

# Shaping Bioeconomy Strategies in Europe: The Role of Civil Society



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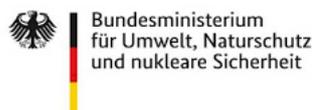
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# Summary

The EU Bioeconomy Strategy<sup>1</sup> stresses the role of bio-based products as alternatives to fossil-fuel counterparts, and their importance in developing a sustainable economy based on renewable materials in Europe. It encourages member states to develop national bioeconomy strategies or equivalent policies that enhance the cooperation between primary producers (in agriculture, forestry or fisheries) and bio-based industries.

Currently, nine EU member states (Austria, Finland, France, Germany, Ireland, Italy, Latvia, Spain, and the Netherlands) have a national strategy while others are involved in national or regional bioeconomy development.<sup>2</sup> All have in common that they are primarily geared at enhancing the cooperation of government agencies and bio-based industry with support of science and primary producers. This is mainly done through the provision of public funds to research and development.

This study takes a closer look at the role of civil society in the development and implementation of bioeconomy strategies in the EU, Finland, Sweden, Estonia, Italy, France and the Netherlands. While the bio-based industry is well organized and well-funded, civil society involvement in drafting and implementing bioeconomy strategies at EU or member state level has up to now remained limited.

Although all policy documents related to bioeconomy mention “stakeholder participation” in some way or another, respective stakeholder consultations primarily address state and regional authorities, industry and their associations as well as members of the scientific community. While the opinion of individual citizens is at best taken note of in scientific studies on attitudes towards the bioeconomy, participation of representatives like non-governmental organisations has in most cases only been sporadic. Formal consultation processes are lacking in most countries or are restricted to requests for written comments.

Adding to a lack of political will, participation is also hampered by a lack of financial resources that limits NGO activities in this field. By contrast, the biotech industry has ample means and lobby power to influence politics in their favour.

This changes, when it becomes evident that the resource needs of bio-based industry may lead to an overexploitation of ecosystems or may adversely affect the livelihoods of local communities. This is the case in Finland and Sweden,

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1 EC, 2018, A sustainable Bioeconomy for Europe: Strengthening the connection between economy, society and the environment, COM(2018) 673, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018DC0673>

2 [https://knowledge4policy.ec.europa.eu/visualisation/bioeconomy-different-countries\\_en](https://knowledge4policy.ec.europa.eu/visualisation/bioeconomy-different-countries_en)

where new biorefineries are pushing timber harvests to their limits, or in France and the Netherlands, where imports of biomass for the production of biofuels or for co-firing in coal power plants are not in line with sustainability criteria.

Making sure that planetary boundaries are respected and that all biomass used for bioenergy or the production of bio-based materials is sourced sustainably, is one of the main goals of environment and development NGOs. For many citizens, this also is a basic requirement for a broader acceptance of the bioeconomy.

These are some of the reasons for civil society and their organisations to play a stronger role in developing and implementing policies and guidelines for a bioeconomy that is environmentally sound, socially just and provides a genuine contribution to climate and biodiversity protection.

It is time for civil society to change from an observer on the side line to the centre of the playing field. This requires more than routinely mentioning stakeholder participation in policy papers. Moving from paper to practise will not only need inclusive fora for dialogue but also adequate resources to do so.

# European Union

In the European Commission, Directorate-General Research and Innovation is responsible for topics related to bioeconomy. The DG remains abbreviated RTD (Research and Technological Development), as it was formerly known. The Commissioner is Mariya Gabriel (Bulgaria).

Bioeconomy is dealt with in Directorate B Healthy Planet, led by Director John Bell (Ireland). It includes the following units:

- DG RTD B.1 Circular Bioeconomy and Biobased Systems  
(Head of Unit: Pavel Misigia)
- DG RTD B.2 Bioeconomy and Food Systems  
(Head of Unit: Peter Wehrheim)
- DG RTD B.3 Climate and Planetary Boundaries  
(Head of Unit: Philippe Tulkens) and
- DG RTD B.4 Healthy Ocean and Seas  
(Head of Unit: Elisabetta Balzi).

In October 2018, the European Commission adopted the Communication “A sustainable Bioeconomy for Europe: Strengthening the connection between economy, society and the environment” (generally referred to as the “European Bioeconomy Strategy”)<sup>3</sup> with an accompanying Staff Working Document.<sup>4</sup> It was an update of the 2012 EU Bioeconomy Strategy.

The scope of bioeconomy is set very broadly, encompassing basically anything that makes use of natural resources:

*“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.”*

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3 EC, 2018, A sustainable Bioeconomy for Europe: Strengthening the connection between economy, society and the environment, COM(2018) 673, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018DC0673>

4 EC Staff Working Document 2018, A sustainable Bioeconomy for Europe: Strengthening the connection between economy, society and the environment, SWD(2018) 431, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018SC0431>

The Bioeconomy Strategy sets out an action plan with 3 priorities and 14 key actions:<sup>5</sup>

**Priority 1: Strengthen and scale-up the bio-based sectors, unlock investments and markets**

- Mobilise stakeholders in development and deployment of sustainable bio-based solutions
- Launch the EUR 100 million Circular Bioeconomy Thematic Investment Platform
- Analyse enablers and bottlenecks for the deployment of bio-based innovations
- Promote and develop standards, labels and market uptake of bio-based products
- Facilitate the development of new sustainable biorefineries
- Develop substitutes to fossil-based materials that are bio-based, recyclable and marine biodegradable

**Priority 2: Deploy local bioeconomies rapidly across the whole of Europe**

- Launch a Strategic Deployment Agenda for sustainable food and farming systems, forestry and bio-based products
- Launch pilot actions for the development of bioeconomies in rural, coastal and urban areas
- Support regions and Member States to develop Bioeconomy Strategies
- Promote education, training and skills across the bioeconomy

**Priority 3: Understand the ecological boundaries of the bioeconomy**

- Enhance knowledge on biodiversity and ecosystems
- Monitor progress towards a sustainable bioeconomy
- Promote good practices to operate the bioeconomy within safe ecological limits
- Enhance the benefits of biodiversity in primary production

To achieve this, considerable financial resources have been put forward. Under the EU Research and Innovation programme Horizon 2020, €3.85 billion were made available to the bioeconomy from 2014 to 2020.<sup>6</sup> Under its successor instrument Horizon Europe (2021 – 2027) funding has increased to €8.95 billion that are foreseen for the cluster food, bioeconomy, natural resources, agriculture and environment.<sup>7</sup>

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5 EC 2019, Bioeconomy: the European way to use our natural resources, Action plan 2018, <https://op.europa.eu/en/publication-detail/-/publication/775a2dc7-2a8b-11e9-8d04-01aa75ed71a1>

6 European Commission 2018, Bioeconomy: the European way to use our natural resources - Action plan 2018, <https://op.europa.eu/en/publication-detail/-/publication/edace3e3-e189-11e8-b690-01aa75ed71a1/language-en/format-PDF/source-149755478>

7 European Union 2021, Horizon Europe Budget, <https://op.europa.eu/en/publication-detail/-/publication/1f107d76-acbe-11eb-9767-01aa75ed71a1>

Horizon Europe’s Strategic Plan explains how this cluster will make a difference:<sup>8</sup>

*“Physical and biological planetary boundaries and flows will be better understood and defined, notably in relation to the use and management of natural resources.”*

*“Research and innovation will benefit sustainable forest, agriculture and ocean management and the delivery of multiple new products and services. Innovative bio-based solutions will unlock the potential of sustainable bioeconomy and replace fossil – based, carbon intensive and harmful materials with innovative, climate-neutral, bio-based, circular, non-toxic materials and chemicals.”*

In December 2019, the Commission adopted the European Green Deal and its overarching aim of making the European Union climate neutral by 2050. A month earlier, the Council of the European Union adopted conclusions on the Bioeconomy Strategy, stressing that a sustainable European bioeconomy should be one of the major components for the implementation of the European Green Deal and it called upon the incoming Commission to deliver a progress report and if appropriate an update of the action plan and/or the Strategy at the latest by 2022.<sup>9</sup>

A roadmap for the initiative “European Bioeconomy Policy: Stocktaking and future developments” was published in July 2021. From July to August 2021, 62 individuals and organisations provided feedback. A report is planned for the first quarter of 2022.<sup>10</sup>

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8 EC DG RTD, 2021, Horizon Europe Strategic Plan (2021-2024), [https://ec.europa.eu/info/sites/default/files/research\\_and\\_innovation/funding/documents/ec\\_rtd\\_horizon-europe-strategic-plan-2021-24.pdf](https://ec.europa.eu/info/sites/default/files/research_and_innovation/funding/documents/ec_rtd_horizon-europe-strategic-plan-2021-24.pdf)

9 Council of the European Union, 2019, Draft Council Conclusions on the updated Bioeconomy Strategy, 14594/49, <https://data.consilium.europa.eu/doc/document/ST-14594-2019-INIT/en/pdf>

10 [https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13057-European-bioeconomy-policy-stocktaking-and-future-developments\\_en](https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13057-European-bioeconomy-policy-stocktaking-and-future-developments_en)

## Scientific support

Launched in July 2017, the EC's Knowledge Centre for Bioeconomy is run by the European Commission's Joint Research Centre (JRC). It holds a number of datasets, documents and an overview of the bioeconomy situation in Europe.<sup>11</sup> An overview over the bioeconomy in different countries is given in the Bioeconomy country dashboard.<sup>12</sup>

Located in Ispra (Italy), the Directorate for Sustainable Resources is one of the six scientific directorates of the Joint Research Centre (JRC). In different units it focuses on food security, land, soil, water and ecosystem services and is tasked with providing data and analysis of EU and global biomass supply, demand, and related impacts.<sup>13</sup> Unit JRC D.1 specifically deals with bioeconomy (Head of Unit: Greet Janssens-Maenhout).

## Involvement of Industry

The Bio-based Industries Consortium (BIC) was set up in 2013 and by now comprises of 240 industry members.<sup>14</sup> It invites “any interested stakeholders along the bio-based value chain” to join its ranks.<sup>15</sup>

In 2014, this group was invited by the EU to become the industrial partner in a public-private partnership called the Bio-Based Industries Joint Undertaking (BBI-JU). Originally slated to run until 2024, it operated on a budget of €3.7 billion. €975 million were public EU funds made available by Horizon 2020 and €2.7 billion were pledged by industry partners.<sup>16</sup>

In 2021, the EU's partnership with bio-based industries was extended for another 10 years and renamed into Circular Bio-based Europe Joint Undertaking (CBE JU). It runs on a budget of €2 billion operating under the rules of Horizon Europe.<sup>17</sup>

An analysis published in 2020 comes to the conclusion that “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” and questions the eligibility of EU research funds “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.”<sup>18</sup>

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11 [https://knowledge4policy.ec.europa.eu/bioeconomy\\_en](https://knowledge4policy.ec.europa.eu/bioeconomy_en)

12 [https://knowledge4policy.ec.europa.eu/bioeconomy/country/germany\\_en#survey](https://knowledge4policy.ec.europa.eu/bioeconomy/country/germany_en#survey)

13 [https://unece.org/fileadmin/DAM/timber/meetings/2019/20190214/06\\_JRC\\_outlook\\_work.pdf](https://unece.org/fileadmin/DAM/timber/meetings/2019/20190214/06_JRC_outlook_work.pdf)

14 <https://biconsortium.eu/membership>

15 <https://biconsortium.eu/about>

16 Martin Pigeon and Rachel Tansey 2020, In the Name of Innovation, Report 2 (of 2), Corporate Europe Observatory, <https://corporateeurope.org/en/in-the-name-of-innovation>

17 <https://www.bbi.europa.eu/about/circular-bio-based-europe-joint-undertaking-cbe-ju>

18 Martin Pigeon and Rachel Tansey 2020, In the Name of Innovation, Report 2 (of 2), Corporate Europe Observatory, <https://corporateeurope.org/en/in-the-name-of-innovation>

## *Involvement of civil society*

While bio-based industry is well organized and well-funded, civil society involvement in drafting and implementing the EU Bioeconomy Strategy has up to now only been sporadic.

Although nearly all major NGOs active in the field of environment and development have offices or representatives in Brussels and their staff cooperates well in a great number of networks, bioeconomy policies seem to be dealt with primarily on the national level.

Several aspects linked with bioeconomy are at the centre of joint campaigns focusing on forests, agriculture, climate or energy. There is a very active network of NGOs working on bioenergy, coordinated by Birdlife Europe, Transport & Environment and FERN that deals with the increasing use of biomass in energy productions (especially the conversion of coal power plants to burning wood or the use of palm oil as biofuel). But their strategic focus is more on the Renewable Energy Directive (RED) rather than the Bioeconomy Strategy.

A 2016 review of bioeconomy strategies at regional and national levels concludes “that initiatives for participative governance in the bioeconomy are rare and that involvement of civil society is only just starting.”<sup>19</sup>

In 2018, a group of 6 NGOs<sup>20</sup> published “NGO recommendations for a sustainable EU bioeconomy”<sup>21</sup> stressing their concern “that a growing bioeconomy is already increasing demand for land, fresh water and biomass” and that “‘bio’ is not necessarily better than fossil”.

One of the few reports by civil society organisations that explicitly deals with the EU’s implementation of its Bioeconomy Strategy was published by Corporate Europe Observatory (CEO) in 2020. It focuses on the Bio-Based Industries Joint Undertaking (BBI-JU) and its privileged access to EU funds via Horizon 2020 and it questions the fact that “civil society organisations are also nowhere to be seen in the BBI’s governance.”<sup>22</sup>

The multitude of Brussel’s NGO has all the expertise necessary to improve civil society’s input into monitoring and providing critical guidance to the implementation of the EU Bioeconomy Strategy. A fraction of the funds made available to biobased industry could help to improve coordination and make additional voices heard.

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19 Greet Overbeek, Erik de Bakker, Volkert Beekman, 2016, Review of bioeconomy strategies at regional and national levels, <https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5a5a82ec7&appId=PPGMS>

20 Birdlife Europe and Central Asia, FERN, Oxfam, Transport & Environment, Wetlands International and Zero Waste Europe

21 [https://www.fern.org/fileadmin/uploads/fern/Documents/NGO%20recommendations%20for%20a%20sustainable%20EU%20bioeconomy\\_0.pdf](https://www.fern.org/fileadmin/uploads/fern/Documents/NGO%20recommendations%20for%20a%20sustainable%20EU%20bioeconomy_0.pdf)

22 Martin Pigeon and Rachel Tansey 2020, In the Name of Innovation, Report 2 (of 2), Corporate Europe Observatory, <https://corporateeurope.org/en/in-the-name-of-innovation>

# Finland

*“Finnish bioeconomy is so fundamentally connected to the utilisation of the country’s forest resources that Finnish bioeconomy is forest bioeconomy.”*

*Tero Toivanen (2021)<sup>23</sup>*

The Finnish Bioeconomy Strategy was published in 2014.<sup>24</sup> In September 2020, the Ministry of Economic Affairs and Employment started a process of updating the strategy to reflect on the updated EU Bioeconomy Strategy as well as on changes in policy by the centre-left coalition that was elected in 2019. It appointed a steering group, a coordination secretariat and a broad advisory panel for the project.<sup>25</sup>

The Bioeconomy Panel is chaired by the Minister of Economic Affairs and the Minister of Agriculture and Forestry. Its 44 members have been elected for the period from August 2020 to December 2023. The majority of members are from public authorities and industry, some from research and education institutes, and two representatives of environmental NGOs (WWF Finland and Finnish Association for Nature Conservation).<sup>26</sup> Until September 2021, five meetings of the panel have taken place.<sup>27</sup>

According to a presentation by an adviser to the Ministry of Economic Affairs and Employment, the bioeconomy accounted for 13% (€27bn) of total value added in the national economy in 2019. If the growth in value added can be raised to 4% from 2020 onwards, an annual value added of €50 billion would be achieved by the end of the strategy period. This would mean a doubling of the value added generated by the bioeconomy by 2035.<sup>28</sup>

The protocol of the 5th meeting of the Bioeconomy Panel shows that this growth scenario does not go uncontested: “Panel members noted that the growth of the bioeconomy is in fact already constrained by the availability of raw materials. Sustainable growth of bio-resources remains important topic

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23 Tero Toivanen, 2021, A Player Bigger Than Its Size: Finnish Bioeconomy and Forest Policy in the Era of Global Climate Politics, in Maria Backhaus et al., 2021, Bioeconomy and Global Inequities, Socio Ecological Perspectives on Biomass Sourcing and Production, Palgrave McMillan, <https://doi.org/10.1007/978-3-030-68944-5>

24 The Finnish Bioeconomy Strategy, 2014, [https://www.biotalous.fi/wp-content/uploads/2014/08/The\\_Finnish\\_Bioeconomy\\_Strategy\\_110620141.pdf](https://www.biotalous.fi/wp-content/uploads/2014/08/The_Finnish_Bioeconomy_Strategy_110620141.pdf)

25 <https://valtioneuvosto.fi/en/-/1410877/updated-finnish-bioeconomy-strategy-aims-to-promote-sustainable-growth-and-climate-objectives>

26 <https://www.biotalous.fi/biotalouspaneelin-jasenet/>

27 <https://www.biotalous.fi/suomi-kehittaa/kansallinen-biotalouspaneeli/>

28 Presentation by Sari Tasa at the 4<sup>th</sup> meeting of the Bioeconomy Panel, 3.6.21, (translated with DeepL), <https://www.biotalous.fi/wp-content/uploads/2021/06/Biotalousstrategian-paivitys-20210603.pdf>

that should be dared to be addressed.” For the forest-based industry “differentiating between biomass and ecosystem services is a challenge ... as wood, for example, is an ecosystem service for this industry” and “the sub-section could do more to show that the bioeconomy is part of the solution, and not the opposite of the circular economy.”<sup>29</sup>

According to the Finnish government, additional investment into the bioeconomy will be needed to reach the goal of achieving carbon neutrality by 2035.<sup>30</sup> Much of this goes into new pulp mills and biorefineries like the Metsä Group’s Bioproduct Mill in Äänekoski (operating since 2017) with an annual timber use of 6,5 million m<sup>3</sup>. In Kemi, the same group is building another biorefinery that will use 7,6 million m<sup>3</sup> of wood per year (replacing a pulp mill that used 2,8 million m<sup>3</sup> annually).<sup>31</sup> Additionally, there are plans to build another 4 plants with an additional annual timber use of over 14 million m<sup>3</sup>.<sup>32</sup>

The Natural Resources Institute Finland (Luke) has calculated a sustainable allowable cut of 81 million m<sup>3</sup> per year.<sup>33</sup> Yet, in 2019 roundwood consumption in Finland already amounted to 82 million m<sup>3</sup>.<sup>34</sup> This hardly leaves any additional local supply for new biorefineries. Whether they are planning to import timber from neighbouring Russia is not known yet.

Already in 2017, 68 Finnish climate, environmental and ecological scientists wrote a public letter raising concerns over the climate and biodiversity impacts of Finland’s forest policy. It highlighted how the idea – which underpins the bioeconomy – that wood-based fuel and wood-based products are always carbon neutral and therefore climate friendly, is essentially a myth: it relies on the belief that the combustion of wood is carbon-neutral, and ignores the decreases in forests’ carbon stocks and sink capacity caused by increased harvesting – with an impact similar to actual carbon emissions.<sup>35</sup>

According to Kaisa Raitio, “Finland’s strategy of vastly expanding its forest industry – that is, increasing timber harvest levels – would require a massive reduction in carbon emissions in other sectors to make up for the reduced carbon held in its forests. The costs of these reductions would not be covered by the forest industry, but by the state. Finland’s bioeconomy strategy is, therefore, not just bad for the climate and biodiversity, but also for taxpayers.”<sup>36</sup>

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29 Protocol of the 5<sup>th</sup> meeting of the Bioeconomy Panel, 2.9.21, (translated with DeepL), [https://www.biotalous.fi/wp-content/uploads/2021/09/Biotalouspaneelin-ptk\\_5-20210902.pdf](https://www.biotalous.fi/wp-content/uploads/2021/09/Biotalouspaneelin-ptk_5-20210902.pdf)

30 <https://valtioneuvosto.fi/en/marin/government-programme/carbon-neutral-finland-that-protects-biodiversity>

31 <https://biorrefineria.blogspot.com/2021/02/Metsa-Fibre-to-build-a-new-bioproduct-mill-in-Kemi.html>

32 Moritz Albrecht, 2019, Bioökonomie in Finnland: Nachhaltig oder fragwürdig?, <https://denkhausbremen.de/bioekonomie-in-finnland-nachhaltig-oder-fragwuerdig/>

33 <https://www.luke.fi/en/natural-resources/forest/forest-resources-and-forest-planning/felling-potential-estimates/>

34 <https://www.luke.fi/en/news/82-million-cubic-metres-of-roundwood-consumed-in-2019/>

35 <http://www.bios.fi/publicstatement/publicstatement240317.pdf>

36 <https://www.climatechangenews.com/2019/07/09/finlands-forestry-myth-undermines-radical-climate-ambition/>

In a discourse analysis of the process leading to the Finish Bioeconomy Strategy of 2014, Irmeli Mustalahti concludes that

*“[i]n Finland, despite efforts at transparency and interactive public debate in relation to the current transition towards a bioeconomy trajectory, it has been challenging for citizens to meaningfully participate in the strategic decision-making.”*

*“An interactive debate between civil society and forestry sector-driven actor coalitions is a challenge for Finland’s current forest-based bioeconomy strategies and program.”*

*“Citizens may not be able to find solutions and create the new innovations which the bioeconomy strategy requires, yet it is the citizens who will live under the changed access to opportunities and entitlements including environmental services. For this reason, responsive governance and its adaptive and interactive administration need to ensure that many change actors are taken into account as a matter of basic justice in various processes of the bioeconomy transition.”<sup>37</sup>*

In November 2021, a proposal for the updated bioeconomy strategy was presented<sup>38</sup> and opinions were requested from over 190 stakeholders from industry, science, regional federations and civil society. Until the deadline set at December 2021, 44 statements were received.<sup>39</sup>

In their comment on the draft bioeconomy strategy the Finnish Association for Nature Conservation (Soumen luonnonsuojeluliitto, SLL) criticises that “the strategy does not sufficiently address the role of the bioeconomy as an accelerator of habitat loss and climate change, nor does it propose measures to ensure the sustainability of the bioeconomy in the future. The strategy should be clearer about how it will ensure that the measures proposed are compatible with the limits imposed by nature.”

This view is supported by WWF Finland: “The update of the bioeconomy strategy seeks to shift the strategic focus from the previous strategy’s emphasis on increasing the volume of production to increasing the added value of production, which is a welcome improvement. This opens up opportunities. However, the strategy update seems to be badly missing the mark in terms of reforming the bioeconomy sector. The strategy refers to renewal here and there, yet it seems to conceive of the bioeconomy largely as it is now. The strategy does not seem to include a proper reflection on the necessary reform, for example, of what it would mean for the sector to comply with the boundary conditions of ecological sustainability.”

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37 Irmeli Mustalahti, 2018, The responsive bioeconomy: The need for inclusion of citizens and environmental capability in the forest based bioeconomy, Journal of Cleaner Production, Vol. 172, <https://www.sciencedirect.com/science/article/pii/S0959652617313021>

38 <https://www.lausuntopalvelu.fi/FI/Proposal/DownloadProposalAttachment?attachmentId=16734>

39 <https://www.lausuntopalvelu.fi/FI/Proposal/Participation?proposalId=9a-22f89a-2a35-4efe-aabe-b0babc6ac7fd>, all following quotes are taken from the statements on the website (translated with DeepL)

Others, like the forest administration (Metsähallitus) are very positive about the proposal by underlining their support for statements like “Profitable agriculture and forestry is a prerequisite for the availability of bio-resources” (quote from the proposal) and stating that “Finnish forests are more than 90 % eligible for certification and there is an almost unlimited global market for processed natural products, provided that the supply chain, further processing and marketing of the products can be managed in a cost-effective way.”

The Confederation of Finnish Agricultural Producers interprets the strategy’s call to “Identify the means for the bioeconomy to mitigate and contribute to adaptation to climate change and halt biodiversity loss” as to “include a measure to accelerate forest growth through increased forest management.”

And the sawmill industry warns that “changing the focus from quantity to quality must not mean driving down existing production by reducing the availability of raw materials. Stable and profitable basic production is the basis for functioning value chains.”

The Ministry for Employment and the Economy is currently evaluating the statements and is expected to come up with a final version of the updated Finish Bioeconomy Strategy in the coming months.

# Sweden

In its 2019 Climate Action Plan, the Swedish government announced that it will develop a Swedish bioeconomy strategy. Under leadership of the Ministry of Enterprise and Innovation and together with the ‘green sectors’ (forestry, agriculture and fisheries) it wants to achieve “increased access to biomass and employment throughout the country.”<sup>40</sup> A government decision was planned for October 2021, but the work is still in progress.

The bioeconomy strategy is meant to complement the Swedish strategy for circular economy, which was published in July 2020.<sup>41</sup> The core of the strategy is a vision of “a society in which resources are used efficiently in toxic-free circular flows, replacing new materials.”<sup>42</sup>

It focuses on four areas:

- sustainable production and product design,
- sustainable ways of consuming and using materials, products and services,
- toxic-free and circular material cycles and
- the circular economy as a driving force for the business sector and other actors through measures to promote innovation and circular business models.

In Sweden there is a strong focus on a forest-based bioeconomy. The forest industry claims to be one of Sweden’s most important business sectors, accounting for 9 – 12% of the employment, exports, turnover and added value in Swedish industry.<sup>43</sup>

In this context, it is interesting to look at the development of the Swedish National Forest Program (NFP) that started in 2013. The process coincided with the spread of the concept of a bioeconomy in Europe, which became a guiding principle for structuring negotiations around the NFP.

A detailed analysis by researchers from the university of Uppsala gives insights into the process that gathered momentum in 2015/2016, when representatives from the government, forest owner associations, forestry companies, research funders, government agencies and civil society came together in four

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40 Hans Nilsagard, Ministry of Enterprise and Innovation, 2021, The Swedish bioeconomy strategy – work in progress, <https://www.ksla.se/wp-content/uploads/2021/05/2021-06-09-Hans-Nil-sagard-The-Swedish-bioeconomy-strategy.pdf>

41 Government Offices of Sweden, 2020, Circular economy – Strategy for the transition in Sweden, <https://www.government.se/4ad42c/contentassets/d5ab250cf59a47b38feb8239eca1f6ab/circular-economy--strategy-for-the-transition-in-sweden>

42 <https://www.government.se/press-releases/2020/07/sweden-transitioning-to-a-circular-economy/>

43 <https://www.forestindustries.se/forest-industry/swedish-forest-industry/>

working groups.<sup>44</sup> Their reports formed the basis of the NFP strategy launched in 2018.

Quotes from the working group documents:

*“The forestry industry needs to become more generally accepted so that different markets, businesses and consumers can feel trust and positivity about forest-based products.”*

*“The conflict between environmental organisations and the forestry industry gives a divided picture of how the forest should be used and what for. The credibility of the forestry industry is challenged by the conflict between production and conservation.”*

*“Internationally, there is often intensive debate about the sustainability of forestry. When the sustainability of the bioeconomy is questioned, this reflects market uncertainty about the goods and services that the forestry industry provides.”*

*“Urbanisation means that consumers are increasingly removed from nature, which can lead to a reduced understanding of the use of forests, anxiety about over-use of forest resources and increased emphasis on reducing deforestation.”*

The researchers conclude:

*“Our analysis revealed five storylines that together construct a strong story of the Swedish forest-based bioeconomy:*

- *A bioeconomy will revive Swedish forestry in a sustainable way through neo-industrialisation*
- *Consensus is key to developing the forest-based bioeconomy*
- *Forest owners, industry and state actors take responsibility for the forest-based bioeconomy*
- *Technical knowledge is needed to build the forest-based bioeconomy*
- *The uninformed public is a threat to the forest-based bioeconomy.*

*In summary, these storylines unite in a story about neo-industrialisation, driven by the private sector and supported by the state, simultaneously reviving forestry and establishing the bioeconomy. It facilitates a discourse coalition composed by the state and industry, indirectly driving the idea that actors who are not in favour of the new-industrialisation path represent obstacles to the transition to a bioeconomy.*

*Our analysis shows that the use of “consensus” in the NFP follows a tradition in Swedish forest policymaking where the focus on consensus leads to the marginalization of values and interests that do not clearly align with the dominant story about Swedish forests.”<sup>45</sup>*

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44 Klara Fischer, Tove Stenius, and Sara Holmgren, 2020, Swedish Forests in the Bioeconomy: Stories from the National Forest Program, Society & Natural Resources, Vol. 33, No. 7, <https://www.tandfonline.com/doi/epub/10.1080/08941920.2020.1725202?needAccess=true>

45 Klara Fischer, Tove Stenius, and Sara Holmgren, 2020, Swedish Forests in the Bioeconomy: Stories from the National Forest Program, Society & Natural Resources, Vol. 33, No. 7, <https://www.tandfonline.com/doi/epub/10.1080/08941920.2020.1725202?needAccess=true>

An analysis of the key players in the Swedish bioeconomy discussion shows a close cooperation of biorefinery research organisations with forest industry and forest owner associations. “Through careful storytelling combining global bioeconomy narratives of innovation and substitution, with idealisation of private forest ownership and Swedish forestry, key actors in the network have mobilised support and legitimacy regionally, nationally and in the EU.”<sup>46</sup>

One of the most outspoken environmental NGOs that took part in this process was the Swedish Society for Nature Conservation (SSNC). According to David Erlandson who works as bioeconomy advisor for SSNC, the Swedish government began its work on developing a Swedish bioeconomy strategy in fall of 2020. During the political turbulence in Sweden in 2021, where the responsible minister resigned in summer and the government changed in fall of 2021, work on the strategy has come to a halt. Currently, SSNC is inquiring the responsible minister about how the work with the strategy is proceeding and about the plans to include civil society in the discussion.<sup>47</sup>

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46 Sara Holmgren et al., 2021, Whose transformation is this? Unpacking the ‘apparatus of capture’ in Sweden’s bioeconomy, *Environmental Innovation and Societal Transitions* 42, <https://www.sciencedirect.com/science/article/pii/S2210422421001179>

47 Personal communication

# Estonia

In its 2020 Estonia country report, the Bio-based Industries Consortium mentions plans by the Estonian Ministry of Rural Affairs to launch a consultation for development of an ‘Estonian Bioeconomy Strategy to 2030’ in conjunction with Ministry of Environment.<sup>48</sup>

But apart from a 2015 proposal statement<sup>49</sup> the government of Estonia has not published a dedicated bioeconomy strategy yet. Instead, the visioning and planning of Estonian bioeconomy will draw on three strategic documents:<sup>50</sup>

*the Agriculture and Fisheries Strategy 2030 that was published in 2021. It expects bioeconomy to help reduce the high share of exports of unprocessed or low-processed bio-products. Industrial biotechnology solutions shall help to establish biorefineries that are suitable for primary producers. “New uses will be sought for land that is not used for agriculture, to support the development of bio-economy or nature conservation objectives.”<sup>51</sup>*

*Estonia’s 2030 National Energy and Climate Plan (published in 2019) mentions bioeconomy in the context of adaptation. “The sustainability of the bioeconomy sectors that are important for Estonia is ensured through climate-conscious planning of agriculture, forestry, water management, fisheries and tourism and peat extraction.” At the same time, bioenergy is expected to play an increasing role in the coming years.<sup>52</sup>*

*An Estonian Forestry Strategy has not been published yet. In a position with regard to the EU forestry strategy for 2030 that was published in July 2021, the Estonian Minister of the Environment worries about “additional administrative burden to the public and private sector or reduce states’ powers in matters related to forestry.”<sup>53</sup>*

With 51,4 % forest cover the forest sector contributes to around 10 % of gross domestic product and wood and wood-based products are an important part of the national trade balance.<sup>54</sup> But in 2018, plans by a consortium of forestry

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48 Bio-based Industries Consortium, 2020, Mapping Estonia's bio-based potential, <https://biconsortium.eu/sites/biconsortium.eu/files/downloads/Mapping%20Estonia%27s%20bio-based%20potential%20-%20BIC%20country%20report.pdf>

49 <https://www.agri.ee/sites/default/files/content/arengukavad/biomajandus/2030/biomajanduse-strateegia-2030-ettepanek-eelnou.pdf>

50 [https://scar-europe.org/images/CASA/Events/Battlic\\_Riga\\_4-5April2019/presentations/3-3\\_Helena-Parenson\\_Bioeconomy\\_Estonia.pdf](https://scar-europe.org/images/CASA/Events/Battlic_Riga_4-5April2019/presentations/3-3_Helena-Parenson_Bioeconomy_Estonia.pdf)

51 <https://www.agri.ee/sites/default/files/content/arengukavad/poka-2030/poka-2030-executive-summary-2021.pdf>

52 Estonia's 2030 National Energy and Climate Plan, final version Dec. 2019, [https://ec.europa.eu/energy/sites/ener/files/documents/ee\\_final\\_necp\\_main\\_en.pdf](https://ec.europa.eu/energy/sites/ener/files/documents/ee_final_necp_main_en.pdf)

53 [https://www.baltictimes.com/estonia\\_introduces\\_its\\_positions\\_to\\_europe\\_re\\_new\\_eu\\_forest\\_strategy/](https://www.baltictimes.com/estonia_introduces_its_positions_to_europe_re_new_eu_forest_strategy/)

54 <https://envir.ee/en/water-forest-resources/forestry>

companies (called Est-For Invest) to build a new biorefinery met considerable resistance by civil society organisations.

The production of 700.000 tonnes of pulp and the attached wood-burning energy plant would require 3,3 million cubic meters of wood annually, amounting to around a quarter of Estonian timber production. As the mill was neither planned to use totally chlorine free technology (TCF), nor a closed water cycle, it was going to put the local water ecosystem at an extreme risk. The mill would not only consume 1.3 % of the river Emajõgi's average flow, it would discharge an effluent containing chloride, potassium, carbon, calcium and sulphate compounds into Lake Peipus (which Estonia shares with Russia).<sup>55</sup>

A coalition of environmental organisations and scientists work hard to inform citizens, community administrations and the government about the threats. In May 2018, protests cumulated in a human chain of more than 4.500 participants in the city of Tartu and a new petition that soon gained 9.000 signatures. By the end of June, the governing parties announced that they would close down the planning procedure.<sup>56</sup>

One of the organisations that is critical about forest degradation and increasing timber harvest, especially when related to the export of woody biomass for energy production, is the Estonian Fund for nature (ELF). Together with the Latvian Ornithological Society they have recently published a report on the impacts of intensive logging in Estonian and Latvian forests.<sup>57</sup>

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55 Environmental Paper Network, 2018, Bio-refinery: new name, dirty old story, <https://environmentalpaper.org/wp-content/uploads/2018/05/180517-EstFor-briefing-final.pdf>

56 <https://www.fern.org/publications-insight/people-power-estonians-show-how-to-bring-about-change-69/>

57 Estonian Fund for Nature (ELF) and Latvian Ornithological Society (LOB), Dec. 2020, Hidden inside a wood pellet, [https://media.voog.com/0000/0037/1265/files/Biomass\\_report\\_ENG%20\\_2020.pdf](https://media.voog.com/0000/0037/1265/files/Biomass_report_ENG%20_2020.pdf)

# Italy

With a turnover of €328 billion in 2019, the Italian bioeconomy is the third biggest in the EU, following Germany and France, dominated by the food and agriculture sectors.<sup>58</sup>

The first Italian Bioeconomy strategy (BIT)<sup>59</sup> was approved in February 2017. In March 2019, a National Bioeconomy Coordination Group (NBCD) was set up under the National Committee for Biosafety, Biotechnology and Life Sciences (CNBBSV). It consists of representatives of four Ministries, the 21 Regions and Provinces, the National Agency for Cohesion and the main relevant National Technology Clusters (public private partnerships primarily from the agri-food sector, biobased industry and fisheries).<sup>60</sup>

In May 2019, the group presented an update of the Italian bioeconomy strategy (BIT II)<sup>61</sup> which was supplemented with the BIT II-related Implementation Action Plan in January 2021. In a brief paragraph on communication and dissemination it states that

*“This IAP will be ... open to any national and international stakeholders interested in being involved in the implementation process. The NBCB will then hold a public forum every year in order to stimulate the research/ industrial/primary producers/education and citizen communities to share their needs and thus contributing to improvement and implementation of proposed actions.”<sup>62</sup>*

As of now, civil society has only had a chance to comment on documents that had already been officially published.

Initially, the concept of a “green economy” had greater political prominence than that of the bioeconomy. In 2006, the government passed a law banning the sale of non-biodegradable single-use plastic bags. In 2012, another law stipulated that disposable plastic bags that are biodegradable and compostable must comply with the EN 13432 standard. Two years later, the law was further strengthened by the introduction of sanctions for non-compliance and in 2018 Italy introduced a ban on ultra-light plastic bags for fruit and vegetables.

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58 [https://knowledge4policy.ec.europa.eu/bioeconomy/country/italy\\_en#bioeconomics](https://knowledge4policy.ec.europa.eu/bioeconomy/country/italy_en#bioeconomics)

59 Government of Italy, 2017, Bioeconomy in Italy: A unique opportunity to reconnect Economy, Society and the Environment (BIT I)

60 Fabio Fava et al., 2021, The bioeconomy in Italy and the new national strategy for a more competitive and sustainable country, *New Biotechnology*, Vol. 61, <https://www.sciencedirect.com/science/article/pii/S1871678420302041#bib0010>

61 Government of Italy, 2019, BIT II Bioeconomy in Italy: A new bioeconomy strategy for a sustainable Italy, [https://cnbbsv.palazzochigi.it/media/1774/bit\\_en\\_2019\\_02.pdf](https://cnbbsv.palazzochigi.it/media/1774/bit_en_2019_02.pdf)

62 CNBBSV, 2021, Implementation Action Plan for the Italian Bioeconomy Strategy BIT II, [https://cnbbsv.palazzochigi.it/media/2079/iap\\_2332021.pdf](https://cnbbsv.palazzochigi.it/media/2079/iap_2332021.pdf)

Thus, the production capacities of Italian bioplastics producers have been strongly stimulated by Italian policies. Globally, the production capacities for bioplastic have increased to 2,4 million tonnes in 2021. Currently, nearly a quarter of the production capacity is located in Europe. This share is expected to decrease significantly in the coming years as Asia's share is expected to increase from currently 50% to 70% in 2026.<sup>63</sup>

In June 2019, the EU adopted a directive on Single-Use Plastics (SUP) with the aim to prevent and reduce the impact of certain plastic products on the environment. A guideline on the application of the directive specified that only recycled plastic is ok, while biodegradable and bio-based plastics are considered to be plastic under this directive.<sup>64</sup>

Italian environmental NGOs like Legambiente are campaigning for a drastic reduction of the use of disposable plastic while at the same time recognising "Italy's international leadership in bioeconomy, production of compostable plastics, separate collection of domestic wet waste and industrial composting chain". While strongly opposing an exemption for paper-based products with thin traditional plastic coatings, they propose the use of compostable bioplastic films and agree with the derogation for biodegradable and compostable products.<sup>65</sup>

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63 <https://www.european-bioplastics.org/market/>

64 [https://ec.europa.eu/commission/presscorner/detail/en/QANDA\\_21\\_2709](https://ec.europa.eu/commission/presscorner/detail/en/QANDA_21_2709)

65 [https://www.ansa.it/canale\\_ambiente/notizie/rifiuti\\_e\\_riciclo/2021/06/03/legambiente-sbagliata-limpostazione-ue-sulle-bioplastiche\\_e37bfad5-17c3-4261-b3e6-aa46fcdf8324.html](https://www.ansa.it/canale_ambiente/notizie/rifiuti_e_riciclo/2021/06/03/legambiente-sbagliata-limpostazione-ue-sulle-bioplastiche_e37bfad5-17c3-4261-b3e6-aa46fcdf8324.html)

# France

In 2017, the Minister for Agriculture and Food presented the French bioeconomy strategy.<sup>66</sup> In 2018 an action plan<sup>67</sup> followed that aims at

- extending knowledge,
- promoting the bioeconomy and its products to the general public,
- creating the conditions for matching supply with demand,
- sustainable bioresource production, mobilisation and processing,
- removing obstacles and providing funding.

A Strategic Committee for Bioeconomy was set up by the Minister for Agriculture and Food in 2017.<sup>68</sup> According to the bioeconomy strategy, the committee “would have as members the relevant sectors, the public authorities and representatives of society.” Information about any meetings of this committee is not publicly available.

Industry is well organised in competitiveness clusters (Pôles de Compétitivité) that bring together a variety of members from enterprises and science around specific themes. The bioeconomy cluster (Pôle IAR) has only recently been renamed Bioeconomy for Change (B4C).<sup>69</sup> It has more than 450 members from across the entire bio-based value chain, from upstream agricultural inputs to the marketing of finished products.

In line with the National Low Carbon Strategy (SNBC 2018)<sup>70</sup>, a special focus is put on bioenergy by “the facilitation of financial investment into farm methanisation projects” and “the removal of regulatory obstacles”.<sup>71</sup> SNBC estimates a production potential for agricultural biomass close to 250 terawatt hours (TWh), whereas it currently represents only 40 TWh. But according to a study by France Stratégie the maximum energy potential identified for agricultural biomass such as livestock manure, crop residues or surplus grass could, in theory, reach 120 TWh.<sup>72</sup>

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66 Republique Française, 2017, Une stratégie bioéconomie pour la France, [http://www.iar-pole.com/wp-content/uploads/2017/01/170119\\_planstrategique\\_bioeconomie.pdf](http://www.iar-pole.com/wp-content/uploads/2017/01/170119_planstrategique_bioeconomie.pdf)

67 Republique Française, 2018, A Bioeconomy Strategy for France, 2018-2020 Action Plan, <https://agriculture.gouv.fr/telecharger/91602?token=57d8d758699c110f24d47140e0152abc6a3121ccb4fde6ffaa79eb6121dd3db5>

68 <https://agriculture.gouv.fr/stephane-le-foll-installe-le-comite-strategique-bioeconomie>

69 <https://www.iar-pole.com/le-pole-iar-devient-bioeconomy-for-change/>

70 <https://www.ecologie.gouv.fr/strategie-nationale-bas-carbone-snbc>

71 <https://agriculture.gouv.fr/bioeconomy-strategy-france-2018-2020-action-plan>

72 France Stratégie, 2021, Biomasse agricole: quelles ressources pour quel potentiel? [https://www.strategie.gouv.fr/sites/strategie.gouv.fr/files/atoms/files/fs-ns\\_-\\_biomasse\\_agricole\\_-\\_quelles\\_ressources\\_pour\\_quel\\_potentiel\\_-\\_29-07-21.pdf](https://www.strategie.gouv.fr/sites/strategie.gouv.fr/files/atoms/files/fs-ns_-_biomasse_agricole_-_quelles_ressources_pour_quel_potentiel_-_29-07-21.pdf)

French environmental NGOs have up to now concentrated their campaigns on the increasing production of biofuels in France. Total's biorefinery La Mède started operations in 2019 with a production capacity of 500.000 metric tons of "renewable diesel". Up to 300.000 metric tons of palm oil are used as raw material.<sup>73</sup>

In April 2021, the Marseille Administrative Court partially annulled the refinery's authorisation and recognised the oil company's obligation to assess the climatic impacts caused by its palm oil supply. The court ruled that: "Given the impact on the climate that the use of palm oil in the production of biofuels is likely to generate, and the substantial quantities likely to be used for the operation of the La Mède biorefinery, the impact study for the project should therefore include an analysis of its direct and indirect effects on the climate, a notion that cannot be understood in a strictly local manner within the immediate perimeter of the project."<sup>74</sup>

For the applicant associations (France Nature Environnement, Greenpeace France, Les Amis de la Terre France and Ligue pour la Protection des Oiseaux) this decision is a clear signal to any biorefinery that local as well as imported raw materials need to comply with strict rules regarding their sustainability.

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73 <https://totalenergies.com/energy-expertise/projects/bioenergies/la-mede-a-forward-looking-facility>

74 <https://www.amisdelaterre.org/communique-presse/total-la-mede-prise-en-compte-des-impacts-climatiques-le-tribunal-ordonne-a-total-de-revoir-sa-copie/>

# The Netherlands

In 2011, 43 parties from the business community and civil society in the Netherlands signed the Biobased Economy Manifesto. Among other things, the parties commit to work together towards a bio-based economy that takes the carrying capacity of ecosystems and the basic necessities of people as preconditions. The paper was signed by the following Dutch NGOs: Both Ends, IUCN NL, Oxfam Novib, Solidaridad, Stichting Natuur en Milieu and WWF NL.<sup>75</sup>

In 2012, an Outline Memorandum was published as a mid- and long-term vision and strategy for the Dutch biobased economy that took note of the manifesto.<sup>76</sup> In 2018, a dedicated Position on the Bioeconomy in the Netherlands followed.<sup>77</sup>

Here, a distinction is made between the “classic bioeconomy” (including agriculture, fishing industry and food sector with a turnover of app. €120 billion) and “bio-based economy” (mainly bioenergy and manufacture of bio-based materials and chemicals with a turnover of €21 billion).

In their comparison of the Dutch and the Finnish bioeconomy, Bosman and Rotmans find that

*“the governance approach in The Netherlands focusses on co-creating a long-term vision that informs for short-term action, on facilitating bottom-up, regional clusters and on promoting radical innovation through cooperation between vested players and frontrunners. Finland adopts a more traditional, top-down governance strategy, focussing on the shorter-term economic opportunities and incremental innovation that keeps the overall structure of existing industries intact. We conclude that the Dutch government acts as a facilitator, while the Finnish government acts more as a director of the transition.”<sup>78</sup>*

Industry is organised in the Platform Bio-Economie (PBE) which describes itself as “the organisation for the promotion of a sustainable and socially accepted use of bio-based raw materials in the Netherlands within an adequate and stable policy and regulatory framework.”<sup>79</sup> Supporting companies that are

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75 Manifest Bio-based Economy, 2011, <http://www.biobasedeconomy.nl/wp-content/uploads/2011/10/Manifest-BBE-def-29-sep.pdf>

76 Dutch Government, 2012, Hoofdlijnennotitie Biobased Economy, <https://open.overheid.nl/repository/ronl-archief-8a090fbf-b1f6-4f71-8c9a-fe680d19c08f/1/pdf/hoofdlijnennotitie-biobased-economy.pdf>

77 Ministry of Economic Affairs and Climate Policy, 2018, The position of the bioeconomy in the Netherlands, <https://www.government.nl/documents/leaflets/2018/04/01/the-position-of-the-bioeconomy-in-the-netherlands>

78 Rick Bosman and Jan Rotmans, 2016, Transition Governance towards a Bioeconomy: A Comparison of Finland and The Netherlands, Sustainability, MDPI, <https://www.mdpi.com/2071-1050/8/10/1017>

79 <https://platformbioeconomie.nl/pbe/>

active in bioenergy is an important part of PBE's work.

According to a presentation of the Netherlands Enterprise Agency (Rijksdienst voor Ondernemend Nederland, RVO), bioenergy is at the heart of the bio-based economy.<sup>80</sup> In 2020, the burning of biomass accounted for over half of the renewable energy generated in the Netherlands. From 2016 to 2020, biomass-related CO<sub>2</sub> emissions in the power sector have more than tripled (from 1,8 to 6,2 Mt), mainly due to government subsidies that stimulated the co-firing of biomass in coal power plants.<sup>81</sup>

This has spurred resistance of civil society in many regions, leading to the formation of several new environmental organisations like Comité Schone Lucht, Leefmilieu or Mobilisation for the Environment. With broad support they succeeded in convincing the House of Representatives in 2021 to call for biomass subsidies to be discontinued, until a path for phasing this out has been shared with the House. The Senate underlined this appeal by requesting the cabinet to stop issuing new or extended subsidies for burning woody biomass.<sup>82</sup>

In July 2021, all major Dutch environmental organisations<sup>83</sup> withdrew their support for the Biomass Sustainability Covenant. Signed in 2015, the agreement with the energy industry called for strict sustainability rules for biomass used for co-firing in Dutch power plants. Over the years, NGOs had to realise that the criteria and the compliance with them were weakened further and further.<sup>84</sup>

This will have implications for the biobased economy in general, as greater scrutiny regarding the sustainability of biomass used in industry scale biorefineries can be expected.

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80 Presentation by Kees Kwant, RVO, Biodbased Economy in the Netherlands and the Regions, [https://www.ufz.de/export/data/2/137654\\_3\\_Kwant\\_Bioeconomy%20and%20Biobased%20NL\\_16.03.17.pdf](https://www.ufz.de/export/data/2/137654_3_Kwant_Bioeconomy%20and%20Biobased%20NL_16.03.17.pdf)

81 CBS, 2021, CO<sub>2</sub> emissions from biomass burning on the rise, <https://www.cbs.nl/en-gb/news/2021/48/co2-emissions-from-biomass-burning-on-the-rise>

82 <https://www.volkskrant.nl/columns-opinie/opinie-om-klimaatdoelen-te-halen-moet-europa-stoppen-met-verbranding-van-biomassa~bd1231aa/>

83 Greenpeace, Milieudefensie (Friends of the Earth NL), Stichting Natuur en Milieu, WWF NL

84 <https://www.vpro.nl/argos/lees/onderwerpen/money-to-burn/2021/milieuorganisaties-trekken-zich-per-direct-terug-uit-biomassa-akkoord.html>