured by plants. During this period, additional atmospheric CO₂ continues to contribute to the greenhouse effect. In the case of an old tree, this can be counted in hundreds of years; for trees grown in plantations it is 40 to 50 years. And, in the short term, **burning wood emits the most CO₂ per Kwh of all fuels when it is burned: 390gCO₂/Kwh on average.²¹⁹ Burning wood adds considerable amounts of CO₂ (and toxic particles) to the atmosphere, and it takes decades for this CO₂ to be recaptured.**

After forests, soils are the planet’s biggest terrestrial carbon sinks. But in order to play this role (and their many others: feeding us and the rest of terrestrial life, depolluting water...), they need to be fed with organic matter, and, even more importantly, cultivated in a way that preserves their structure. In particular, the ‘residues’ of farming, like straw, should as far as possible be left on the surface to replenish organic soil content (see Section 1.3, and in particular the LIGNOFLAG project). According to a research project funded by the European Commission on the matter, “Farming practices that lead to declining returns and inputs of carbon (C) to soils pose a threat to soil functions by reducing availability of organic matter for soil microbes and by affecting soil structure, and soil C stocks that are key to regulating greenhouse gas emissions.”²²⁰

Furthermore, carbon sinks sequester atmospheric CO₂ regardless of where it comes from: burned or processed plants or fossil fuels. In the current situation, we need to retrieve considerable amounts of CO₂ from the atmosphere as quickly as possible. And **seeing that forests and soils are the largest carbon sinks available in our terrestrial ecosystems,**²²¹ **increasing the extraction of biomass without imposing reductions on the burning of fossil fuels is simply combining the worst of both worlds.** The result is that carbon sinks will shrink while even more CO₂ is being emitted. **Biomass use cannot be sustainable in itself simply because it comes from plants that use atmospheric CO₂; it can only be sustainable when there is a balance between overall CO₂ emitted and the CO₂ that is captured by natural carbon sinks.**

For all these reasons, the new industry sector that the BBI is trying to develop might be trying to build a “sustainable low-carbon economy”, but in the current context it is just an additional threat to the climate.

Biomass use cannot be sustainable in itself simply because it comes from plants that use atmospheric CO₂; it can only be sustainable when there is a balance between overall CO₂ emitted and the CO₂ that is captured by natural carbon sinks.

4.4 Has the EU research funding managed by the BBI really helped risky research projects?

The purpose of EU public-private partnerships in research is about ‘de-risking’ the R&D activities of the private sector in Europe. But this presupposes that the R&D activities funded by the BBI are risky in the first place. Is that the case? Does the BBI actually jump-start projects that would not have happened without its financial support?

This is a difficult question to answer, as it would require accessing the internal information of the companies designing the projects. But the BBI’s interim evaluation of its 2014-2016 work shows that the BBI has funded a lot of activities that were already at a very mature stage of technology development: “Lignocellulose, forest-based and agro-based value chains existed before BBI and thus it is not surprising that they present the highest technology readiness level and launching of the flagship projects in those areas was possible.”

The DEMO and FLAG projects combined (called ‘Innovation Actions’ in the BBI’s nomenclature) received the vast majority of the 2014-2016 budgets (72.7 per cent).²²² This is very important: in the BBI nomenclature, a Technology Readiness Level of 7 (TRL 7) refers to DEMO (demonstration), meaning a small production unit or a demonstration unit at pre-commercial scale, while a Technology Readiness Level of 8 (TRL 8) refers to FLAG (flagship) projects, that is to say a production unit that is at commercial scale but with characteristics that mean that it is not yet ‘bankable’: it would not yet qualify for a private bank loan. For example: the project is the first of its kind in Europe; there might be issues with the supply; or the plant might still need to undergo last-minute modifications.

The BBI interim evaluation states that “interviews with BBI project coordinators made evident that the consortia of projects with TRL > 7-8 would have not taken place without the support of BBI”.²²³

But is the opinion of a handful of project coordinators benefiting from BBI funding sufficient evidence? Can such sources really be expected to say that they did not actually need the money after having received it? This question is all the more important that a Technology Readiness Level of 9 means that the production unit is proven both at commercial scale and in operational environment, in which case the BBI considers that it is ‘bankable’ and therefore no longer eligible for BBI funding.

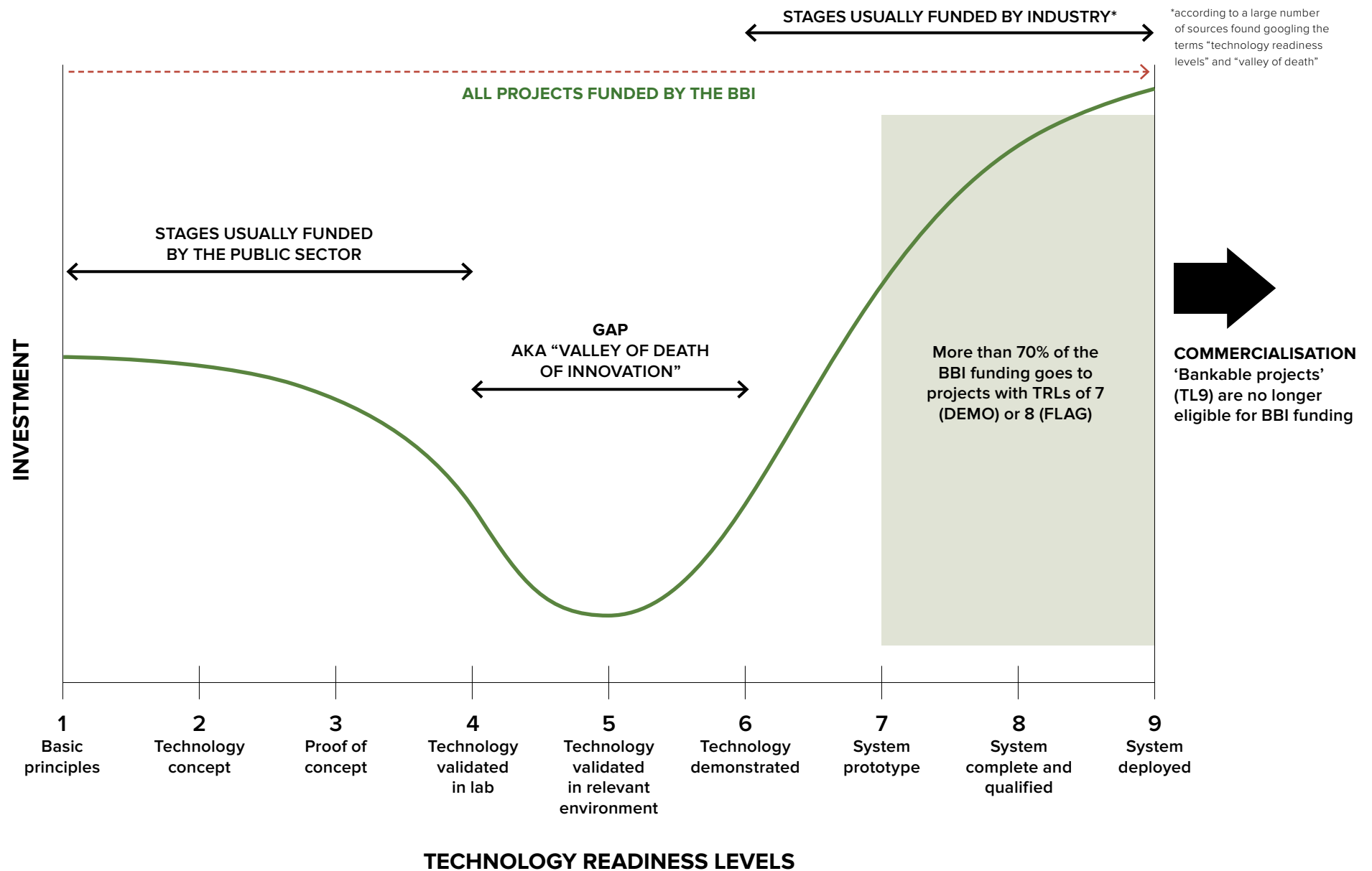
What is the difference for BBI between a “system complete and qualified” (TRL8) and an “actual system proven in operational environment” (TRL9)? For the evaluators screening the proposals of companies applying for BBI flagship project funding, deciding to classify these projects as one or the other was a decision worth between €20-€25 million for the applicants. And one can indeed wonder, particularly in the case of the flagship projects that received the most money, whether some of these projects would still have happened without the funding.

One example is the LIGNOFLAG project, which consists of the construction of a “first-of-a-kind commercial flagship facility for lignocellulosic feedstock to ethanol conversion” in Podari, Romania, using the ‘sunliquid’ technology developed by Clariant.

Clariant is a very large chemicals company, with a turnover of CHF 6.623 billion (€6.182 billion at January 2020’s exchange rate) in 2018 and registered profits of CHF 356 million that same year.²²⁴ The company was awarded the 2015 German Innovation Prize for Climate and Environment for sunliquid, and its German subsidiary received €23 million under FP7 between 2014 and 2018 (in addition to what it later received from the BBI) for the construction of “a sunliquid® pre-commercial industrial scale demonstration plant for the production of lignocellulosic ethanol” in Germany. The total budget for this project was more than €224 million.²²⁵

**Can such sources
really be expected
to say that they did
not actually need
the money after
having received it?**

Figure 6: The BBI's generous de-risking funding policy



After having already invested so much money in this technology, could Clariant really not have managed to find the more than €20 million that the BBI will transfer between 2017 and 2022 to its Romanian subsidiary to help build its commercial plant?²²⁶ The entire budget of this project is a reported €100 million,²²⁷ with EU funds totalling €40 million. Plant construction started in September 2018, and when completed it will be the “fourth bioethanol plant based on the company’s technology portfolio using the sunliquid® technology” (the three others are in Germany, Poland and Slovakia). Moreover, ethanol produced from wheat straw is considered a renewable fuel under the EU’s 2019 Renewable Energy Directive, meaning there is a guaranteed market for it.²²⁸

The BBI’s insistence that the projects have to be “bankable” puts the bar very low for making public support possible.

More generally, should the construction of commercial-scale biorefineries and plants be eligible for funding by the BBI when, by definition, the technologies involved in such projects have already been tested at the pre-commercial scale,^{xiv} the technology-related risks are minimal and the amounts involved are so significant? This is also the question for other flagship projects such as BIOSKOH (€20 million) and PEference (€25 million). In other words, should FLAG projects have received public funding?

The BBI’s insistence that the projects have to be “bankable” puts the bar very low for making public support possible. Private finance can be involved in technological projects at earlier and riskier stages than when companies can access commercial bank loans, but usually require equity (getting shares in the company) as a counterpart in such cases. Projects holders like this option less as it reduces their share of the final profits. But why should EU taxpayers’ money subsidise this?

Perhaps as an indication that there would be some doubts to appease concerning this issue, BIC was asked during a Governing Board meeting in March 2019 to “ensure that those investments done in Europe that would not have happened if it wasn’t for the existence of BBI are communicated accordingly and systematically”.²²⁹

xiv In the case of BIOSKOH the question remains open as so far it seems the pre-commercial projects had failed, see section 1.3

5. The resources of the ‘partnership’ and their uses

5.1 EU funding mainly comes from Horizon 2020’s societal challenge pillar

Of the EU’s €975 million budgeted financial contribution to the BBI, **85 per cent comes from Horizon 2020’s budget for Societal Challenge 2 (SC2): Food Security, Sustainable Agriculture and Forestry, Marine and Inland Water Research and the Bioeconomy.** The total budget of Societal Challenge 2 in Horizon 2020 being €3.8 billion,²³⁰ this means that **the BBI is receiving 21.8 per cent of this budget line, the biggest of all Horizon 2020 on these issues.**

The remaining 15 per cent of the BBI’s budget comes from Horizon 2020’s budget for Leadership in Enabling and Industrial Technologies (LEIT) programme, covering ICT, nanotechnologies, advanced materials, biotechnology, advanced manufacturing and processing and space.²³¹ The total budget for the LEIT program is €13.5 billion,²³² so **the BBI is only receiving 1 per cent of this budget line.**

Given that the BBI’s objectives are primarily to bolster the biotech industry’s competitiveness, why is so little taken from Horizon 2020’s Industry Leadership pillar, which is all about industry’s competitiveness? And why is so much money taken from the budget dedicated to societal challenges? It is all the more striking that all of the BBI’s large ‘flagship’ projects, which consist of building factories, are funded with the EU societal challenge budget and not by the industry competitiveness budget.

The fallout is that much less public funding is available in this budget line for research that actually explores food security, sustainable agriculture and forestry, and marine and inland water research, despite these being fundamental issues for the sustainability of Europe. And this comes at a time when many universities and public research centres, especially in Southern Europe and France, have been experiencing severe austerity.²³³

5.2 The majority of direct beneficiaries are private companies

The creation of the BBI was the result of a lengthy lobby effort by the biotech industry in particular. Its strategic research agenda and annual work plans are drafted by BIC: in that sense, the BBI first and foremost serves industry interests. Remarkably, the European Commission does not play a very active role in this public-private partnership beyond providing the money (see Section 1.2). In this sense, the public money and researchers mobilised in BBI projects are also serving industry interests. But beyond the strategic level, individual companies enjoy even more benefits as they receive a lot of the funding directly.

As the BIC explains: “Since BIC members develop the Annual Work Plan, they have access to information early before the official publication of the call for proposals. This increases their chances of writing successful project proposals. 64% of BIC large enterprises, SMEs and SME clusters are represented in granted BBI projects (2014-2017) ... This input has a direct influence on the development of the EU bioeconomy.”

According to the BBI's interim evaluation, a large majority of the beneficiaries thus far – 70.7 per cent, totalling €292.76 million – are for-profit entities, with academia and research organisations combined receiving 26.8 per cent “despite a large mobilization”.²³⁴

An April 2019 presentation²³⁵ by the director of the BBI mentioned slightly lower figures: 61 per cent for commercial beneficiaries, and 28 per cent for research organisations and academia.

5.3 Industry's in-kind contribution is much lower than expected and difficult to evaluate; it has thus far refused to pay its financial contribution to the BBI and has tried to pass its own costs on to other partners

Industry is meant to cover almost 75 percent of the partnership's total budget, which comes down to €2.7 billion of the total €3.7 billion budget.²³⁶ However, although the contribution of industry is supposed to include both ‘in-kind’ contributions and financial ‘in cash’ contributions, most of industry's contribution is in-kind (paid in goods and/or services rather than cash). Furthermore, its in-kind contributions are in turn divided into two types:

- in-kind contributions to operational costs (IKOP): costs incurred by BIC members during the implementation of a BIC project, meant to be on par with EU funding (with a commitment of €975 million).
- in-kind contributions to additional activities (IKAA): investments made by industry outside the BBI work plan, i.e. not directly linked to the call for proposals in the BBI (€1.7 billion has been promised by industry).

The in-kind contribution of industry to operational costs (IKOP) for 2014 and 2015 was assessed at €114.6 million. But, given that companies' IKOP are audited by a company of their choice and that certifications for IKOP contributions were only given to the BBI in 2018,²³⁷ this figure should be viewed with caution. **The European Court of Auditors stated in 2018 that, because they had “no right to audit in-kind contributions to additional activities”, they could not “provide an opinion on the nature, quality or reality of such contributions”.**²³⁸

Industry's in-kind contributions have been consistently far below commitments. **At the end of 2018, four years into the ten-year programme, only 3.7% (€36.8 million) of the promised €975 million in IKOP had been brought in by industry** (out of which only €21.2 million had been validated by the BBI), as well as €700 million for IKAA. **At the same time, the European Commission had already paid 27 per cent (264.6 million) of its contribution – in cash.**

The methodological and transparency challenges seem likely to be even greater when it comes to reliably substantiating IKAA contributions, particularly in proving whether activities are indeed additional. An amendment tabled in January 2020 by a MEP from the Renew political group to the BBI's 2018 budget discharge remarked “with concern that the realised leverage effect is decreasing since 2015”.²³⁹

The BBI regulation also requires BIC members to make financial contributions to operational costs. However, **during the BBI's first couple of years, industry simply failed to pay up.** BIC members refused on the grounds that financial contributions at the programme level (as BIC agreed to in the regulation establishing the BBI) would be “commercially unviable because it does not offer any guaranteed benefit in exchange (e.g. results of the projects and related intellectual property rights) and it could benefit competitors participating in projects funded by the BBI”.²⁴⁰

The Commission reacted patiently, and did its best to accommodate BIC by proposing an amendment to the regulation that would allow in-cash contributions to be made at project level. The Commission even went so far as to **encourage** the BBI's State Representative Group (SRG) members to lobby their national members of the Council's working group on research to adopt the EC's amendment.²⁴¹ The amendment did pass; it was adopted by the Council in January 2018. Nonetheless, after all of these concessions, BIC still continued to massively underpay.

Documents released under EU freedom of information laws reveal that for some of the years that BIC failed to pay its financial contribution to the BBI, the Commission instituted a partial suspension of the Union contribution, as stipulated in the regulation, to reflect BIC's reduced payment. The Commission's letter to BIC in **2017** (when it reduced the EU's contribution by €50 million) and **2018** (when it was reduced by an additional €20 million) included the polite statement that moving some of the “budget to later stages would leave BIC the possibility of still honouring its financial (in cash) commitments in the course of the initiative and we expect BIC to come forward with concrete actions towards achieving this objective”.²⁴²

But in December 2018 – nearly a year after the regulation's amendment – the Commission **wrote** to BIC again, with a change in tone and message:

“Looking at current data from the BBI Annual Activity Report 2017, it becomes clear that BIC's cash contribution to date is almost non-existent. The Council Regulation had been amended to assist BIC by allowing cash contributions delivered at project level to be counted towards the minimum legal target as well. However, as you are aware, despite the amendment, BIC has come forward with only €0.46 million in Call 2018 proposals, which amounts to a mere 3% of the initially expected amount.”²⁴³

Furthermore, the Commission said that it had “deduced from the total absence of a financial contribution by BIC at programme level in the Draft Annual Work Plan 2019” that it did not expect BIC to pay up in the remaining two BBI calls (2019-2020).

It seems that BIC's disregard for its legal financial commitments really tried the Commission's patience. But despite the severity of the problem, the Commission justified its continued (though again reduced) investment in the BBI to allow for a final call in 2020, invoking the “political importance of continuing investment in this sector”.

The European Court of Auditors observed in December 2019 that **“out of the minimum EUR 182,500,000 of cash contributions to be made by the industry members to the Joint Undertaking’s operational costs, only EUR 800 000 were paid by the end of 2018”**, and that “As a result, the Commission decided at the end of 2018 to reduce the Joint Undertaking’s 2020 budget of EUR 205 000 000 by EUR 140 000 000”. The Court remarked that there was a “high risk that the industry members will not achieve the minimum amount of operational cash contributions by the end of the BBI programme.”²⁴⁴

That’s not the only example of bad behaviour (to put it mildly) on the books for BIC. Released documents also reveal that **BIC tried to pass its financial burden on to the other beneficiary members of BBI consortiums**. As a result, another dispute between the BBI’s public and private partners arose in 2018, following BIC’s decision to request a 4 per cent ‘project contribution’ from grant beneficiaries to cover its contribution to the administrative costs of the BBI. Upon learning of this, the Commission **warned** BIC that this had “clearly no legal basis” and “could expose the BBI and the Commission to a serious reputational risk and give rise to political arguments against the continuation of such initiatives under the next Framework Programme”.²⁴⁵

Given these two serious cases of financial misconduct concerning the investment of public money, the next question that arises is: just how reckless would BIC’s behaviour have to be for the Commission to pull the plug? Why is it supporting the BBI’s successor, that will involve the same ‘partners’, with such a precedent?

5.4 The attraction of agricultural biomass

A majority of BBI-funded projects (57 per cent) claim to focus on the conversion of non-edible plant matter into fuels, chemicals and materials. But this figure must be viewed with scepticism. Some projects that are registered in the lignocellulosic value chain – and are supposedly not competing with food production and as such are the most funded – use sugar as a raw material. Sugar, however, can be sourced from either edible or non-edible plant matter. Moreover, lignocellulosic plant matter can also come from crops grown for that purpose, that can compete with food production on agricultural land.

Given that BBI ostensibly aims to create a more resource-efficient Europe, it is notable that, as of 2017, projects in the conversion and revalorization of the waste value chain had received by far the smallest amount of funding, 7 per cent. This is less than half of what had been planned in the SIRA.

On the contrary, projects developing agricultural biomass were the second biggest recipient, receiving 60 per cent more funding than expected for a total of €85.4 million. This was despite the European Commission’s insistence that priority should be given to projects using non-edible biomass. Moreover, two ‘flagship’ projects were funded on this topic, whereas only one had been planned per value chain.

This points to a simple reality: agro-based biomass is attractive for industry because industrial farming is able to deliver a homogenous raw material. But the methods used for both industrial agriculture and industrial forestry have long proven to be destructive for biodiversity and for the climate. Simply put: in nature, uniformity breeds weakness and disease. Monocultures, be they in agriculture or forestry, require synthetic fertilisers, herbicides, insecticides and fungicides to keep the rest of nature at bay.

The Strategic Innovation and Research Agenda (SIRA) developed by BIC sets out the BBI's funding priorities according to bio-based value chains (VC).

This table sets out four of these VCs, as well as the proportion of the total funding allocated to them by SIRA for demonstration and flagship projects (two out of the total of four kinds of projects).^{xv} It also shows what proportion of the total funding they actually received, according to BIC's interim evaluation, as well as the total number of projects (i.e. all four project types), and the number of flagship projects (which was supposed to be one per VC).

Value Chain (VC)	SIRA funding allocation (DEMO & FLAG)	Actual funding allocation (DEMO & FLAG) 2014-16	Total number of projects (all types)	Number of FLAG projects (supposed to be 1 per VC)	Total funding received for all project types
VC1: From lignocellulosic feedstock (i.e. plant dry matter) to advanced biofuels, bio-based chemicals and biomaterials	48%	40%	14	3	€142.6 million
VC2: Forest-based value chains (promising to utilize “the full potential of forestry biomass” to create new products and markets)	15%	17%	10	1	€64.2 million
VC3: Agro-based value chains (promising new products and markets and “improved agricultural production”)	15%	24%	11	2	€85.4 million
VC4: Value chains from organic waste (new tech to convert waste into products)	15%	7%	6	0	€31.9 million
Not in SIRA – ‘Across VCs’	0%	12%	19	0	€68.6 million
Not in SIRA – Aquatic Biomass	0%	0%	5	0	€21.5 million

xv Figures are based on the BBI 2017 Interim evaluation

There was a fifth VC in the SIRA (Integrated energy, pulp and chemicals biorefineries, promising “sustainable bio-energy production”), which was slated to receive 7 per cent of flagship and demo funding. This area is however “being financed in other parts of Horizon 2020” and was left out to “avoid overlaps with SC2 ‘Energy’”. Instead, ‘Across VCs’ projects received 12 per cent of the funding, and had the highest number of projects. In addition, Aquatic Biomass, a new VC (responding to “emerging market needs”²⁴⁶) was introduced.

The industry-drafted SIRA planned that 34.75 per cent of funds should go to flagship projects (FLAG – TRL 8); 30 per cent to demonstration projects (DEMO - TRL 6-7); 30 per cent for research and innovation actions (RIA - TRL 6-7); and only 3.25 per cent for coordination and support actions (CSA - TRL 3-5, in other words for technologies that still need a lot of research beyond the proof of concept).

In reality, FLAGs received 33.2 per cent, more or less on target; DEMOs received much more than planned, nearly 40 per cent; whilst RIAs received less, at 25.9 per cent of the total available funding. This was despite the fact that RIA projects attracted 57.3 per cent of the participants (354 out of 618). The interim evaluation noted that the “share of budget dedicated to DEMO projects is significantly higher than originally planned at the expense of RIA”. CSA projects, where the most cross-cutting research was needed, were only given 1.4 per cent of the total funding.

6. Governance flaws of the BBI

6.1 The BBI is a very opaque body, and even the European Commission had to fight for years to access sensitive data

Similar to the Innovative Medicines Initiative (IMI), none of the meeting minutes of BBI's Governing Board (GB), Scientific Committee (SC) or States Representatives Group (SRG) are made public. This provides little transparency as to what decisions are made and why. CEO was forced to use the EU's access to documents legislation to obtain some of this information. There was a lapse of several weeks before the minutes were received, and sometimes they were heavily edited.

That being said, DG Research did answer many of our questions in detail. This is to be commended; it is not always the case with departments of the European Commission. Also, on the CORDIS database, which applies to all research projects funded by the EU as well as to the EU's Financial Transparency System, more details about the financial details of the projects can be found than on the website of the BBI itself.

But this is just about the money. Public research funding is meant to be a societal investment in knowledge production. As such, the public should receive the results of its investments through the publication of new knowledge and its dissemination throughout the scientific community. In fact, this is why Horizon 2020 rules stipulate that publications originating from the projects it funds, such as journal articles, should be published 'open access'.²⁴⁷

- sponsorship of awards, prizes and events with a strong link to the bio-based sector, bioeconomy and the wider R&I policy: the EUCYS 2019 bioeconomy prize, World Bio Markets 2019, other events of similar scope and focus;
- participation in other events organised by EU institutions.

16. Potential AOB



Screenshot of a redacted section of the BBI Governing Board March 2018 meeting minutes

However, open access to research data – although applied ‘by default’ through the Open Research Data Pilot since 2017 – can be ‘opted-out’ of by participants at any time, in this case the participants of projects funded by the BBI.

Neither project proposals nor grants nor project agreements are publicly available. These documents however cover issues of great concern to the public interest, such as how IP and access is agreed between BIC members, other industry participants and partners such as research and academic organisations.

Opting out of open data access is not just a rare exception; there is a very broad array of justifications for doing so in Horizon 2020.²⁴⁸ Moreover, the initiators of project proposals cannot be penalized in any way if they choose to opt out rather than share their data. Information about the number or content of BBI projects that have opted out of open data access does not appear to be publicly available. But BBI’s interim evaluation refers to “the high level of confidentiality applied to most data produced within BBI projects”.²⁴⁹ The report considers this to be justified “to some extent” by the high ‘technology readiness levels’ (TRLs) of BBI’s demonstration and flagship projects. In other words, the projects are so close to being commercially ready that this information has value for competitors.

This is a serious issue. Of course industry’s competitiveness is a driving motive for the very creation of the BBI, but isn’t innovation stimulated by the circulation and competition of information and ideas? That industry participants can appropriate all the knowledge they create with the help of public funding is simply not defensible.

In fact, legal uncertainties meant that the European Commission itself was not able to access the BBI’s “project results, documents and related information (confidential information)” for years. Finally, a system was put in place in June 2017 that allowed the BBI to share documents related to its projects with Commission officials, but only “on a ‘need to know’ basis and on the basis of necessity and proportionality”. Based on a [letter](#) from DG Research to the Executive Directors of all Joint Undertakings, it appears that the problem was common to *all* of them.²⁵⁰

6.2 A consultative Scientific Committee dominated by industry

The BBI’s Scientific Committee (SC) is tasked with providing scientific advice to its Governing Board on the areas of work undertaken by the BBI.

The membership of the SC is supposed to constitute “a balanced representation of worldwide-recognised experts from academia, industry, SMEs, non-governmental organisations and regulatory bodies”. However, it is not balanced,²⁵¹ as no NGO representatives are present. Industry, on the other hand, is abundantly represented.²⁵² The Chair, Prof. Kevin O’Connor, is a scientist and also an industry executive; he is the founder and Chief Technology Officer of Bioplastech, a company that is “endeavouring to commercialise the conversion of residues and biobased resources to biodegradable polymers”. Most other members of the Scientific Committee have either ongoing or past industry affiliations.

Members of the SC are encouraged to act as “ambassadors for the BBI in their respective communities thus providing momentum”.

According to contacts CEO had with a SC member, the committee was relatively ignored in its early years although the situation has improved. In the past year, the SC has been asked to feed into the preparation of strategy documents (which they did not advise on in the past). Our contact also mentioned that the SC has been taking an increasingly proactive role over the past two years. He also described how the SC now receives written feedback from BIC (e.g. in a column in an excel file) in response to their recommendations. The feedback specifies why BIC does or does not follow their suggestions; our contact mentioned “not enough industry interest” as an example of a BIC response to a SC recommendation.

“There is widespread scepticism amongst potential applicants to BBI concerning the processes of AWP [Annual Work Programme] development, proposal evaluation and grant agreement as a consequence of the current lack of transparency. Many believe the programme to be a largely a ‘closed shop’ serving the interests of the industry representatives.”

German representative on the BBI’s States Representative Group

6.3 EU citizens and Member States pay, but have no say

EU citizens ultimately fund the EU budget via Member States’ contributions. By extension, they provide at least 97 per cent of the BBI’s budget given industry’s refusal to pay what they were expected to.

The most direct representatives of EU citizens in the EU, Members of the European Parliament (MEPs), have absolutely no role in the BBI’s governance, except through the annual budget discharge procedure where they rely on the findings of the European Court of Auditors (no budget discharge for the BBI has ever been blocked or postponed by the European Parliament). Nor do they have any role in any Joint Undertaking, nor, in fact, in many of the EU’s Research Funding Programmes, whose general regulations they can only co-decide upon every seven years.

Civil society organisations are also nowhere to be seen in the BBI’s governance. EU citizens are indirectly represented via the States Representatives Group (SRG), but this is only an advisory body with no decision-making power. Like the Scientific Committee, SRG members are encouraged to act as “ambassadors” of the BBI.

In fact, Member States seem unhappy about this situation and have serious concerns about how the BBI is working. Minutes of an extraordinary meeting of the SRG held on BBI premises on 7 February 2019 were released to CEO. [These minutes](#) provide some insights into the SRG’s opinions, in particular their answers to a questionnaire sent to them beforehand by BBI staff. A great deal of the conversation was about the next iteration of the BBI for the period 2021-2028 under Horizon Europe. In this new phase, Joint Undertakings that are prolonged would be called ‘institutionalised partnerships’. It looked like the fate of the BBI wasn’t quite settled then.

What follows are some excerpts from the minutes (emphasis added):

Germany: “...greater mobilisation of stakeholders beyond those already engaged. At present there is **widespread scepticism amongst potential applicants to BBI concerning the processes of AWP [Annual Work Programme] development, proposal evaluation and grant agreement as a consequence of the current lack of transparency. Many believe the programme to be a largely a ‘closed shop’ serving the interests of the industry representatives**”.... “Programme Committee structure currently applied in SC2 should also apply to the institutionalised partnership.”

Greece: “It is important for the R&I community, and citizens to be more involved in the operation of BBI.”

Belgium: “It is **difficult for research organisations and SMEs to get involved in consortia if not member of BIC**”.... “We would like to see the role of the SRG strengthened.”

Spain: “**Funding of Large Flagships which are only suitable for a selected club of enterprises.** This could be an important barrier for Spanish representatives”.... “Stronger role of MS [EU Member States] in the decision-making process.”

France: “It’s important that MS continue to be involved in the BBI governance.”

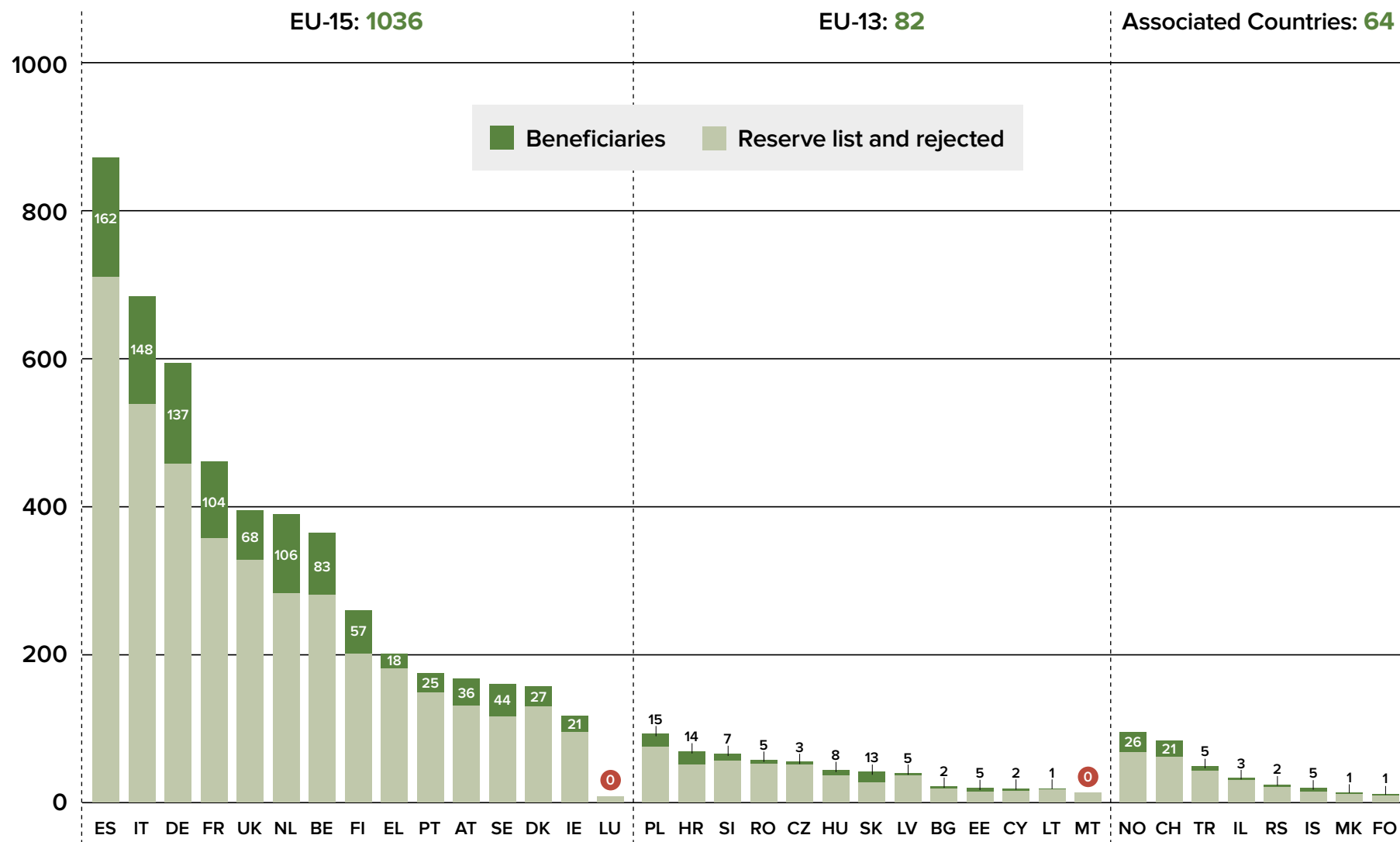
Member States including Denmark, Ireland and Poland also complained about the lack of enthusiasm about BIC from their national industries. Denmark noted: “We do not hear anything from the Danish BIC members”, and Ireland stated that for them, “the key to is try to raise greater awareness among companies operating in the traditional agri-food, forestry, marine and waste sectors of the BBI opportunity”. Poland said that “business arguments should be provided about how could private stakeholders benefit from BBI”.

Beyond showing that what the BBI does has much more to do with business development than research activities, these comments reflect the fact that these three countries have very few participants, either public or private, that benefit from BBI funding. In fact, Denmark and Ireland have the fewest participants (27 and 21 respectively) among the EU-15 countries, and Poland has even fewer (15).

It is worth noting that EU-15 countries got the lion’s share of the total BBI funding, with 87.8 per cent of the participants coming from these countries versus 8.8 per cent from the EU-13. The rest came from Associated Countries including Norway, Switzerland and Turkey.

According to the BBI’s mid-term evaluation, **the EU-15 accounted for 84 per cent of the total funding (€348.12 million).**²⁵³ **What’s more, 94 per cent of the project coordinators (for a total of 62) came from the EU-15. EU-13 countries meanwhile accounted for just 7.9 per cent of the EC funding (€32.90 million).** The evaluation reported that there was so far only one project coordinator from the EU-13 (from Poland), and that the success rate of applicants from EU-13 countries was far lower (19.7 per cent) than that of applicants from the EU-15 (32.6 per cent), or from Associated Countries like Norway, Iceland and Turkey (27.9 per cent).

Figure 7: **Successful participants in retained proposals compared to reserve list and rejected – calls 2014-2018**



Source: BBI Presentation, 2019

6.4 Industry employees and lobbyists among the experts evaluating incoming projects

When the BBI receives project proposals in response to the annual work plan developed by the BIC, these are evaluated by ‘independent experts’ against the set of performance indicators we looked at in Section 4.2. (In other words, not covering social and environmental impacts until an embryo of that was introduced from 2018 onwards). These independent experts are chosen by BBI staff, “selected from the Horizon 2020 experts’ database.... on a competitive basis”.²⁵⁴

Evaluation experts are required to “declare beforehand any conflict of interest and must immediately inform the responsible BBI staff member if one becomes apparent during the course of the evaluation. The BBI staff will take whatever action is necessary to remove any conflict of interest.” The Horizon 2020 Conflicts of Interest (COI) identification rules are applicable to the BBI, stating for instance that there is a COI if the evaluator “stands to benefit directly/indirectly, if the proposal is successful or fails”, or is in a “situation that casts doubt on [his/her] impartiality or that could reasonably appear to do so”.²⁵⁵ Evaluators are forbidden to get in touch with applicants, both during and after the evaluation.

Evaluators are unknown to the applicants and the public for good reasons during the evaluation process, but their identity also remains unknown following the completion of the projects. **It is therefore impossible to check whether or not a conflict of interest has occurred in the course of the evaluation.**

And whilst the BBI does appoint independent observers to monitor and report on the process of evaluating project proposals, we have not found any independent observers’ reports that have been made public (nor does the BBI refer to an intention to publish them).²⁵⁶

Unlike the Innovative Medicines Initiative, which has had to respond to some bad publicity around its lack of transparency and corporate capture,²⁵⁷ the BBI has almost completely escaped media scrutiny so far. But although it does not publish the names of the experts it selects as evaluators,²⁵⁸ the European Commission does publish annual lists of the experts who have worked on each call.

The BBI would be expected to select experts from Horizon 2020’s Societal Challenge 2 on Food Security to evaluate its projects. But although the lists published by the European Commission mainly include academics and public officials, they also include industry employees and even lobbyists. For example, the 2017 list features employees of multinational corporations and lobbyists from the Brussels-based biotech lobby group EuropaBio, as well as employees of commercial companies such as Limagrain.²⁵⁹

The BBI would also be expected to select experts from Horizon 2020’s Industrial Leadership Biotechnology lists, as this funds 15% of the BBI’s budget. The proportion of industry experts in the relevant list is much higher, and in 2017 included experts from Syngenta Crop Protection as well as BIC members CropDesign BASF and Novozymes.²⁶⁰

The possibility of a conflict of interest is therefore very real.

Expert evaluators are expected to “perform evaluations on a personal basis, not as representatives of their employer” and are supposed to be protected by strict confidentiality procedures. However, credibility is lost when the employees of commercial companies are given a crucial role in the attribution of EU funding benefiting other commercial companies in their sectors, either because it favours their employers or their employers’ competitors. The European Food Safety Authority’s 2017 Independence Policy, for instance, “considers financial investments with business actors directly or indirectly impacted by EFSA’s operations as a source of potential Col irrespective of their magnitude. The same holds true for current employment”.²⁶¹

Not only are industry employees and lobbyists included among BBI’s evaluators, but Business Europe is lobbying the European Commission to increase the proportion of corporate evaluators in the lists and weaken Col prevention rules. This large business lobby group commented on Horizon 2020’s mid-term evaluation in 2017 that:²⁶² “The involvement of industry-based evaluators should also be strengthened” since “the expertise of the evaluators appears to be not always in line with the detailed technical depth of the proposals. This includes a proper balance of the representativeness of evaluators and fair application of conflict of interests’ rules.”

Industry experts may indeed sometimes need to be consulted by independent evaluators when there is a technical deficit on certain points. However, it makes little sense to give them a decision-making role in evaluations directly impacting industry interests.

6.5 The BBI’s positive interim evaluation was mainly done with insiders, by insiders

The BBI itself was also evaluated. Considering all its governance shortcomings, one could expect that an external evaluation would produce at least a bit of critique in its conclusions. But the interim evaluation of the organisation (2014-2016), published in June 2017, failed to do so. This is all the more important that the European Commission used this document as a reference in the impact assessment evaluating whether and how the BBI should be continued in Horizon Europe, the next EU Research Framework Programme (2021-2027). While it noted several of the critical points mentioned above in the detailed parts of the document, in the end the evaluation was not really external, and its scope was first and foremost driven by competitiveness. Indeed, this was its main evaluation:

“BBI intends to de-risk in research, demonstration and commercialization of BBI technologies and to respond to the challenge of creating and maintaining a competitive position of Europe in BBI technologies, especially in the light of the growing number of demonstration size facilities being implemented in US and Asia.

Although it is still too early to assess the overall effectiveness of BBI in meeting these goals, the JU appears well aligned with the initial aims. The main positive effects of BBI in terms of competitiveness of BBI technologies come via encouragement and support of value chain driven cooperation across sectors (‘the structuring effect’) and via innovation driven mobilisation of key stakeholders (‘the mobilising effect’).”

This evaluation was conducted by an expert group chosen by the Commission.²⁶³ The six ‘independent experts’²⁶⁴ selected to evaluate the BBI’s “relevance, efficiency, effectiveness, coherence and EU added value” were certainly very knowledgeable and produced a detailed and useful report, but their independence from either the BBI, BIC or the European Commission is questionable. In fact, only one expert, Prof. Eric Vandamme, was not connected to any of these three bodies, and he left before the evaluation was completed. Three of the experts came from industry and the other two from academia.

Among the industry representatives, two of the experts were from companies active in the bio-based sector and one worked with a consultancy firm. Dr Roland Wohlgemuth, the group’s chair, came from Merck subsidiary Sigma-Aldrich, a US firm specialising in chemicals, biotech and life sciences (since the publication of the evaluation, the company has joined a BBI project consortium).²⁶⁵ Dr Alistair Reid worked for the Dutch multinational AkzoNobel, which was participating in a BBI-funded project at the time.²⁶⁶ And Tiina Pursula was the business director of Gaia Consulting Oy, a business sustainability consultancy during the evaluation, as well as a member of the Horizon 2020 Societal Challenge 2 (Bioeconomy) mid-term evaluation group. She has since moved to work for a BIC member, Finnish paper and forest products company Stora Enso, as director of sustainability.²⁶⁷ Stora Enso is also part of two BBI projects, both of which were ongoing at the time of the interim evaluation.²⁶⁸

From academia, Prof. Lucia Gardossi had gained extensive experience in EU research funding programmes both as a project coordinator and advisor, as well as in engaging with bio-based companies like DSM; and Dr Danuta Cichocka had been a research programme officer at DG Research’s biotechnologies programme, responsible for the FP7 projects related to environmental biotechnology and ‘emerging trends in biotechnology’ areas until 2012. At the time of the evaluation, she was a senior researcher at the University of Applied Sciences and Arts Northwestern Switzerland.²⁶⁹

As no BBI projects had yet been completed when the evaluation was performed, the evaluators had to rely on qualitative feedback. However, following an approach “developed and agreed with the Commission services”,²⁷⁰ the experts kept it within a close group: they interviewed project coordinators, BBI staff, members of BIC, Commission representatives, and the chairs of the Scientific Committee and the SRG.²⁷¹ A public consultation was organised, which delivered “highly positive” feedback regarding BBI’s contribution to a “more sustainable bio based industry”. Two thirds of the respondents (95) were applicants.

7. The future of the BBI and biomass-based industries

Reading the minutes of the Governing Board meetings of the BBI,²⁷² one must appreciate the fact that industry lobbyists were able to obtain a structure that truly serves their interests when the Joint Undertakings were created. Forming a public-private partnership with the European Commission, a key lobbying target for corporate lobbyists, is an ideal way to gather political intelligence and win friends inside the EU apparatus. Throughout 2018 and 2019, when negotiations about Horizon Europe were ongoing between Member States and the European Commission, Commission officials repeatedly and formally briefed their industry partners about the latest internal developments, including the concerns of Member States (see Section 4.3).

For example, on 28 March 2019, Deputy Director Wolfgang Burtscher of DG Research explained to BIC that the Council and the Parliament had reached a provisional partial agreement “at the historic speed of less than three months” on the Horizon Europe Framework Programme. Furthermore, he opined that this agreement was “a very good and balanced outcome” that preserved the “key elements of our Commission proposal” such as the “rationalisation of the partnership landscape”. He then provided a detailed overview of the timeline towards the launch of the new “Institutionalised Partnerships”: in early 2021 “at the earliest date”.

Unsurprisingly, BIC has called for “a continued partnership with the European Commission under the new EU Research & Innovation Framework programme” and has lobbied the Commission for its own continuation.²⁷³ But have the financial woes that have plagued the BBI in the form of BIC’s financial arrears, as well as the extremely low in-kind contributions of industry partners, shaken the Commission’s faith in the industry consortium’s promises? The answer is perhaps affirmative, at least for other Commission departments. In 2019, DG Research representatives explained to their BIC partners in the Governing Board that “we are currently facing a big credibility problem due to the non-delivery in the current partnership model”.²⁷⁴

But was this credibility crisis enough to make DG Research consider discontinuing support to the BBI? To the contrary. The option of not renewing the partnership itself no longer seems to be on the table. Perhaps another good omen for the BBI’s successor: Wolfgang Burtscher, who represented DG Research within the BBI and seems a strong proponent of the industrial bioeconomy approach, has been promoted to head the European Commission’s powerful DG Agriculture from 1st April 2020 onwards.

7.1 In Horizon Europe

Whatever format it ends up taking, the EU's financial and policy push towards an industrial bioeconomy has staying power. When DG Research drafted the regulation creating Horizon Europe in 2018, it identified 'Bio-based Innovation systems' as one of the 'Key Orientations' for research and innovation under Pillar 2.²⁷⁵ Neither the European Parliament nor the Council touched this part of the text. In the near-final version of the regulation, one of the suggested areas for possible 'Institutionalised European Partnerships', the new name for the Joint Undertakings, is 'Sustainable bio-based solutions'.²⁷⁶ The latest and probably final name for BBI's likely successor is 'Circular Bio-based Europe'.

In July 2019, the European Commission launched a public consultation on the 'Inception Impact Assessments' (preliminary impact assessments) for its next research and innovation public-private partnerships, and 'Circular Bio-based Europe' was among them.²⁷⁷ More precisely: a "European Partnership on 'Circular Bio-based Europe: sustainable innovation for new local value from waste and biomass' (Sustainable, inclusive and circular bio-based solutions)". The Inception Impact Assessment performed by the Commission on the concept was rosy, consistent with the wishful thinking of the EU's Bioeconomy strategy:

"Bio-based and nutrient value chains, business concepts based on sustainable biomass production, good forest management practices, and the use of waste and residues will help preserve and restore biodiversity and ecosystems, reduce greenhouse gas (GHG) emissions, act as carbon sinks, and contribute to soil and water protection."

Existing problems with agriculture, forestry and waste management were not mentioned anywhere in the document, nor was the non-fulfilment of commitments by industry partners in the BBI. The assessment did acknowledge "major challenges", but only from the perspective of the difficulties of giving birth to a whole industry sector from scratch: fragmented policy framework, untested technologies, high initial costs, unclear supply and so forth.^{xvi}

Providing all of this background paved the way for the Commission to explain that:

"Given these challenges, it is important to provide funding for research and innovation in the bio-based sector to a sufficient level to foster the development of innovative and replicable bio-based products and solutions."

Which was easier than explaining that they wanted to develop additional demand on an already unsustainable supply and to give more public research funding to companies not fulfilling their commitments.

But the decision to create and launch 'Circular Bio-Based Europe' has not yet been formally taken. The European Commission still needs to complete its impact assessment, submit it to the Regulatory Scrutiny Board, and go through a number of steps before adopting the regulation that will create this strategy.²⁷⁸

xvi The complete list is: "technological and innovation challenges related to the development of reliable and competitive supply chains for sustainable biomass and processes for turning biomass into industrial products"; "the multi-sectoral nature of the bio-based sector, with fragmented value chains and untried or non-existent industrial ecosystems"; "the wide range of applicable policies (agriculture, waste, industry, fertilisers, chemicals, etc.) at EU, national and regional level, leading to a complex and sometimes fragmented policy environment"; "the high risk and large capital expenditure required to demonstrate and deploy large biorefineries"; and "the uncertainty around feedstock availability and costs".

Industry is already writing the research agenda of BBI's successor

In the meantime, corporate lobbying continues. On 27 January 2020, EuropaBio met with the cabinet of Research Commissioner Mariya Gabriel to discuss “the future of Bio Industries”.²⁷⁹ In February 2020, the European Bioeconomy Alliance sent a contribution to a public consultation on the upcoming EU Climate Law, touting how beneficial their industrial bioeconomy approach would be to meeting the EU's climate objectives.²⁸⁰ But industry seems certain it will obtain what it wants: in April 2020, the Bio-Based Industries Consortium (BIC) was already publishing the second version of its draft Strategic Research Agenda (SRA) for 2030, meant to frame the overall agenda of ‘Circular Bio-based Europe’ until 2027.²⁸¹ And possibly beyond, as in the meantime the BIC has released a “2050 Vision” ticking most keywords (and repeating more or less what was already in the 2012 EU Bioeconomy strategy):

“By 2050, Europe will have a sustainable and competitive bio-based industry providing jobs and growth that contribute to a circular bio-society. In this circular bio-society, informed citizens choose a sustainable way of life, supporting an economy that couples economic growth with societal well-being and respect for the environment.”²⁸²

The overall priorities of the SRA 2030 have not really changed since the first SRA from 2013: “Create new business models”, “Accelerate the commercialisation of sustainable solutions”, “Establish carbon-neutral operations to mitigate climate change” and “Establish new purchasing and consumption patterns for a circular bio-society”.²⁸³

There is no reference anywhere in the document to the need to cap biomass extraction from nature. Just that this “biomass feedstock” should be “sustainable”. Just like the 2013 SRA, there is also a reference to the need to fund projects that will help delivering “supporting regulation” (lobbying), “acceptance of sustainable solutions” (PR and marketing), and to bring “investments and co-funding to resolve market failure” (subsidies).

The document was written after input was received from the BIC's members (see section 1.2), the lobby group European Bioeconomy Alliance (see section 1.3) (with the additional input from the lobby groups representing the chemicals agricultural machinery industries), the BBI's Scientific and States Representatives Committees.

The European Commission is said to be reflecting in parallel to input into the SRA. But judging by the comments of DG Research & Innovation's “Healthy Planet” Director, John Bell, at the BBI Info Day in April 2020, serious challenges coming from DG Research are unlikely: “This call today is part of a wider narrative of transition, of moving into a #sustainable #bioeconomy as part of a climate-neutral planet” (sic). “@BBI2020, which is organising the #Call2020, is a driving instrument in this.”²⁸⁴

Member States will have the last word

Ultimately, however, everything will depend on the outcome of the ongoing EU budget negotiations between Member States, the European Commission and the European Parliament. As far as Horizon Europe is concerned, mega-alliances of industry lobby groups such as the Industry4Europe coalition are pushing for “at least” €120 billion to be dedicated to the programme (the same amount requested by the European Parliament).²⁸⁵ They prescribe that “at least 60% should be allocated to Pillar II ‘Global challenges and European industrial competitiveness’”, where most of the funding for ‘Circular Bio-Based Europe’ is expected to come from (Horizon 2020’s two pillars ‘Societal Challenges’ and ‘Industrial Leadership’ were merged into one in its successor Horizon Europe).

Member States, who must pay for the show to go on, are a little reluctant and would prefer to pay less. Proposals by the Finnish Presidency of the Council in December 2019 mentioned a negotiating figure of €84 billion.²⁸⁶ Despite the fact that the UK has now left the EU, this figure would still represent a 6 per cent increase in comparison with Horizon 2020 (€79 billion).^{xvii} Interestingly, the Finnish Presidency proposal dedicated €8.6 billion specifically for “research and innovation in food, agriculture, rural development and the bioeconomy”, one of the research areas in Horizon Europe’s Pillar 2 – a more than doubling of the previous same budget, the “societal challenge” out of which 85 percent of the BBI’s budget came from. Finland, which was one of the key proponents of the ‘bioeconomy’ strategy in the first place and whose timber industry is quite developed, has a strong interest in getting more money for it.

xvii Horizon 2020 itself had a budget that was 43 per cent higher than its 2007-2013 predecessor, FP7 (€55 billion).

That said, the negotiations are difficult, and at the time of writing have yet to be concluded, with the coronavirus crisis reshuffling the cards. The so-called ‘frugal five’ Member States (Netherlands, Austria, Germany, Sweden and Denmark) are pushing for a smaller overall EU budget that is capped at 1 per cent of the EU’s Gross National Income. This, according to a group of concerned public researchers, could bring the total Horizon Europe budget down to €75 billion.²⁸⁷

7.2 In the European Green Deal

In December 2019, the Council of the European Union, which represents Member States and is the key decision-making body of the EU, adopted a series of conclusions insisting that the updated bioeconomy strategy should be “adopted without delay” by Member States, and that the European Commission should facilitate and drive forward its implementation.²⁸⁸

Despite this being a mere act of faith as long as overall resource use levels in Europe are not reduced, the Council highlighted “the capacity of the bioeconomy to support the achievement of the EU environmental and climate goals through sustainability and circularity”. It also insisted that “a sustainable European bioeconomy should be one of the major components for the implementation of the European Green Deal, which is expected to be amongst the main immediate priorities of the new Commission”.

This sentiment was, of course, welcomed by the European Bioeconomy Alliance. The industry coalition commented that “this should be done with concrete actions, such as boosting investments and R&I related to the bioeconomy and ensuring an appropriate level of funding for the bioeconomy (via the future CAP and Horizon Europe), introducing market-creation incentives for bio-based products in strategic sectors and promoting public-private partnerships such as Circular bio-based Europe.”

In March 2020, the European Commission published its Circular Economy Action Plan, a component of the Green Deal. This communication is an interesting – and even in certain aspects groundbreaking – sketch of what a more circular economy could actually look like.²⁸⁹ But the document also contained a reference to the need to support “the sustainable and circular bio-based sector through the implementation of the Bioeconomy Action Plan”. Again, the assumption seems to be that the bio-based sector would in itself be “sustainable and circular”, which is not at all self-evident.

The same month, the BBI published a summary of its December 2019 stakeholders event via a media partner called Science Business. The title of the article made its ambitions clear: “Europe’s bio-based industry eyes Green Deal accelerant”.²⁹⁰

However, references to ‘bio-based solutions’, the ‘bioeconomy’ and even ‘biomass’ were missing from the European Commission’s new Industrial Strategy published in early March 2020. Although the paper highlighted the need for a “transition to a carbon-neutral and sustainable economy” and referenced industrial biotechnology as one of its “Key Enabling Technologies” (in line with the Commission’s thinking over the past years), biomass-based industries were not listed among the “strategic areas”.

This document originated from DG GROW, the department of the Commission in charge of Internal Market, Industry, Entrepreneurship and SMEs. Could this mean that not everyone in the Commission is convinced that trying to substitute fossil fuels with biomass in European industrial processes is a desirable policy approach, specifically in the absence of substantial available feedstocks and no chance of their sustainable production at the required volumes?

Conclusions

Behind the industrial ‘bioeconomy’ vision at the heart of the Bio-Based Industries partnership (BBI) lies the appealing promise that – despite the climate crisis – the European lifestyle, built over a century and a half of prospering from fossil fuels, could be made sustainable by substituting fossil carbon with biological matter for energy production and the manufacturing of goods.

Even better, the technologies developed for the occasion could be sold to the whole planet: economic growth, corporate international competitiveness and sustainability reconciled at last, goes the story, thanks to the creativity of European engineers and scientists. The re-engineering of various life forms, in particular microorganisms, would be the key ‘enabling technology’ to this end (the recently updated EU Bioeconomy Strategy uncritically borrowed several elements from the biotech lobby).

The concept of ‘Bioeconomy’ is useful to the extent that it can be a broader vision of the economy, better embedded in nature, with the potential to better take into account the problems of pollution, environmental destruction and resource exhaustion.

But the industrial bioeconomy pushed by bio-based industries and the European Commission’s Directorate-General for Research and Innovation is not doing this. Rather, beyond establishing new connections between existing economic activities, it appears as a mere rebranding, with the risk of disguising their uglier aspects. There is nothing more inherently sustainable or circular about the BBI-funded industrial bioeconomy than there is about contemporary agriculture, forestry, fisheries, waste management, and the industries using their products.

Worse: by mining the carbons sinks we need and expanding the extraction of biomass from nature, the ‘bioeconomy’ might actually accelerate the climate crisis and the destruction of biodiversity. It is vital that biomass ceases to be considered a renewable resource: in the current EU context, where correct regulation of the climate and biodiversity impacts of biomass use is lacking and companies are able to purchase biomass from all over the world, where regulations are even poorer countries, it is not.

BBI might be an organisation tasked with contributing to “a more resource efficient and sustainable low-carbon economy”, and its putative successor be called “Circular Bio-based Europe”, but its perspective and organisation are linear. Driven by corporate interests, excluding EU bodies tasked with preserving the environment from its decision-making, it only focuses on developing and imposing new production processes, and does not measure their consequences on the environment. Its primary purpose seems indeed to improve the competitiveness of Europe-based economic interests engaged in the global race to re-position existing industries towards using biological matter rather than fossil fuels as feedstock.

For this very specific purpose, however, it is quite holistic: not only does the BBI transfer hundreds of millions of euros, and the work of many public researchers, from the public to the private sector in order to build factories and so-called ‘bio-refineries’, but it also supports projects involving regulatory, lobbying and public relations work to sway EU regulators and public perception to become supportive of bio-based industries’ priorities and products. These projects also use public research funding – and public researchers – to serve industry’s lobbying and reputational objectives.

This linear thinking shows in various projects the BBI is funding, for instance in the production of bioplastics that are not less toxic or more biodegradable than fossil-fuels based ones, or of plant-based packaging for products whose trade comes with disposable packaging (in particular unhealthy ready meals, sugary drinks or snack bars).

Dealing with technical issues, surrounded by a halo of greenness, the BBI has so far escaped critical media scrutiny. It is full of rather scandalous stories though.

That the BBI is largely focussed on funding pre-commercial and commercial-scale ‘biorefineries’ (provided they’re the first of their kind) is in itself a problem. Should commercial-scale factories really be eligible for EU research funding, which is normally dedicated to projects so risky that the private sector alone could not finance them? These projects have already been tested at the pre-commercial scale, the technology-related risks are minimal, and the amounts involved are very significant.

Moreover, whereas all of the designated projects were supposed to be funded by both public money and industry’s in-kind and financial support, the latest figures available (from the end of 2018) show that while the European Commission has already paid 27 per cent (€264,6 million) of their pledged cash contributions, industry partners have so far only paid 3 per cent of theirs as well as 3.7% per cent of their auditable in-kind contributions. These companies are also opposed to disclosing the data that would enable a proper evaluation of their in-kind contributions.

Due to a lack of transparency, the results of the research projects funded by the BBI are difficult to evaluate. Companies systematically privatise results and data regarding their projects, and the evaluation indicators used are so narrow that they at least initially failed to take social and environmental impacts into account. As an indication however, it should be noted that only 10 per cent of the coordinators of projects funded by the BBI estimated that their projects would have a positive impact on biodiversity.

While there might be cases of industry abusing the system, our findings are consistent with the way the BBI was set up: its overall research agenda and its annual work plan have been authored by industry. That participating companies would divert the BBI's resources for their own pre-existing priorities, instead of meeting societal challenges, was to be expected.

But will the bioeconomy at least make the EU industry more sustainable? After all, the general idea is to partly replace fossil fuels with 'biomass' in industrial processes, and surely using plants is more sustainable than using fossil fuels?

Although it is counter-intuitive, the answer in today's context is no. Replacing fossil fuels with plants in industrial processes is even worse for the climate and biodiversity than our current situation. There are two simple reasons for this: firstly, plants only sequester CO₂ as long as they are alive, and secondly, in today's context the use of plants adds to the total output much more than it replaces fossil fuels. There is no evidence that substitution between fossil fuels and other resources is happening anywhere near the needed scale and pace. Global banks have invested US\$ 2700 billion in fossil fuels since the adoption of the Paris Agreement. There is no reason to think that substitution will be better for plastics, or for the many other materials the biotech industry is promising to make from plants. Worse, the perception that plant-based products are sustainable has a greenwashing effect and deflects from the urgent need to reduce the extraction and consumption of fossil fuels.

Given that plants, soils and forests are the main carbon sinks available in our terrestrial ecosystems, increasing the extraction of biomass without imposing reductions on the burning of fossil fuels is simply combining the worst of both worlds. Since burning plants for energy emits enormous amounts of CO₂ in comparison with the energy resulting from this process, more than with any fossil fuel, the result is that **carbon sinks will disappear while even more CO₂ is being emitted**. Biomass use cannot be sustainable in itself just because it comes from plants; it can only be sustainable when there is a balance between overall CO₂ emissions by humans and the CO₂ that is captured by natural carbon sinks including plants, soils and oceans.

And the numbers don't even remotely add up. The production of biomass in Europe has been stagnating over the past 15 years, and the current production is only obtained through unsustainable farming and forestry practices. With no binding targets in sight to limit the total use of biomass in Europe, the additional demand that will be triggered by this industrial 'bioeconomy' can only be met at the expense of food production and the integrity of the remaining functioning ecosystems. Before it was ever portrayed as a renewable source of energy or an industrial feedstock, 'biomass' was a term used by environmental scientists as a measurement of the total organic matter (both living and dead) in a given area. **'Biomass' really is life itself.**

Building an industry that feeds on European nature without sufficient domestic supply means more resource grabs by European companies elsewhere, and particularly in the Global South where most of the planet's biomass is located. Should the path toward European 'sustainability' really be about neo-colonial imports of wood, oil and sugar from the tropics again, at the expense of the climate, biodiversity and livelihoods of the people living there? This neo-colonialism would be criminal, trigger dramatic conflicts, and not even green.

Now that it has created entire industrial supply chains based on biomass without daring to seriously reduce overall fossil carbon use, Europe threatens to wipe out entire ecosystems at the very moment fossil fuels stop being competitive with biomass – whether it be due to market conditions, increased public support to biomass or taxes on fossil fuels. This is the limitation of EU's preference for market-based mechanisms in environmental policy and of delegating the design of its research and innovation strategy to corporate lobby groups. It is high time that the people designing the EU's policy in this crucial domain rise up to their responsibilities and abandon their lazy habits of delegating their planning and implementation to the private sector. After all, this is not what they are paid to do.

As Member States and the European Commission are busy negotiating the EU's 2021-2027 budget, and in particular the next EU Research Framework Programme Horizon Europe, the same corporate lobby groups – and the BBI itself – are lobbying for the BBI's successor, 'Circular Bio-based Europe', to be continued and expanded with even more public money on offer.

Although the European Commission's DG Research is well aware of the BBI's failures, it has so far only slightly reduced its overall financial support for the partnership. Despite some internal hesitations and criticism from Member States, it decided to support the creation of 'Circular Bio-based Europe'. DG Research's persistence in supporting the 'partnership' is matched by the representatives of EU Member States, who called for the EU's Bioeconomy Strategy to be part of the upcoming European Green Deal in December 2019.

The urgent and growing need for action on the climate crisis, combined with the apparent impossibility of these decision-making to consider a reduction in overall resources use, sadly makes the industrial bioeconomy's promise of a possible status quo even more tempting for EU leaders. DG Research is a massive EU administration, tasked with handing out enormous amounts of money. This responsibility has won it many friends among Brussels' lobbyists, especially those representing corporations and the large research centres that receive the lion's share of the funding. These days, this whole community is feverishly awaiting the agreement of EU Member States on the overall budget of Horizon Europe, Horizon 2020's successor. Will they get what they want?

Almost a decade ago, in a 2011 letter²⁹¹ written with more than a hundred civil society groups from across Europe to then European Commission President José Manuel Barroso, we had written that we were “extremely concerned” about the EU’s Research funding policy’s excessive focus on industry competitiveness. We wrote that the corporate approach to research “that prioritise[s] profit and market share” couldn’t meet Europe’s grand challenges “precisely because these challenges require alternatives to the high-growth, high-profit models of economic development that have been pursued to such devastating excess”. We added: “European research should promote and focus on innovation that provides solutions rather than investing in end of pipe technologies, which do not tackle the root causes of the problems that society faces”. We concluded by saying that “research that will make Europe (and the world) an environmentally sustainable, healthy and peaceful place to live must now be prioritised over and above research that delivers marketable technologies”.

At the time we had no response to our letter, and similar concerns raised by civil society during the drafting phase of Horizon Europe were also essentially ignored.²⁹²

As long as the dominant countries and corporations in the EU keep framing the EU research and innovation policy as an instrument to boost industry’s competitiveness, rather than produce knowledge and results for the public interest, chances of such perspectives to find traction within the European Commission’s leadership will remain limited. Judging from the results of the BBI, our concerns and warnings have sadly been proven right though, and it looks like our recommendations are just as relevant today as they were nearly a decade ago. As a societal investment in knowledge production for tomorrow, it is high time that the EU’s research policy receives the political attention and debates it really deserves.

Recommendations

On the industrial bioeconomy

1. Introduce EU and national caps for total agricultural and forestry biomass production and uses (including imports) at levels that can maximise carbon sequestration by forests and soils, and help restore biodiversity.
2. End existing EU economic and legal incentives to the uses of biomass for energy production, and do not introduce new incentives for the industrial uses of biomass (be it for energy or other products like chemicals or materials). In particular, given the current climate crisis context, only take actual GHG emissions into account for evaluating the climate impact of biomass use (in particular when burned for energy), and no longer include in regulation “life cycle assessments” as their calculations suffer from flawed assumptions and unsolvable issues.
3. Extend in time the uses of wood and other biomass sources (cascading uses).
4. Introduce economic incentives for mixed and natural forests conservation and expansion, sustainable management and uses.
5. Phase out clear cuts, tree monocultures and their products with increasing financial penalties, also for imports.

6. Support farming practices increasing soil organic carbon content and biodiversity, including the promotion of agroforestry, the reintroduction of hedges and the use of organic waste as fertiliser.
7. Invest in public research and locally embedded innovation in sustainable forestry and agriculture
8. Phase out the use of fossil fuels and invest in energy savings.

On the remaining years of BBI

9. Only transfer to industry partners the remaining public funding available in the BBI upon the delivery of their expected cash and auditable in-kind contributions.
10. Introduce a requirement to all BBI funded projects to publicly report the origin, the nature and the volumes of the biomass they use when applicable, and evaluate the projects’ social and environmental impacts (including the fate of downstream waste), in particular looking at their consequences on the land use changes, food prices, climate, biodiversity and inequalities.

On ‘Circular Bio-based Europe’

11. We strongly advise against creating ‘Circular Bio-based Europe’.

A public-private ‘partnership’ where the private sector sets the agenda, only takes the public funds on offer, uses it for its own purposes and does not deliver its promised contributions should not be continued with the same structure and the same partners. ‘Circular Bio-based Europe’ is expected to have a very similar agenda and structure, comparable objectives and the same partners as the BBI.

12. In the event the corporate lobbying pushing for it is successful and ‘Circular Bio-based Europe’ is nevertheless created, we recommend that:

- i. the current Strategic Research Agenda is not approved by the European Commission, and re-drafted in an open process including, in addition to DG Research and Agriculture, EU administrations tasked with protecting the environment and the climate, Members of the European Parliament’s ENVI Committee, academia and civil society. The drafting process should use as a starting point the findings of the Joint Research Centre on the available biomass supply in Europe, and scale projects accordingly, with a focus on producing locally adapted knowledge rather than standardised technologies.
- ii. the Governing Board should include a majority of representatives from the public sector, including from DG Environment and DG CLIMA, the Council, the European Parliament’s ENVI Committee. It should also include representatives from academia and civil society. The minutes of its meetings should be made public.

Additional comments

In the event ‘Circular Bio-based Europe’ is created and made to follow industry’s narrow strategic agenda of technology development, we recommend that:

On financial aspects

- a. *The EU financial contribution to its budget comes entirely from Horizon Europe’s Pillar 3, Innovative Europe, and not Pillar 2, where societal challenges and industry’s competitiveness have been unfortunately merged. In light of the probable damage that this partnership will cause to the climate and biodiversity, we strongly recommend that its budget is as reduced as possible.*
- b. *To avoid a repetition of industry not delivering on its commitments, EU funding should only be transferred to projects once promised cash payments have been made, and auditable in-kind contributions committed, by the industry partners.*

On transparency

- c. *All project proposals, grants, agreements and results should be made public. Projects data should also be made as public as possible.*
- d. *The names of the project proposals’ evaluators should be made public one year after they have finished their work.*
- e. *All funded projects publicly report the origin, the nature and the volumes of the biomass they use when applicable.*

On governance

- f. *The partnership's annual work programmes should no longer be drafted by the industry partners, as this gives them control over the partnership, but by the European Commission and the Scientific Committee, whose composition should be better balanced and whose independence should be ensured – no member should be able to obtain funding from the partnership for instance. The industry partners should of course be included in the consultations leading to the final versions of the annual work programmes.*
- g. *Project evaluators' independence should be rigorously enforced – in particular, they should not have any financial links with the companies whose projects they are evaluating as well as with the competitors of these companies. Experts whose contribution would be seen as indispensable but have such links could be heard by the evaluators if needed.*
- h. *The mid-term evaluation of 'Circular Bio-based Europe', and that of the projects it funds, should be done by experts who are independent from both industry partners and the European Commission. The evaluation should be performed using also indicators looking at the projects' social and environmental impacts (including the fate of downstream waste), in particular looking at their consequences on the land use changes, food prices, climate, biodiversity and inequalities.*

On projects

- i. *The funding made available in 'Circular Bio-based Europe' should not be used to finance projects at a Technology Readiness Level of 7 or 8 (high technological development maturity), as there are usually private investments options available for these.*
- j. *'Circular Bio-based Europe' should not finance regulatory, lobbying and public relations activities.*
- k. *'Circular Bio-based Europe' should primarily fund projects whose focus is on waste recycling and valorisation activities, not on agricultural biomass. Projects or technologies planning to use whole trees as a biomass supply should never be funded.*
- l. *The use of offsets (climate, biodiversity or else) is not accepted to mitigate any of these impacts.*

Endnotes

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GHA is a non-profit advocacy NGO dedicated to ensuring equitable access to healthcare in the EU and globally. GHA works toward an EU whose policies are shaped to achieve direct and tangible benefits for citizens and society, with a particular focus on EU research and innovation (R&I) and development policies.

CEO is a research and campaign group working to expose and challenge the disproportionate influence that corporations and their lobbyists exert over EU policy-making. CEO works in close alliance with public interest groups and social movements in and outside of Europe to develop alternatives to the dominance of corporate power.

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