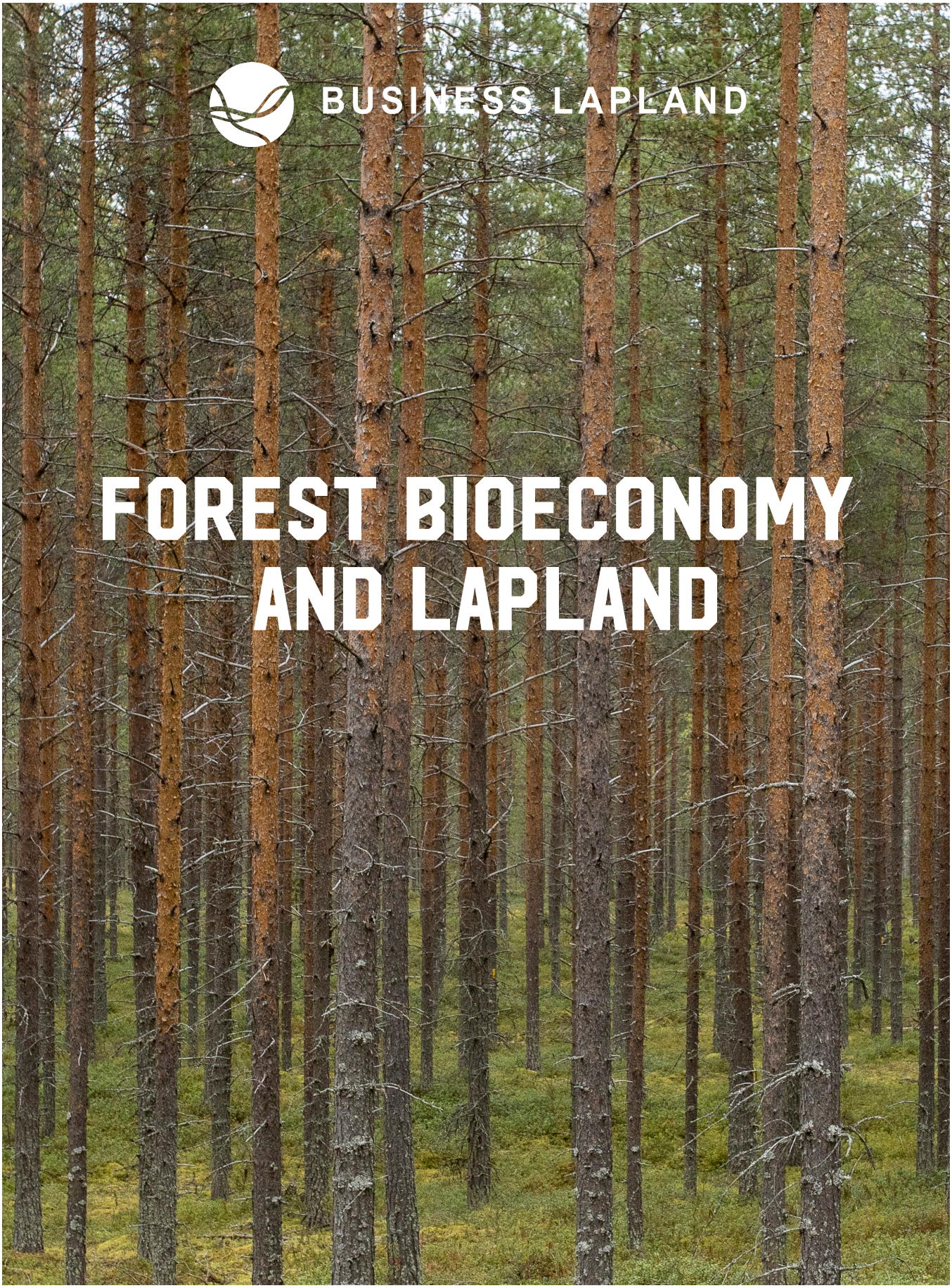

BUSINESS LAPLAND

FOREST BIOECONOMY AND LAPLAND

HOUSE OF LAPLAND

Leverage from the EU 2014–2020

European Union
European Regional Development Fund
European Social Fund

CONTENTS

3 BIOECONOMY BRINGS SOLUTIONS FOR CURRENT AND FUTURE CHALLENGES

3 FOREST INDUSTRY IN FINLAND

3 FOREST BIOECONOMY IN LAPLAND TODAY

4 FUTURE OF FOREST BIOECONOMY IN LAPLAND: SEVERAL PROJECTS PLANNED

5 FOREST BIOECONOMY BRINGS WELL-BEING AND EMPLOYMENT TO LAPLAND

6 FOREST GROWTH AND SUSTAINABLE FELLING IN FINLAND AND LAPLAND

7 FORESTS AS CARBON SINKS

FOREST BIOECONOMY AND LAPLAND

BIOECONOMY BRINGS SOLUTIONS FOR CURRENT AND FUTURE CHALLENGES

Global challenges, such as climate change and the deterioration of the condition of ecosystems together with the increasing population, force us to find new solutions in both production and consumption, taking the planet's ecological limitations into account.

Bioeconomy is the answer to many great challenges of humankind. Bioeconomy covers all sectors and systems that utilize natural resources of biological origin (agriculture, forestry, fishing, etc.).

Forest bioeconomy gives replacements for many products made from nonrenewable raw materials. In practice, almost anything can be made from bio-based materials that is currently mainly produced with oil as the raw material, e.g., replacing plastic with biodegradable alternatives. With constant research and development, bio-based products are becoming more and more usable as replacements for products made from nonrenewable materials in such applications as construction, packaging, cosmetics and consumer products.

Sustainable bioeconomy plays an important role in combating climate change when building a carbon-neutral future in the spirit of the Paris Agreement. Bioenergy is currently the most significant source of renewable energy in both Finland and the EU. In addition to electricity and heat production, biofuels also play a key role in the reduction of traffic emissions. The bioproduct industry makes efficient use of side streams in the production of renewable energy, almost two thirds of which is based on the forest industry.

Sustainable bioeconomy is a central part of the circular economy. The utilization of logging waste and the side streams of the forest industry is already commonplace at factories today, and the forest industry aims to develop products with an even higher degree of processing in this area, as well.

> **"IN PRACTICE, ALMOST ANYTHING CAN BE MADE FROM BIO-BASED MATERIALS THAT IS CURRENTLY MAINLY PRODUCED WITH OIL AS THE RAW MATERIAL."**

FOREST INDUSTRY IN FINLAND

The forest industry plays an important role in the Finnish national economy. In 2017, the gross value of the production of the forest industry was €21.2 billion, which constituted 18 percent of the total value of the production of the manufacturing industry. The industry brings over 20 percent of the export revenue of Finland and creates employment, especially in regional areas.

According to a report made by Ernst&Young, commissioned by the Finnish Forest Industries Federation, the total tax revenue of the forest industry was almost four billion euros in 2014. The tax revenue consists of the employees' taxes and non-wage labor costs, the employer's non-wage labor costs, energy and fuel taxes, organizations' income taxes and value-added tax. According to the same report, the forest sector directly employs over 40,000 employees in Finland and indirectly almost 140,000 employees in the entire Finnish value chain, including subcontracting.

Sources:

Ministry of Agriculture and Forestry, Finnish Forest Industries Federation

FOREST BIOECONOMY IN LAPLAND TODAY

The forest industry is the second largest field of industry in Lapland, and it is also growing steadily. The revenue of the entire forest sector in the region is about €1.5 billion and the field employs some 3,600 people. If realized, the large-scale investments

planned in bioindustry will increase the current volume significantly.

Facts about the forest sector

- Revenue €1.5 billion, largely from the pulp and paper industry
- Employment yield about 3,600 person years
- 5 million hectares of forest, of which two thirds can be used for timber production
- The timber resources of the forests have increased 1.5-fold since the 1970s
- Large projects planned: Boreal Bioref in Kemijärvi and Metsä Fibre and Kaidi in Kemi

According to the Finnish Forest Centre, the annual revenue of the forest sector in Lapland is about €1.5 billion (2016). The majority of this, roughly €1.1 billion, comes from the pulp and paper industry. The annual yield of forestry is about €270 million, while the wood product industry generates some €180 million in annual returns. According to the Finnish Forest Centre's information, the forest sector employed nearly 3,600 people in 2016, with forestry, the pulp and paper industry and the wood product industry as the leading employers.

Within the Lapland region, the forest industry is strongly focused in the Sea Lapland area. For example, Kemi holds the northernmost paper mill in the world, which is owned by one of the largest forest industry companies in the world, Stora Enso.

> **"ACCORDING TO THE FINNISH FOREST CENTRE'S INFORMATION, THE FOREST SECTOR EMPLOYED NEARLY 3,600 PEOPLE IN 2016."**

Source:

Lapland Forest Centre, Metsäohjelman seuranta, https://www.metsakeskus.fi/sites/default/files/amo-seuranta-lappi.pdf

FUTURE OF FOREST BIOECONOMY IN LAPLAND: SEVERAL PROJECTS PLANNED

Metsä Fibre's Kemi bioproduct mill project

Metsä Fibre, part of Metsä Group, is currently conducting project planning for the construction of a new bioproduct mill in Kemi. If realized, the value of the investment would be €1.5 billion. The purpose of the project planning is to create the conditions for constructing a bioproduct mill that would annually produce approximately 1.5 million tons of softwood and birch pulp and several other bioproducts on Metsä Group's current mill site in Kemi.

The Kemi bioproduct mill would directly employ approximately 250 people and, in its entire direct value chain, roughly 2,500 people in total. This would mean an increase of 1,500 people compared to the current situation. The employment impact in the construction phase is estimated to be almost 10,000 person-years, over half of which in Kemi. The starting points for the planning are fossil-free operations and 250 percent self-sufficiency in electricity.

The annual pulpwood consumption of the new Kemi bioproduct mill would be approximately 7.6 million cubic meters, which is roughly 4.5 million cubic meters more than the consumption of the current mill. The aim is to source the pulpwood for the mill mainly from Finland.

Source:

Website of Metsä Fibre's Kemi bioproduct mill project

Boreal Bioref's Kemijärvi biorefinery project

Boreal Bioref Oy is planning the construction of a modern biorefinery in Kemijärvi. The cost estimate of the investment is €950 million. The refinery would produce 500,000 tons of biomaterials and biochemicals per year. The products would include market pulp, dissolving

pulp and microcrystalline cellulose. In addition to these, the plant would produce C5 and C6 sugars, pine oil, turpentine and soil improvement substances. The plant would use its waste to produce e.g., biogas that can be used for the refinery's raw material shipments, among other things. The production plant would be a net producer with regard to energy, i.e., it would produce more electricity and heat than it uses.

The construction phase would create employment for around 2,700 people. The finished refinery would provide employment for 185 people. All in all, the biorefinery would help create over 1,100 permanent jobs in Kemijärvi and Eastern Lapland.

The biorefinery would use approximately 2.8 million cubic meters of wood per year, 0.5 million of which would be wood chips from local sawmills.

Source:

Boreal Bioref Oy's website

Kaidi's Kemi biorefinery project

Kaidi Finland is planning to construct a second-generation biorefinery in Kemi. The refinery would produce 225,000 tons of second-generation biofuel per year, 75% of which would be renewable diesel and 25% renewable gasoline. The total value of the investment would be approximately €900 million, and it would produce approximately €200 million of direct and indirect tax revenues annually. The aim is to acquire all the materials used in the construction phase from Finland. The project would be over 50% of domestic origin.

The construction of the refinery would require 4,000 person-years, and the completed plant would create 150 permanent jobs in Kemi. In addition to this, the refinery would help create hundreds of jobs for subcontractors, such as logging entrepreneurs, transport operators and equipment manufacturers.

Kaidi's annual energy wood demand would be approximately 2.8 million cubic meters. In addition to local energy wood, the Kemi biorefinery could utilize by-products from sawmills and surplus from the chemical forest industry, such as tree bark.

Source:

Kaidi Finland's website

FOREST BIOECONOMY BRINGS WELL-BEING AND EMPLOYMENT TO LAPLAND

Today, the forest industry is already the second largest industry in Lapland. With new investments, its significance could still grow significantly.

Large forest industry projects are significant employers as early as the investment phase. The construction of factories and related infrastructure requires the contribution of thousands of person-years. Indirect investments increase the demand for services and thus bring employment and well-being to the area.

> **"TWO LARGE PROJECTS IN THE FOREST INDUSTRY WOULD CREATE EMPLOYMENT IN FACTORIES FOR 600 PEOPLE. THE REST OF THE VALUE CHAIN WOULD GAIN A CORRESPONDING NUMBER OF JOBS."**

Factory projects are large investments, and their lifespan is counted in dozens of years. Factories provide employment for hundreds of people even during their normal functions. During maintenance and additional investments, the amount of employment increases even further.

However, the forest industry value chain from the forest to the transport of finished products should be examined as a larger whole than a single factory. Timber harvesting, forest management and timber transport to factories offer a great deal of employment in Lapland, as

well. The income from timber sales is a significant source of additional income for many of the area's residents. In the entire value chain from the forest to the factories and the transportation of products, the direct and indirect employment effect can be counted in thousands of people per year. The amount of local and state tax revenue from their earned income is considerable.

Forest industry investments also increase the amount of renewable energy. In addition to the wide range of products made using wood as a raw material, they also produce heat for both the factories and district heating in the surrounding society. The most effective plants produce substantially more energy than they need themselves. The factories produce electricity for the national grid, reducing the use of fossil fuels.

New investments also create the opportunity to further strengthen the forest industry cluster in the area.

According to a report by Pellervo Economic Research PTT, two large projects in the forest industry would create employment in factories for 600 people. The rest of the value chain would gain a corresponding number of jobs. When factoring in service jobs, the growth in employment would be 1,400 people in total. With the projects, employment would be 2.5 percent higher than without them. The projects would increase work-related migration to Lapland, and the population would increase by 1.4 percent.

"THE CARBON STORE OF FINNISH FORESTS IS CONTINUOUSLY GROWING."

Source: Lapin suurhankkeiden vaikutukset työllisyyteen ja aluetalouteen,

www.lappi.fi/c/document_library/get_file?folderId=147965&name=DLFE-35221.pdf

FOREST GROWTH AND SUSTAINABLE FELLING

Finland

In Finland, information on forest resources is collected regularly in national forest inventories. These inventories date back to the 1920s. The inventories include measuring the growth of the forests. The Natural Resources Institute Finland (LUKE) maintains information about Finnish forest resources. The latest measured amount of timber in Finland is 2.5 billion cubic meters, and the annual growth is 107.0 million cubic meters.

In addition to growth, there are detailed statistics in Finland on the amount of wood felled from our forests. Roundwood removals refer to the total volume of roundwood harvested from our forests. In 2018, roundwood removals totalled 78.2 million cubic meters, of which 89 percent, or 69.2 million cubic meters, was logs and pulpwood. Of the total, 8.9 million cubic meters was energy wood, which means fuelwood used in private homes or small-diameter roundwood used as forest chips in heat and power plants. Of the wood that ends up as forest energy, roundwood is included in the aforementioned roundwood removals, while logging residue and stumps are not.

The total drain from Finnish forests in 2018 was 94 million cubic meters. Besides the roundwood removals, this number includes the roundwood left in forests as logging residue and dead trees. As the annual growth is 107.0 million cubic meters per year, the carbon store of Finnish forests is continuously growing.

In addition to the total growth, roundwood removals and total drain of the forests, estimates for the maximum sustainable roundwood removals are calculated in Finland. These are also estimated for the coming decades. The maximum sustainable roundwood removals refer to the upper limit for felling when aiming for sustainable forestry. The limit is set taking into account economic sustainability, sustainable

wood production, forest management recommendations and any protection decisions that have been made.

The Natural Resources Institute Finland's estimate on the maximum sustainable felling potential extends to 2040. The estimate for a sustainable annual felling potential for roundwood in 2015–2024 is 84.3 million cubic meters. During the ten years after that, the annual felling potential will continue to rise to 93 million cubic meters. The roundwood removals in the whole country in 2018 represented 93 percent of the maximum sustainable felling potential

Source: https://mmm.fi/metsat/metsatalous/metsatalouden-kestavyys/kestavyytta-koskevat-laskelmat

Lapland

In Lapland, forestry land constitutes 9.08 million hectares, i.e., 98%, of the land area. This number also includes nature reserves. Forest land, in turn, covers an area of 5.00 million hectares in Lapland, 3.78 million hectares (68%) of which is usable for timber production.

> **"BIOECONOMY FACTORIES SITUATED IN LAPLAND CAN ALSO EXTEND THEIR TECHNICAL AND ECONOMICAL TIMBER SUPPLY AREA BEYOND THE BORDERS OF LAPLAND TO NEIGHBORING REGIONS OR ACROSS THE BORDER TO SWEDEN OR RUSSIA, FOR EXAMPLE."**

Of the forest land, the state owns 62%, and the corresponding percentage used for timber production is 47%. Timber production is not possible on forest land falling under protected areas (nature reserves on both state-owned and privately owned lands, nature conservation program areas and protected areas marked in regional land use plans). The treatment of forests is restricted on groundwater areas marked in regional land use plans and near ancient relics, as well as on certain nature conservation program areas and areas marked in regional land use plans.

According to Statistics Finland, the roundwood removals carried out in Lapland in 2018 were approximately 5 million cubic meters, while the maximum sustainable felling potential is estimated to be just under 7.2 million cubic meters in 2015–2024. During the following ten-year period, the maximum limit of sustainable felling will rise to 9 million cubic meters per year. Bioeconomy factories situated in Lapland can also extend their technical and economical timber supply area beyond the borders of Lapland to neighboring regions or across the border to Sweden or Russia, for example.

Sources: Natural Resources Institute Finland (LUKE), http://alueluva.fi/meto-lappi/wp-content/uploads/sites/8/2019/02/13.-Lappi_metsavarat_2019-1.pdf

Ministry of Agriculture and Forestry

FORESTS AS CARBON SINKS

Forests play a significant role in the mitigation of climate change. Forests and other biomass absorb carbon dioxide from the atmosphere as a result of photosynthesis and function as significant carbon sinks. Deforestation, caused by e.g., agricultural expansion and construction, is a significant source of greenhouse gas emissions on a global scale. The most significant source of greenhouse gas emissions is the use of fossil fuels, especially in energy production and traffic. Reducing and eliminating the carbon dioxide emissions of these sectors plays a crucial role in combating climate change.

The size of the net carbon sink of Finnish forests, i.e., the amount of carbon dioxide absorbed from the air by forests, has varied between 18–47

million tons as carbon dioxide equivalents (Mt CO2e) since 1990. This has been equal to 30–60 percent of the total annual emissions in Finland.

In 2017, the net carbon sink of Finnish forests was 27 Mt CO2e, equal to 48 percent of the greenhouse gas emissions in Finland. In the EU, the sinks correspond on average with approximately ten percent of the emissions of other sectors. As a part of the second commitment period of the Kyoto Protocol, Finland has internationally committed to maintaining a carbon sink for 19 Mt CO2e per year until 2020.

> **"EU MEMBER STATES' FOREST REFERENCE LEVELS WILL BE CONFIRMED IN 2020."**

Forest sinks and EU climate policy

The EU's so-called LULUCF regulation concerning land use was ratified in early 2018. The LULUCF regulation determines how carbon sinks and the greenhouse gas emissions caused by forest and land use are taken into account in the EU's climate goals up to 2030.

From Finland's perspective, the most significant issue in the LULUCF regulation concerns the calculation of forests' carbon sinks and greenhouse gas emissions. According to the regulation, each member state sets a reference level of managed forest land using the agreed upon criteria for the periods of 2021–2025 and 2026–2030.

Finland delivered the calculations of the forest reference level in accordance with the regulation to the commission in 2018. The evaluation of the reference levels is currently ongoing. The member states' reference levels will be confirmed in 2020. No regional calculations have been made regarding forest sinks, unlike sustainable felling, for example. It is not currently known how the carbon sink minimum set in the EU will be ensured and how situations where there is a threat of falling below the minimum will be handled.

Carbon sinks in the Finnish Government Program

The Program of Prime Minister Antti Rinne's Government aims to make Finland carbon-neutral by 2035 and carbon-negative soon thereafter. This will be done by accelerating emissions reduction measures and strengthening carbon sinks. The Government will update its medium-term climate plan and national climate and energy strategy to achieve the 2030 emissions reduction level required to achieve carbon neutrality. According to the Government Action Plan, these updates will be finished in the summer of 2021.

As a part of the climate and energy policy planning system, the Government will create a comprehensive climate program for the land use sector. The purpose of the program is to identify the means to decrease the emissions of the land use sector and strengthen Finland's carbon sinks in the long and short term. The goal is to increase Finland's net carbon sink. The carbon sink policy will be included in the update of the Climate Change Act and the strategy toward carbon neutrality. According to the Government Action Plan, the climate program of the land use sector will be finished by the end of 2021.

Sources:

Ministry of Agriculture and Forestry,

Finnish Government Program,

Government Action Plan