



# The Bioeconomy



*a primer*

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# KeyPoints

- The bioeconomy is industry's response to current global social, environmental, and economic challenges including climate change, food insecurity, and natural resource shortages. In the bioeconomy, 'renewable' biological resources are used to replace fossil fuels as well as for food, animal feed, and other bio-based products.
- The bioeconomy agenda has been developed by powerful corporations and is being pushed by EU and G7 member states. It is closely linked to the 'green economy' and the Knowledge-Based Bio-Economy.
- Over the past few years, the bioeconomy's focus on agrofuels has stimulated land grabbing in the Global South. Agricultural land providing food for local people is being converted to agrofuel monocultures, causing numerous negative economic, social, and environmental impacts.
- An additional flaw is that decreased emissions are greatly overestimated: while the EU's dependence on biomass imports has continued to grow, the bioeconomy has simply expanded without a parallel decreased reliance on fossil fuels.
- By prioritising market growth over environmental health and social wellbeing, the bioeconomy agenda ignores the necessity of reducing high levels of consumption, which is the primary cause of resource depletion worldwide.
- Ultimately, agrofuels appear to have more negative impacts than the fossil fuels they are supposed to replace, particularly in terms of lost land, resource access, livelihoods, and food security in the Global South.
- It is thus critical that other perspectives are also considered, for example 'agroecology', which supports the relocalisation of food and energy production as well as autonomous decision-making by farmers.

# Introduction

The bioeconomy agenda emerged in response to the need to find alternatives to fossil fuels. The idea is based on increasing the use of biotechnologies and biofuels, and is a response to growing concerns about the unsustainable use and management of finite natural resources. The bioeconomy is based on the premise that achieving a better balance between biological resources and human economic activities is generally problem-free.

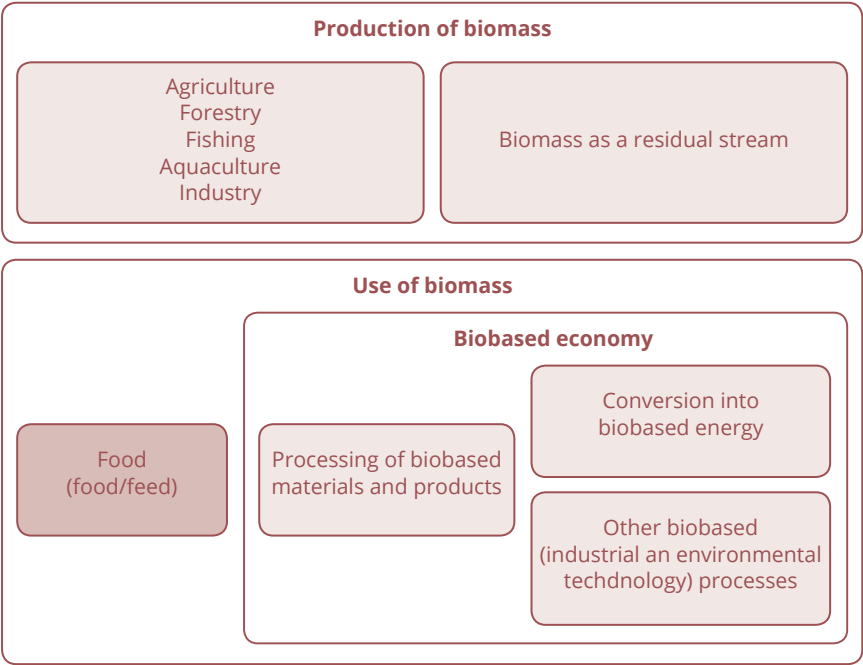
However, the way in which powerful corporate forces are defining and driving this agenda is highly problematic. In particular, the impact on agricultural land is of critical importance, as the increasing production of agrofuel crops entails land being shifted away from food production.

This report traces the emergence and the current trajectory of the bioeconomy. It highlights how corporate interests have managed to capture and dominate its development and growth. It raises a number of key questions in the hope that they will contribute to a debate: does the current approach to the bioeconomy need to be completely rejected as an inherently destructive agenda? Or does the *idea* of the bioeconomy have enough potential that it should be reclaimed and restructured?

## What is the bioeconomy?

According to the European Bioeconomy Panel<sup>1</sup>, the bioeconomy includes the production and use of renewable biological resources as well as economic activities, both within and between countries, related to the invention, development, production and use of biological products and processes. This includes the production of food and non-food agricultural crops, and the technological processes that turn them into food, feed, bio-based products, agrofuels, and bioenergy. More specifically, the bioeconomy encapsulates numerous sectors: agriculture, forestry, fisheries, construction, food processing, pulp and paper, biotechnology, environmental technology, industrial goods, textiles, chemicals and pharmaceuticals, and recycling and waste collection.<sup>2</sup>

Concerns about resource sustainability are growing, particularly in regard to food scarcity and food security; limited national (or global) capacity to produce goods; climate change; and environmental degradation.<sup>3</sup> The bioeconomy presents biotechnologies (processes that use and manipulate biological systems and organisms to develop new products) and biomass (material produced from vegetable or animal matter), as solutions for global resource shortages. The European Bioeconomy Panel is engaged in several projects to this end: for example, processing plants that use hydrothermal carbonisation processes to convert agricultural pulp waste into char.<sup>4</sup>



**The Composition of the Bioeconomy**

Source: Interdepartmental Working Group for the Bioeconomy (2013).<sup>5</sup>

Governments worldwide are increasingly focusing on the development of national and international bioeconomies in order to address a growing number of major social, environmental and economic challenges. These bioeconomies purportedly create new employment opportunities, assist in climate change mitigation, and promote resource efficiency. Concurrent

to the rise of this corporate-driven bio-based strategy, societies across the planet are struggling with converging crises in the areas of food, energy, climate and finance.<sup>6</sup> These multiple and interlinked crises are influencing policy decisions and governance in the agricultural, forestry, fisheries and aquaculture sectors, and by extension impacting people who earn their livelihoods in these areas.

Box 1:

### The global bioeconomy agenda

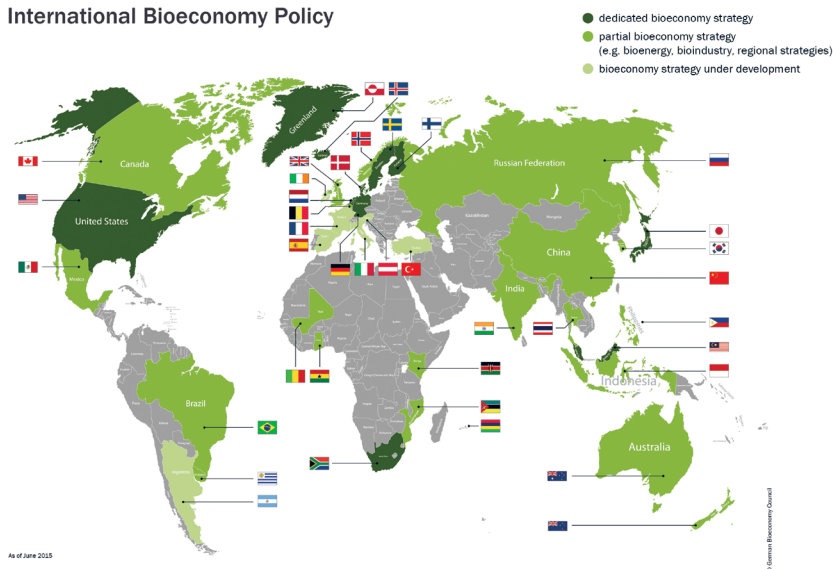
Globally, the scope of political measures promoting the bioeconomy has increased significantly in recent years. The potential benefits of a global bioeconomy have been praised by all of the G7 member countries, as well as more than 30 other countries around the world. Both the EU and the OECD have provided significant political momentum to the agenda, and are calling for increased international cooperation to further the development of a global bioeconomy. Germany, the US and Japan have established ambitious national agendas, and have guided the development of the bioeconomy through comprehensive public support programmes. Italy and Canada have taken a more pragmatic approach by letting industry lead the way, while the UK aims to increase its life sciences competencies as a political strategy for supporting the development of high-value industrial and service sectors. France's approach has been to fund research and development in the bio-based chemistry and energy sectors and to improve the relevant legal conditions (for example by implementing labelling schemes). Including the bioeconomy in comprehensive EU framework programmes (such as FP7 and Horizon 2020) has inspired many EU member states to develop their own national strategies. However, initiatives between G7 member states are poorly coordinated, and many researchers and policymakers argue that international cooperation must be intensified if the full potential of the bioeconomy is to be realised.<sup>7</sup>

Interestingly, beyond the EU and G7 member states, only two countries have developed dedicated bioeconomy strategies: Malaysia and South Africa. The Malaysian government launched its Bioeconomy Transformation Programme (BTP) in 2012 as a platform for the private sector to maximise commercial biotechnology opportunities. Companies work with policymakers in setting

national goals for the application of biotechnology in the areas of agricultural production, industrial manufacturing and health. The BTP's aim is to increase private sector investment in biotechnology in order to decrease the industry's dependence on public funds, with the intension of transforming Malaysia into a high income, inclusive and sustainable bioeconomy by 2020.<sup>8</sup> In short, private companies are in control of the country's biotech development.

South Africa's 2013 Bioeconomy Strategy was implemented as an expansion of its 2001 National Biotechnology Strategy, which initiated the development of health, industrial and agricultural technologies. The 2013 strategy outlines key mechanisms for coordinating the research, development and innovation needs of industries and the government so that South Africa maintains a competitive edge in the global market. Although the Department of Science and Technology plays a key role in leading this strategy, it notes the necessity for the Departments of Trade and Industry, Health and Agriculture, Forestry and Fisheries, and Environmental Affairs to be actively involved in directing research and development activities that "improve the quality of life for South Africans".<sup>9</sup>

## International Bioeconomy Policy



## Bioeconomy Strategies Around the World

Source: German Bioeconomy Council, June 2015.<sup>10</sup>



The European Commission has praised the EU's growing bioeconomy as a demonstration of its member states' engagement with the regional 'green economy' agenda, catalysed in the early 2000s through the active promotion of bioenergy and a widespread transformation toward agrofuels (see Box 4). Yet more than a decade into this experiment, scientific, academic and grassroots research increasingly exposes its flawed claims. Most importantly, decreased emissions are greatly overestimated. Furthermore, agrofuels have more negative impacts than the fossil fuels they are supposed to replace, particularly in terms of lost land, resource access, livelihoods, and food security in the Global South (see Box 8).<sup>11</sup>

Box 2:

### Problems with the dominant view of the bioeconomy

The bioeconomy agenda emerged in response to the need to find alternatives to fossil fuels. However, it ignores the necessity of reducing high levels of consumption, which is the primary cause of resource depletion worldwide. Bioeconomy policy documents highlight the need to accommodate the ever-increasing call for bio-products and biomass, rather than suggesting alternatives that could decrease demand. This means that more and more land will be converted to multiple-use 'flex crops' like soy, sugar and corn, often at the expense of other food crops.

This trend - creating new biologically 'enhanced' products as well as new ways for humans to take control over resource production - leads to the commodification of nature. Furthermore, it perpetuates structures that prioritise market growth over environmental health and human wellbeing. Failure to address this trajectory will aggravate pressures on the environment, forests, and food production, and will lead to the further degradation of lands by chemicals, fertilisers and machinery. In addition to failing in the area of environmental justice, the current bioeconomy threatens social justice by restricting access to land and impacting livelihoods. As the market for bio-products becomes more lucrative, agribusinesses expand their reach. Small-scale producers then succumb either to 'land grabbing' by agribusinesses, or they are forced to sell their land as they are no longer able to compete in the market. A vicious cycle ensues, as the gap widens between

those with and without access to land, and the control over resources, production chains and biotechnologies becomes further concentrated in the hands of a few large corporations.

Source: R. Hall and J. Zacune (2012). Bio-economies: The EU's real 'Green Economy' agenda? World Development Movement and the Transnational Institute.

**Further reading:**

OECD (2009). The Bioeconomy to 2030: Designing a Policy Agenda. <http://www.oecd.org/futures/long-termtechnologicalsocietalchallenges/thebioeconomyto2030designingapolicyagenda.htm>.

European Commission (2015). What is the Bioeconomy. <http://ec.europa.eu/research/bioeconomy/index.cfm>.

H. Paul (2013). A Foreseeable Disaster: The European Union's agroenergy policies and the global land and water grab. Transnational Institute, FDCL and Econexus. <http://www.econexus.info/node/185>.

## What is the Knowledge-Based Bio-Economy (KBBE)?

The Knowledge-Based Bio-Economy (KBBE) is an important factor in understanding the current bioeconomy agenda. It is a specific approach to bioeconomy policy-making that emerged from the EU's life sciences research agenda, which has mainly focused on making agriculture more sustainable and efficient since the 1990s. Since 2007, the European Commission has based its research priorities on the KBBE, which is a hybrid of the OECD's bioeconomy project and the EU's Knowledge-Based Economy and links knowledge with technological innovation. The KBBE can be understood as a new political-economic strategy, and plays a role in shaping policies, institutional practices and societal changes with the aim of creating 'sustainable capital'. Simply put, the EU's KBBE agenda presents technological

advancement as the equivalent of societal progress and improved life quality. However, the KBBE does not address the long-term consequences of constantly striving towards new, 'more efficient' technologies and the development of projects that promote the commodification of nature.<sup>12</sup>

The KBBE perspective equates 'renewable' with 'sustainable.' With this viewpoint, anything that can be regrown is considered to have an infinite supply, and technology that can manipulate organisms should therefore be used to create these renewable products. In short, this requires the commodification of nature. The goal becomes 'sustainable capital', which drives a 'new' trajectory of 'sustainable capitalism'<sup>13</sup> that is essentially no more than an expansion of the corporate-driven market system. There are two analyses of the KBBE, each offering divergent priorities and models for the future of global production (see Box 3). They promote different diagnoses and remedies for the instability of the current agricultural system, and contrasting ideas about the future that can be shaped by mobilising networks and resources and changing institutional practices.

The dominant 'life sciences' perspective argues that the inefficiency of farms – their inputs, processing methods and outputs - is a major threat to society. Proponents, which include multinational companies, some small and medium-sized enterprises, plant scientists, and the Committee of Professional Agricultural Organisations (COPA), hold that Europe's agricultural industry is disadvantaged in terms of global competitiveness and technological progress.

Conversely, the alternative 'agroecology' perspective argues that agro-industrial monocultures force farmers to become dependent on external inputs, undermine their knowledge base, and distance them from consumers. Proponents of this perspective include the organics industry and organic institutes (including the organic section of COPA), and environmental NGOs.<sup>14</sup>

Box 3:

## Two contending visions of the KBBE

**1) Life sciences perspective:** The dominant vision argues that agricultural productivity and efficiency will be increased through global value chains that link European products with the international market. EU competitiveness will be boosted through the privatisation of knowledge and through stronger linkages between agriculture, energy and other industrial products. From this perspective, agricultural goods are viewed as raw materials that can be broken down into smaller parts for further processing. Life sciences proponents claim that the genetic modification of plants enhances their nutritional components and productivity, particularly under harsh conditions such as drought, infertile soil and pest infestations. The life sciences approach supports the use of a combination of technologies in order to identify valuable 'new' substances in nature. It also promotes the more efficient use and expansion of renewable resources. As a hard science based on technological advancement, this perspective dominates bioeconomy research and receives the vast majority of research funding.

**2) Agroecology perspective:** An alternative vision, which has generally been excluded from policy and receives little research funding, argues that organic agriculture and shorter food supply chains will provide farmers with more value for their input and labour. In other words, agroecology supports the relocalisation of food and energy production as well as autonomous decision-making by farmers. Organic farming is highly knowledge-based, requiring both high-tech and indigenous expertise. This perspective also supports the use of agroecological engineering, which aims to create agricultural systems that require as few chemical, fertiliser and energy inputs as possible. Such systems rely on the natural interactions between the various components of an ecosystem, allowing them to regulate themselves and increase their own productivity, soil fertility and pest deterrents. This approach also calls for the more efficient use of renewable organic recycling processes that combine and maintain on-farm resources and enhance farmers' knowledge.

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Source: L. Levidow, K. Birch and T. Papaioannou (2012). 'EU agri-innovation policy: Two contending visions of the bio-economy', *Critical Policy Studies*, 6(1), 40-65.

**Further reading:**

K. Birch, L. Levidow and T. Papaioannou (2010). 'Sustainable Capital? The Neoliberalization of Nature and Knowledge in the European "Knowledge-based Bio-economy"', *Sustainability*, 2, 2898-2918.

J. Franco, L. Goldfarb, D. Fig, L. Levidow, S.M. Oreszczyn (2011). Agricultural Innovation: Sustaining What Agriculture? For What European Bio-Economy? Project-wide final report. CREPE.

L. Levidow, K. Birch and T. Papaioannou (2012). 'EU agri-innovation policy: Two contending visions of the bio-economy', *Critical Policy Studies*, 6(1), 40-65.

## What are the main drivers of the bioeconomy?

The corporate-led agenda for advancing the bioeconomy is reflective of a broader global strategy that is based on innovation and sustainable development. It links both the public and private sector on wide-ranging themes including production, livelihoods, economic growth, ecosystems, and natural resources. Yet perspectives differ on how this should be achieved: sustainable agriculture and natural resource production are particularly contentious and ambiguous processes. The EU's bioeconomy agenda raises various questions: What does 'sustainable' actually mean? What exactly will be 'sustained'? To sustain something means to provide strength or support in order to prolong functioning. In this sense, sustaining food production and the environment implies maintaining existing functions and processes. The agroecology approach fundamentally questions the use of interventionist actions, asking instead why ecosystems and natural resources are no longer able to sustain themselves.<sup>15</sup>

The negative environmental impacts of the industrial production system, particularly in the agricultural sector, has been criticised for decades. While large-scale mass production has sustained the current economic model, governments and private companies are recognising that citizens and consumers increasingly disapprove of development and production at the expense of nature. In an attempt to subdue this disapproval and cater to

the emerging 'live green' trend, new markets for organic, biological and environmentally friendly products and services are being developed. Is this reflective of a completely new system, or is it simply an extension and repackaging of the privatised market system? Is it the perpetuation of old ideologies or the search for real alternatives?

Box 4:

### The 'bioeconomy' and the 'green economy'

The bioeconomy agenda has developed rather subtly alongside the more visible discussions of the 'green economy'. The 'green economy' emerged during the 2012 Rio+20 summit and is being promoted by the United Nations Environment Programme (UNEP). Although they are packaged as a 'greening' strategy, bioeconomies are part of an industrial development trajectory that seeks energy and natural resource security by establishing new 'green', 'biological', and 'sustainable' products. While Rio+20 did not produce a specific 'green economy' agenda, the development of bioeconomies was already underway, particularly in EU countries, the US and China.<sup>16</sup>

**Bioeconomy:** An overarching vision for future societies that use bio-resources for energy and are less dependent on fossil fuels. This requires the increased production of renewable biological resources (biomass) and their conversion into food, feed, bio-products, and energy. A mature and sustainable bioeconomy must offer global food security, improve nutrition and health, develop bio-based products and fuels, and help agriculture, forestry, fisheries and ecosystems to adapt to climate change. It requires the forging of bridges between actors engaged in the following four pillars:

- Food production and processing
- Agri-environmental products and services
- Value-added food and health products
- Energy and bioenergy

**Green Economy:** Driven by the 3F crisis (Food-Feed-Fibres), the green economy is a part of an integrated bioeconomy agenda. Greening the economy means restructuring businesses and infrastructure to provide better returns on investments in natural, human and economic capital.

It includes the production, efficiency and conservation of renewable energy, and is based on the following six sectors: renewable energy, green buildings, sustainable transport, water, waste, and land management. In order for these sectors to be sustainable, the following three main pillars must be harmonised:

- Economy
- Society
- Environment

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Source: C. Socaciu (2014). 'Bioeconomy and green economy: European strategies, action plans and impact on life quality', *Bulletin UASVM Food Science and Technology*, 71(1).

EU governments are also increasingly concerned about having access to cheap resources that will allow the European manufacturing industry to maintain its competitiveness amongst other top global producers (namely the US and China). This has been a stimulus for the EU's recent negotiations to establish broad, comprehensive trade agreements with both the US and Canada: the Transatlantic Trade and Investment Partnership (TTIP) and the Comprehensive Economic and Trade Agreement (CETA), which aims to reduce up to 100 per cent of tariffs on goods exported across the Atlantic, and nearly 90 per cent on agricultural products.<sup>17</sup> Such comprehensive agreements are likely to create positive outcomes for large-scale producers on both sides of the ocean, as it will be easier and more cost-efficient for companies and agribusinesses to export their goods to consumers abroad. However, small-scale producers will no longer be able to compete with cheaper, mass-produced products. These agreements will also facilitate more international trade opportunities for bio-based products, contradicting the agroecological perspective that agricultural production chains should be relocalised.

The current consumption-oriented global economic system creates enormous amounts of waste and increases social inequalities. The 'solutions' presented by the dominant life sciences approach to the bioeconomy simply reframe destructive behaviours and patterns rather than addressing their root causes. This form of bioeconomy further commodifies both nature and

knowledge by intensifying natural productivity for commercial exploitation. Nature is commodified when it 'becomes' a resource with economic value. This is the outcome when the policies, agendas, perspectives, narratives and knowledge of one worldview dominate all others.

There are several processes that contribute to the commodification of nature, including privatisation (of land), marketisation (of air), regulation (of environmental protection), re-regulation (of biodiversity), liberalisation (of resource trading), and competitiveness (in resource markets). These processes are often framed in policy discourse as opportunities and solutions for environmental problems. In turn, this strengthens the view of nature as a freely available resource, and perpetuates capitalist narratives that 'free' markets and 'free' trade should be the core principles around which economic, social, and political relations are organised. Such policy discourse also influences the procedures and institutions driving the commodification of nature through the 'new' knowledge they produce.<sup>18</sup>

**Further reading:**

K. Birch, L. Levidow and T. Papaioannou (2010). 'Sustainable Capital? The Neoliberalization of Nature and Knowledge in the European 'Knowledge-Based Bio-economy'' *Sustainability*, 2, 2898-2918.

## How are EU institutions introducing the bioeconomy?

In 2012, the European Commission adopted 'Innovating for Sustainable Growth: A Bioeconomy for Europe'. This life sciences strategy proposes a comprehensive agenda for addressing the environmental, energy and food supply challenges that Europe is increasingly facing. While not a concrete policy, it aims to focus European efforts collectively within this rapidly changing, diverse section of the economy. The goal is to promote Europe's ability to live within its limits through the sustainable production and consumption of natural resources.<sup>19</sup>



The bioeconomy strategy was inspired by the Rio+20 agenda 'Towards a Green Economy', in which the European Commission recommended bioeconomies as a key component for sustainable development and poverty eradication. Within this framework, the EU has pursued a development trajectory focused on technological and scientific advancement as key priorities for boosting societal progress. This approach explains concerns about environmental and natural resource sustainability as inefficiency issues that can be remedied with the increased use of scientific tools. In other words, biotechnology is cast as the solution to bridge the divide between environmental protection and growing the economy.

The European Commission claims that a transition toward more renewable biological resources and sustainable primary production is crucial in order for the EU to produce more food, fibre and other bio-based products with fewer environmental impacts. Policymakers also contend that Europe must have sufficient supplies of raw materials in order to maintain competitiveness with other top producing countries (such as Brazil, the US and China). These arguments are particularly important for discussions on biofuel production, as fossil fuel resources continue to decrease worldwide.

In order to address these intersecting challenges, the European Commission champions the bioeconomy as offering unique solutions to multiple environmental concerns while simultaneously achieving sustainable economic growth. A dedicated bioeconomy strategy would allow Europe to transition into a more resource-efficient society, relying on renewable biological resources to fulfil consumer demand. Meanwhile, archaic climate-degrading production activities would be phased out. The Commission strategy includes the sustainable (primary) production and processing of renewable resources in multiple sectors, including land; fisheries and aquaculture; food, feed and fibre; bio-based products and energy (biofuels); and related public goods.<sup>20</sup>

The European Commission estimates that the bioeconomy market is worth over EUR 2 trillion and that it provides 22 million jobs, accounting for 9 per cent of total EU jobs. Bio-based industries are one of the EU's main pillars for generating jobs and growth, through the use of renewable biological resources to produce bio-based products (biodegradable materials made

from non-edible parts of plants, for example) and biofuels (made from corn or sugar, for example). If sustainably managed, the bioeconomy could also contribute to the European Commission's goal for a low-carbon economy by 2025 under the Europe 2020 strategy and the Horizon 2020 programme.<sup>21</sup>

**Further reading:**

European Commission (2015). Bioeconomy Strategy. Available from: [http://ec.europa.eu/research/bioeconomy/policy/strategy\\_en.htm](http://ec.europa.eu/research/bioeconomy/policy/strategy_en.htm).

European Commission (2012). Innovation for Sustainable Growth: A Bioeconomy for Europe. Available from: <http://ec.europa.eu/research/bioeconomy/index.cfm?pg=policy&lib=strategy>

European Bioeconomy Panel and SCAR (2014). What Next for the European Bioeconomy? Available from: [http://ec.europa.eu/research/bioeconomy/pdf/where-next-for-european-bioeconomy-report-0809102014\\_en.pdf](http://ec.europa.eu/research/bioeconomy/pdf/where-next-for-european-bioeconomy-report-0809102014_en.pdf).

## How are EU member states engaging with the bioeconomy?

There are a total of 14 countries actively engaged with the EU's bioeconomy vision. Six countries have already created a *dedicated* bioeconomy strategy (Denmark, Iceland, Sweden, Finland, the Netherlands and Germany - see Box 5); three have a *partial* strategy (Norway, the United Kingdom and Belgium - see Box 6); and five have a strategy *under development* (Ireland, France, Spain, Austria, and Italy - see Box 7). Several countries have no specific strategy or policy framework to develop their national bioeconomies (including Hungary, Poland, Romania, and Bulgaria). While a dedicated bioeconomy strategy refers to a comprehensive nation-wide vision, a partial strategy is when only particular provinces or regions have an established agenda. Other countries are still in the beginning stages of strategy discussions and negotiations between government officials, policymakers and potential private sector investors.

Events bringing together representatives from various sectors of the bioeconomy to discuss strategies are being held throughout Europe. For example, the European Forum for Industrial Biotechnology and the Bioeconomy (Brussels, October 2015) brought together “industry experts throughout the vibrant and innovative bio-based community” to discuss key issues and developments in commercial bio-refineries around the world.<sup>22</sup> Additionally, the Global Bioeconomy Summit (Berlin, November 2015), the “first community building platform to discuss bioeconomy policies globally”, builds on the post-2015 development goals and intends to produce a multilateral agenda for the implementation of a sustainable bioeconomy.<sup>23</sup>

Box 5:

### Dedicated bioeconomy strategies: Germany and the Netherlands

The German bioeconomy is governed mainly by the Federal Ministry of Food and Agriculture and the Bioeconomy Council, which is one of the most prominent independent advisory bodies working on the issue in the EU. Recommendations from the Council were included in both the 2013 National Policy Strategy on Bioeconomy and the 2010 National Research Strategy on Bioeconomy 2030. The latter has a six-year budget of EUR 2.4 billion for research on climate change, sustainable food production, bioenergy, and industrial biotechnology, of which EUR 1.4 million is dedicated to project funding and the remainder is institutional funding.<sup>24</sup>

Germany is one of Europe’s most prominent industrial biotechnology producers, with more than 500 biotech companies, 10 per cent of which are engaged in agriculture and ‘green’ technologies.<sup>25</sup> Germany also devotes significant attention to cutting national emissions and the transition towards sustainable energy, aiming to increase renewable electricity to 80 per cent of the total usage by 2050. An Emissions Trading System has been implemented with the goal of limiting greenhouse gas emissions, and an Environmental Taxation programme diverts funds from environmentally unfriendly activities towards social services. The country’s 2014 reform of the Renewable Energy Sources Act calls for the reduction of crop use for energy and fuels, and the promotion of energy from wind, solar, and waste. The Germany biofuels

policy was altered in early 2015 to require fossil fuel companies to increase the amount of biofuels in their total fuel production, rather than simply meeting minimum proportion requirements.<sup>26</sup>

The Dutch bioeconomy strategy is similar: it is governed mainly by the Cabinet of Economic Affairs, Agriculture, and Innovation in collaboration with regional development agencies across the country. Several agreements and strategies have been implemented, including the Energy Agreement for Sustainable Growth. This agreement is based on a long-term growth plan focused on energy and climate goals, as well as increasing competitiveness, employment and exports. The Dutch bioeconomy agenda links more than 40 governmental, environmental, and civil society organisations, employers' associations, unions, and financial institutions.<sup>27</sup>

The Netherlands, along with Finland, tops EU countries in allocating funds to industrial biotechnology research programmes. The country is also prominent in industrial crop cultivation and biotechnology industries, and the chemical and agricultural sectors are cornerstones of the Dutch economy. A few Dutch companies also manufacture bio-based chemicals, while large-scale manufacturing of biofuels and bio-refining are currently in the research or preparatory stages. The Dutch government focuses on the use of bio-based raw materials, meaning that it is actively exploring ways for various non-food products to be derived from biomass and residues from the agricultural sector.

The government's agenda calls for the more efficient use of biomass; sustainable biomass production; increased production of sustainable electricity and green gas; and new market developments. The port of Rotterdam is foreseen as the Bioport of Europe, and promoted as offering the best facilities for biomass trade, transport, storage, processing and production. The national vision for a bio-based economy was made public in 2007, and is driven by the government's interest in strengthening the economic competitiveness of the national business sector, addressing climate change, reducing waste and environmentally hazardous substances, and becoming less dependent on oil.<sup>28</sup>

#### Box 6:

### Partial bioeconomy strategy: Belgium

Whereas Belgium has not developed a national bioeconomy agenda, two of its three regions (Flanders and Wallonia) have bioeconomy governing bodies. In 2013, Flanders produced a strategy setting out the Flemish government's vision for a sustainable and competitive bioeconomy by 2030. The strategy details the development of the region into an 'economically innovative, sustainable and socially warm society by 2020' (Flanders in Action project). In 2012, the Flemish government established an Interdepartmental Working Group for the Bioeconomy in order to address multiple aspects of the bioeconomy.<sup>29</sup> Additional initiatives include the Flemish Climate Plan 2013-2020 for mitigation and adaptation, the Renewable Energy Action Plan 2020, and a 2013 agenda on the sustainable use of renewable raw materials in industrial production, particularly for biomaterials and green chemicals.<sup>30</sup>

There are over 140 biotechnology companies active in Belgium, and approximately 5 per cent of them operate at an industrial level. In 2005, the government introduced a platform of specific measures promoting the integration of bio-products and bioenergy into the market, including recommendations for bioeconomy policy and research topics.<sup>31</sup> The same year, Ghent Bio-Energy Valley (GBEV) was founded as a Public-Private Partnership between the city, the port of Ghent, Ghent University, the East Flanders Development Agency, and several bioenergy companies in the region. The GBEV was formed mainly for political reasons, as companies hoped that their collaboration would result in a larger biofuels production quota from the government and better-coordinated information for the general public. In 2006, GBEV successfully acquired 80 per cent of the Flemish biofuels quota, an investment worth EURO 120 million. Production began in 2008, and GBEV's legal status was changed to non-profit. In 2013, the partnership's name was changed to Ghent Bio-Economy Valley as the scope of its activities extended beyond bioenergy production.<sup>32</sup> The Flemish government believes that the bioeconomy provides important opportunities for green growth and job creation, and that it forms part of a 'circular economy' that facilitates cross-border trade and strengthens competitiveness, research and innovation.<sup>33</sup>

#### Box 7:

### Bioeconomy strategy under development: Italy

Whereas Italy has no specific bioeconomy strategy, there are a number of policies in place with relevant impacts. These include the Italian Action Plan for Energy Efficiency 2014, the 2011 National Budget Law, and the 2012 National Environmental Law, which together decreed that all plastic bags had to be biodegradable or reusable, leading to an increase in the demand for bio-plastics. Additional policies include the 2013 Biorefinery Decree, which simplifies regulation for second and third generation biorefineries, and the National Environmental Decree, which sets out guidelines for national waste management. Additionally, the European Technology Platform for Sustainable Chemistry (SusChem) releases annual vision documents that highlight how Italian society can benefit from chemical and biotechnology industries.

The industrial biotechnology sector only started to emerge in Italy over the past few years, considerably later than in other EU countries. However, the country still has the third-largest number of biotechnology companies in the region, and the highest growth rate in pure biotechnology production. Recognising the possibilities for economic growth in the sector, the Italian government has begun to allocate more research and development funding towards a bioeconomy strategy. Furthermore, Italy was the first European country to declare the mandatory nation-wide use of biofuels beginning in 2018. The government's 2011 Biofuels Decree calls for an increase in biofuels quotas beginning in 2015, and includes support for biomass heating systems. The Italian bioeconomy is governed by the environment, economic, and agriculture ministries; a sectoral board organises a bioenergy roundtable to discuss policies for biomass and biofuel regulation.<sup>34</sup>

# To reject or reclaim the bioeconomy?

Determining the potential positive and negative impacts of the global bioeconomy agenda is complex and raises many questions, as most of the strategies are new and the long-term effects are unknown.

Conventional bioeconomy strategies make many appealing promises about the benefits of an expanded bio-based trajectory for social development and environmental protection. The potential adverse consequences often remain unclear to the public. The policymakers and researchers who favour the expansion and intensification of the European Commission's bioeconomy vision (mainly for its economic possibilities), argue that it:

- 1) Promotes the sustainable and renewable production of natural resources by fostering environmentally friendly societies and utilising cyclical production chains that recycle and reduce waste. In this vision, agricultural goods are presented as infinite (and therefore sustainable) resources that can be continuously harvested and regrown.
- 2) Creates more sustainable jobs by harnessing local labour and increasing opportunities in the agricultural sector. The bioeconomy currently employs 22 million people in the EU alone.
- 3) Generates economic growth through the expansion of industries (such as biotechnology and agriculture) that can then be used for national development.
- 4) Focuses on sustainable energy by increasing the use of cleaner-burning biofuels and decreasing fossil fuel dependence, thus lowering carbon emissions, reducing pollution, and increasing national energy security.
- 5) Increases the export of goods, which creates economic growth and strengthens international trade relationships, which in turn increases national competitiveness in global markets. This also increases overall agricultural production levels, which in turn strengthens national food security.<sup>35</sup>
- 6) Capitalises on local value by replacing crops that were previously transported long distances with local crops. This includes feed and fuel additives: in Norway for example the potential of timber, kelp and seaweed to replace South American soy imports is being explored.<sup>36</sup>

However, these claims spark numerous questions concerning the socio-ecological impacts of the bioeconomy. Who will benefit economically from these technological developments? What are the environmental impacts of such intensive production? Will the bioeconomy really be 'sustainable' in the long term? Our hope is that by raising and exploring these questions we will contribute to a public debate about whether the current bioeconomies approach is inherently destructive and needs to be completely rejected, or whether it should be reclaimed and restructured, for example from an agroecological perspective. Here are our counterpoints and questions:

- 1) Presenting agricultural and natural resources as infinite goods that can be infinitely harvested and regrown is problematic, and can lead to resource overexploitation, water pollution and soil depletion. Sustaining this type of production also requires massive inputs such as fertilisers and pesticides that will further degrade soil in the long run. A critical examination of how these 'sustainable' production methods will impact the environment and agricultural land in the long term is required. How will the overexploitation of resources be prevented? Is the complete recycling of bio-waste (or agricultural by-products) really feasible?
- 2) The creation of new 'sustainable' jobs fails to address the countless jobs that have already been lost due to the increasing domination of industrial agriculture and high-tech production, both of which decrease the need for human labour. The development of new technologies squeezes small-scale farmers out of the agricultural sector due to their inability to compete with large-scale, low-cost production methods. How will these existing losses be addressed? Will these workers find stable employment and training in new bioeconomy-based sectors?
- 3) Who profits from expanded bioeconomy industries? Private companies generally reabsorb most of their profits. Can governments be counted on to pour revenue back into social services to support people in need, including those who have lost their jobs as a result of industrial development?
- 4) Do bioeconomy agendas satisfactorily address the negative environmental impacts of industrial and monoculture production? Why are longer-term, less intensive agricultural solutions, like permaculture



or agroecology, that support decentralisation and local production not supported? What deeper structural issues promoting mass production are at play here?

- 5) How does the increased focus on export goods impact national food security, particularly with regard to the expanded production of non-food agricultural goods? What impacts could this have on local food and land sovereignty movements, specifically in terms of local populations' access to natural resources? How might an increased focus on competition and profits lead to domestic cost cuts, lower worker wages, and the production of lower-quality goods?
- 6) What are the potential impacts on countries in the Global South with markets designed to export goods, such as soy, corn and sugar, to countries in the Global North? What will happen to the surplus if current production levels greatly exceed domestic demand? How can increased local production be promoted and regulated in a globalised 'free trade' world, in which domestic governments have minimal control over import and export flows?

Several limitations to the bioeconomy agenda have already emerged, and some consultants are calling for the expansion of existing strategies to include more agroecological elements. For example, in its evaluation of the potential impact of the bioeconomy on the sustainability of agriculture, forestry and fisheries, the Standing Committee on Agricultural Research (SCAR)<sup>37</sup> recommended that the four key principles for a sustainable bioeconomy (ensuring the primacy of food security; ensuring that harvests do not surpass capacity for regeneration; first using biomass for what draws its highest value; and reducing, reusing and recycling production waste) be expanded to include a fifth principle: the diversification of outputs, scales, practices and methods of production.<sup>38</sup> This fifth principle flags the current agenda's lack of attention to the negative environmental and social impacts of solely engaging in monoculture and intensive or large-scale production, and highlights the importance of exploring multiple methods for diversification and de-intensification. Bringing more small-scale and ecological techniques (for example using fewer chemicals, less machinery, crop rotation, and so forth) into the bioeconomy agenda could potentially make it more comprehensive and inclusive.

Box 8:

## Important lessons from global agrofuel production

While the bioeconomy is presented as a 'greener' alternative to fossil fuels, some have argued that it is actually a strategy for yet another resource grab that would impact land, livelihoods, and knowledge in the Global South, where 86 per cent of the crops used for biomass production are grown.<sup>39</sup>

To date, the establishment of an EU industrial agrofuels market has had detrimental impacts on the land and resource rights of populations not only in the region, but also in countries in the Global South. And while the EU's dependence on agromass imports has continued to grow, the bioeconomy has simply expanded without a parallel decreased reliance on fossil fuels.

Evidence is accumulating that agrofuels, especially when produced on a large scale, are not actually renewable. The European Commission however, backed by the automobile and oil industries, has responded to these findings by broadening its policy focus toward second and third-generation agrofuels. The two pillars of the EU agrofuels policy that deal with the expansion of the bioeconomy in the coming decades, the Fuel Quality Directive and the Renewable Energy Directive, have been challenged for failing to deliver on their promises for low-carbon, sustainable, pro-rural development. These policies, along with others governing agriculture and the environment, have also been criticised for contributing directly and indirectly to changes in land use. In addition they are blamed for the further polarisation of resource control in regions around the world, particularly those heavily engaged in primary sector production. Such changes will certainly have lasting effects in rural areas, destroying the social fabric of agricultural communities and the livelihoods of people who are dependent on access to land and resources. Ultimately, people will continue to be pushed off their land, finding work as labourers on other farms or migrating to urban areas in search of employment.

By presenting the bioeconomy as a win-win strategy, the EU assumes that initiatives like its agroenergy policy have little impact in the Global South. It argues that the region produces most of its own biofuel crops, and attempts to frame the EU as a global leader in production and processing. While this may have been the case in the early stages of the bioeconomy's development

(prior to 2008), the use of land in countries outside the EU has since increased steadily, with agrofuels quickly becoming one of the key drivers of land grabs around the world.

Additionally, the process of 'green grabbing', or land grabbing for environmental or conservation purposes, is illustrated by in the palm oil plantations that are popping up across Africa and Southeast Asia, as well as in South America's soy plantations. All of these projects are producing crops mainly for export to countries in the Global North. GRAIN reports that the EU's biofuels agenda has led to the corporate grabbing of more than 17 million hectares of land in countries worldwide, with the possibility that this figure could increase to over 40 million hectares by 2020.<sup>40</sup> This threatens local agricultural systems (such as pastoralism) and biodiversity, as traditional farms and methods are replaced by large-scale, often foreign-owned, agribusinesses. The threats to local people are also numerous, as their food, water and land security are seriously degraded and families are forced to split up in order to find work.

As the current bioeconomy agenda is taking a similar trajectory, some very important lessons should be learned from the past decade of agrofuel production and expansion. Without the recognition and adjustment of these problems, damage is likely to continue and even increase in severity.

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Source: H. Paul (2013). A Foreseeable Disaster: The European Union's agroenergy policies and the global land and water grab. The Transnational Institute, FDCL and Econexus.

#### **Further reading:**

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# Endnotes

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Hands on the Land for Food Sovereignty is a collective campaign by 16 partners, including peasants and social movements, development and environmental NGOs, human rights organisations and research activists aiming to conduct activities in Europe to raise awareness on issues related to the use and governance of land, water and other natural resources and its effects on the realization of the right to food and food sovereignty. Through evidence-based research and material, public events and meetings, trainings, education and advocacy work, the campaign engages EU citizens, media, journalists, NGO practitioners, social activists, educators, students, politicians, policy and decision makers to take action for food sovereignty

[www.handsontheland.net](http://www.handsontheland.net)

TNI's **Agrarian Justice** project brings together research and analysis on the collective struggles of working people in rural areas to democratize access, ownership, and control of land, water and other natural resources. It works closely in alliance with local, national and global alliances of small-scale farmers, fisherfolk and marginalised rural working people.

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