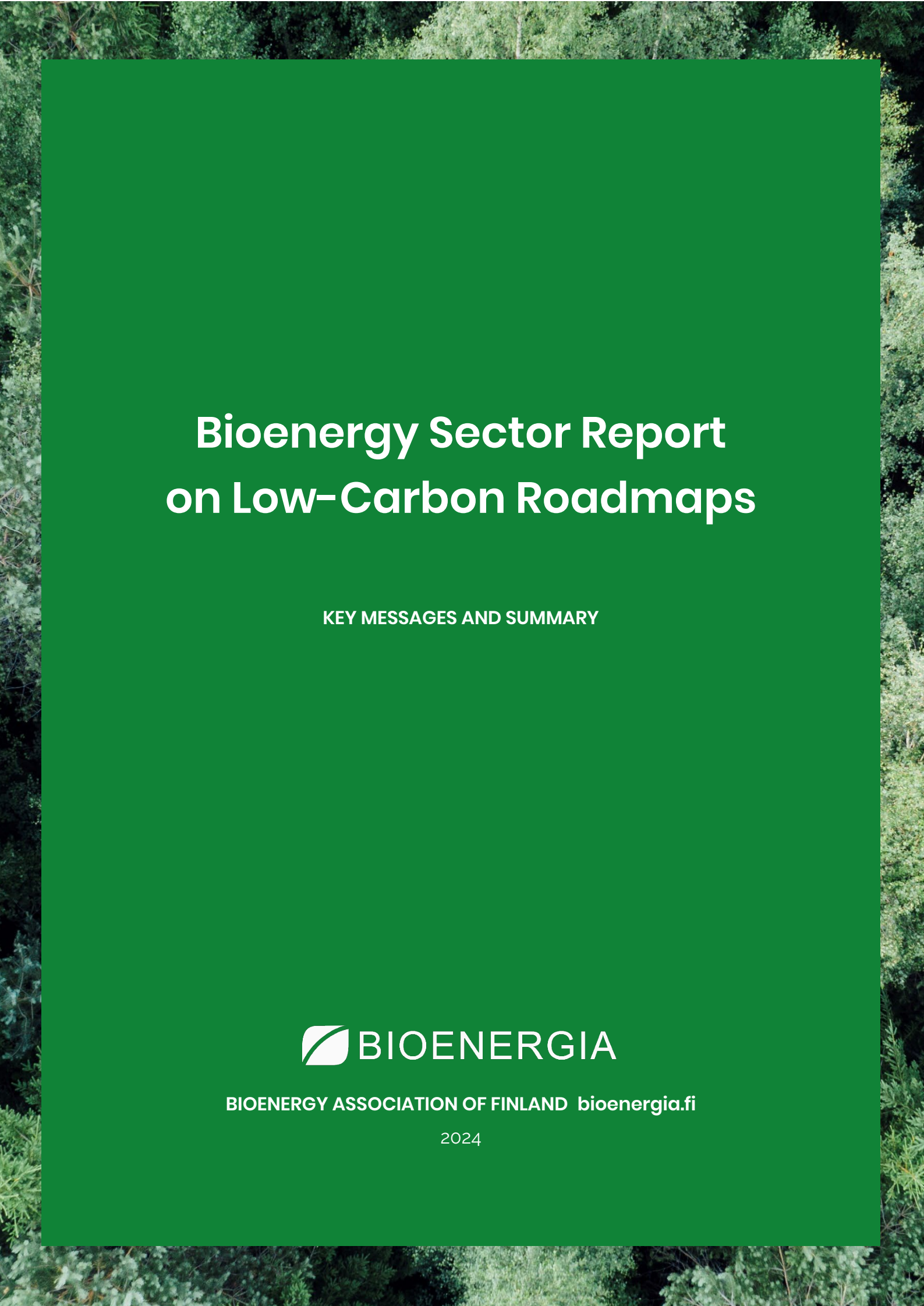

Bioenergy Sector Report on Low-Carbon Roadmaps

KEY MESSAGES AND SUMMARY

BIOENERGIA

BIOENERGY ASSOCIATION OF FINLAND bioenergia.fi

2024

Key Messages

1. It is essential to maintain the conditions for the energy use of biomass. Bioenergy produces 32% of Finland's energy and is the largest source of renewable energy in Finland and the EU. It is particularly important in heat production and transportation.

2. In the current uncertain security situation, bioenergy offers self-sufficiency and supports energy supply and security, which is prioritized higher than the cascading use of biomass in EU regulations.

3. The transition from fossil energy and traditional bioenergy to modern bioenergy worldwide offers opportunities for Finnish companies and solutions. In Finland, investments are being planned for the capture of biogenic carbon dioxide, biorefineries, biogas, and biochar.

4. Finland has large forest resources. Sustainable forest management and use are fundamental conditions for the operation of the bioenergy sector in Finland. These must be continuously developed to meet current demands.

5. In ensuring and increasing biodiversity, funding should be directed to measures and areas that provide the greatest benefit at the lowest cost. The Bioenergy Association of Finland is developing its nature work this year.

6. The development of road traffic emissions is the most significant factor in achieving the goals of the effort sharing sector. Decisions and actions in the coming years will have a concrete impact on the development trajectory.

7. There are already 14 projects in Finland where carbon dioxide is planned to be captured, totaling approximately 1–1.5 MtCO2/a. Removing carbon dioxide from the atmosphere does not require exceptionally expensive climate technology. Finland must promptly create a strong strategy for the capture, use, storage, and removal of carbon dioxide.

8. The production of biochar is currently scaling up significantly. By the end of the 2020s, Finland could have enough biochar production to enable the removal of 0.4 MtCO2/a of carbon dioxide.

BIOENERGIA

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Summary

Sector Development

- Bioenergy, which is primarily based on domestic resources, has supported Finland's energy system during crises and has developed along the lines estimated in our previous report (June 2020), with a controlled growth of 10–20% compared to 2019 by 2030.
- The operating environment of the bioenergy sector has changed significantly since our last report. Key changes include:
    - Changes in the security environment and the increased importance of security of supply
    - The weakening of Finland's economy and the resulting tightening of public finances
    - Increased demand for domestic energy wood and the resulting rise in energy wood prices
    - The EU's 55 readiness package aimed at climate targets and decisions on its implementation
    - Significant changes in perceptions of the size of Finland's carbon sinks
    - The emphasis on electrification in energy investments planned for Finland
    - The growing importance of the technical capture of biogenic carbon dioxide and the emergence of a project portfolio in Finland
    - Strengthening of nature policies and actions

International Outlook for Bioenergy

- The global growth of bioenergy, especially the transition from traditional bioenergy[1] to modern bioenergy worldwide, offers opportunities for Finnish companies and solutions. European suppliers, for example, have a strong position in the market for bio-boilers.
- In the European market, there is strong demand and opportunities for Finnish equipment suppliers, particularly for industrial plants using biomass, biogas plants, and biochar plants, as well as for equipment and machinery related to the bioenergy supply chain.
- To achieve the global climate target of 1.5°C, the International Energy Agency (IEA) estimates that 185 Mt of biogenic carbon dioxide should be captured globally by 2030, 506 Mt by 2040, and 1263 Mt by 2050 using technology. Most of the captured biogenic carbon dioxide should be stored long-term (e.g., through BECCS technology - Bioenergy with Carbon Capture and Storage). Currently, the total capacity of BECCS projects in various stages of development globally is about 50 Mt per year by 2030.
- In the EU, carbon capture, utilization, and storage play a key role in achieving climate targets from 2030 onwards: according to the Communication from the Commission (February 2024) 50 Mt of carbon dioxide should be captured by 2030, 280 Mt by 2040, and at least 450 Mt by 2050. Most of the captured carbon dioxide should be permanently stored. In the impact assessment of the communication, technical sinks, including BECCS technology, were estimated at 75 Mt by 2040.

[1] Traditional bioenergy refers to the use of materials such as firewood, logs, or charcoal. Modern bioenergy refers to advanced usage in electricity and heat production as well as in transportation.

Conclusions for Industry Development

Regulation, Conditions, Challenges

- Bioenergy is the largest source of renewable energy in Finland and the EU, playing a crucial role particularly in heat production and transportation. In the new and highly uncertain security situation, it offers self-sufficiency and supports energy supply and security, which is prioritized higher than the cascading use of biomass in EU regulations. It is essential to maintain the conditions for the energy use of biomass.
- Investments are being planned for carbon capture, biogas, biorefineries, and biochar. The development of EU and Finland's competitiveness must be considered in the quantity and quality of new regulations: regulations should be simplified and leave more discretion to member states and companies in details and priorities.
- We must progress resolutely towards the climate neutrality target. Reducing the use of fossil fuels should remain central, but carbon removal solutions are also needed.
- Finland has substantial forest resources. Sustainable forest management and use remain fundamental conditions for the operation of the bioenergy sector, and these must be continuously developed to meet current demands.
- Ensuring the harvesting and transportation of biomass requires securing educational resources and, in the future, foreign labor.

Market for Solid Biofuels

- The phase of the most significant growth in the use of solid biofuels in Finland appears to be over.
- In Europe, the share of agricultural residues and energy crops in bioenergy raw materials is increasing significantly.
- In Finland, pellet production has stabilized, and we are increasingly relying on imports for pellets. In Europe, there is still additional demand for industrial use of pellets in electricity and heat production.

Renewable Fuels in Transportation

- The demand for bioenergy in transportation is significantly increasing in Europe. This growth is expected to continue in road, air, and maritime transport until 2040.
- Finland's consumption of biofuels in road transport is expected to decrease in the 2030s, which would differ from the rest of Europe.
- The reduction in the distribution mandate will increase emissions in the 2020s. To meet emission reduction and renewable energy targets and to develop domestic production, a prompt correction is needed to restore the levels of the distribution mandate.
- The production of synthetic fuels enables the utilization of waste heat, which can replace the use of fuels in district heating production.

Capture, Utilization, and Storage of Biogenic Carbon Dioxide

- Currently, there are 14 projects in Finland where biogenic carbon dioxide is planned to be captured, totaling approximately 1–1.5 MtCO2/a. The majority of these projects aim to produce synthetic fuels from biogenic carbon dioxide and hydrogen.
- Finland must promptly create a strong strategy for the capture, utilization, storage, and removal of carbon dioxide[2], based on clear long-term goals. Removing carbon dioxide from the atmosphere does not require exceptionally expensive climate technology. Key elements to promote solutions should be included in the upcoming update of the energy and climate strategy.
- Finland should appoint a responsible entity to lead the development of solutions for the capture, utilization, storage, and removal of carbon dioxide in the country.
- Finland must promptly establish bilateral agreements with Norway, Denmark, and the United Kingdom to enable the transport and storage of carbon dioxide by Finnish operators in these countries in accordance with the London Protocol.
- The ramp-up of the CCUS value chain requires both national incentives and funding from voluntary carbon markets.
- The permitting process for projects involving the capture, utilization, storage, and removal of carbon dioxide should be easier and faster.
- EU plans should take into account the opportunities and needs offered by biogenic carbon dioxide.
- Nordic cooperation in the capture, utilization, and storage of carbon dioxide should be increased.
- Finland needs a comprehensive view of the national infrastructure needs for the capture, utilization, and storage of carbon dioxide. The Bioenergy Association of Finland is conducting a separately funded study to examine what an optimal carbon dioxide transport and storage infrastructure would look like, and the costs associated with transport and infrastructure. The study will be completed in August 2024.

Biochar

- The production of biochar is currently scaling up significantly. By the end of the 2020s, Finland could have enough biochar production to enable the removal of 0.4 MtCO2/a of carbon dioxide.
- A key factor in increasing the demand for biochar is the growth in demand for its material use. Applications include green construction, growing media, and agricultural soil improvement.
- Increasing public sector demand through market dialogues and setting procurement criteria for green environments is a sustainable and necessary path for further growth in the biochar industry.

[2] Carbon dioxide can be removed from the atmosphere using technology, for example, by binding it into long-lasting products, BECCS technology, biochar, or other so-called negative emission technologies.

Safeguarding and enhancing biodiversity

- As Finland and the EU implement their strategies with more detailed plans at the national and eventually regional levels in the provinces, The Bioenergy Association of Finland and its member companies want to be actively involved in this work.
- Funding should be directed in an ecologically efficient and cost-effective manner to measures and areas that provide the greatest benefit at the lowest cost.
- Landowners should receive fair compensation for restrictions on the use of their property rights.
- New biodiversity-based earning models and financing mechanisms are also needed to encourage landowners to invest more than the minimum level, for example, in increasing the amount of deadwood in the forest.
- The Bioenergy Association of Finland is developing its nature work this year and, as part of this, will reassess the ecological sustainability recommendations for wood fuel procurement published in 2021 in collaboration with Finnish Energy.