

Position paper

Northern natural resources research provides solutions for the green transition - outlook for open strategic autonomy

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What if Northern Europe plays a bigger role as a knowledge provider on the sustainable use of natural resources in the future?

Recommendations by Natural Resources Institute Finland

Background

Northern Europe has excellent education, safe operational environment for investments, and uniqueness of natural resources. Finland is the most forested country in the EU, with over 75% forest cover. It is also the most peatland rich country in the world, with almost 30% peatland cover. Cold or heat, wetness or drought - knowledge and solutions on the sustainable use of natural resources in northern conditions can be applied at the European level.

Open strategic autonomy aims to enhance Europe's self-sufficiency and independence in critical areas while staying open to global trade and cooperation. The green transition, enabled by sustainable primary production, ensures the security of supply but also helps meet climate and biodiversity tar-

gets. Climate change will increase the pressure on northern raw materials. The need to maintain food and energy security and capacity to use forests will only increase in the future.

The Natural Resources Institute Finland (Luke) is committed to initiating solutions that facilitate the green transition towards a more competitive and climate adaptive Europe. We provide research-based solutions to increase the value of circular bioeconomy, data economy, and hydrogen economy in northern ecosystems (Fig. 1).

Difference in value added by agriculture and forestry between the EU and Finland

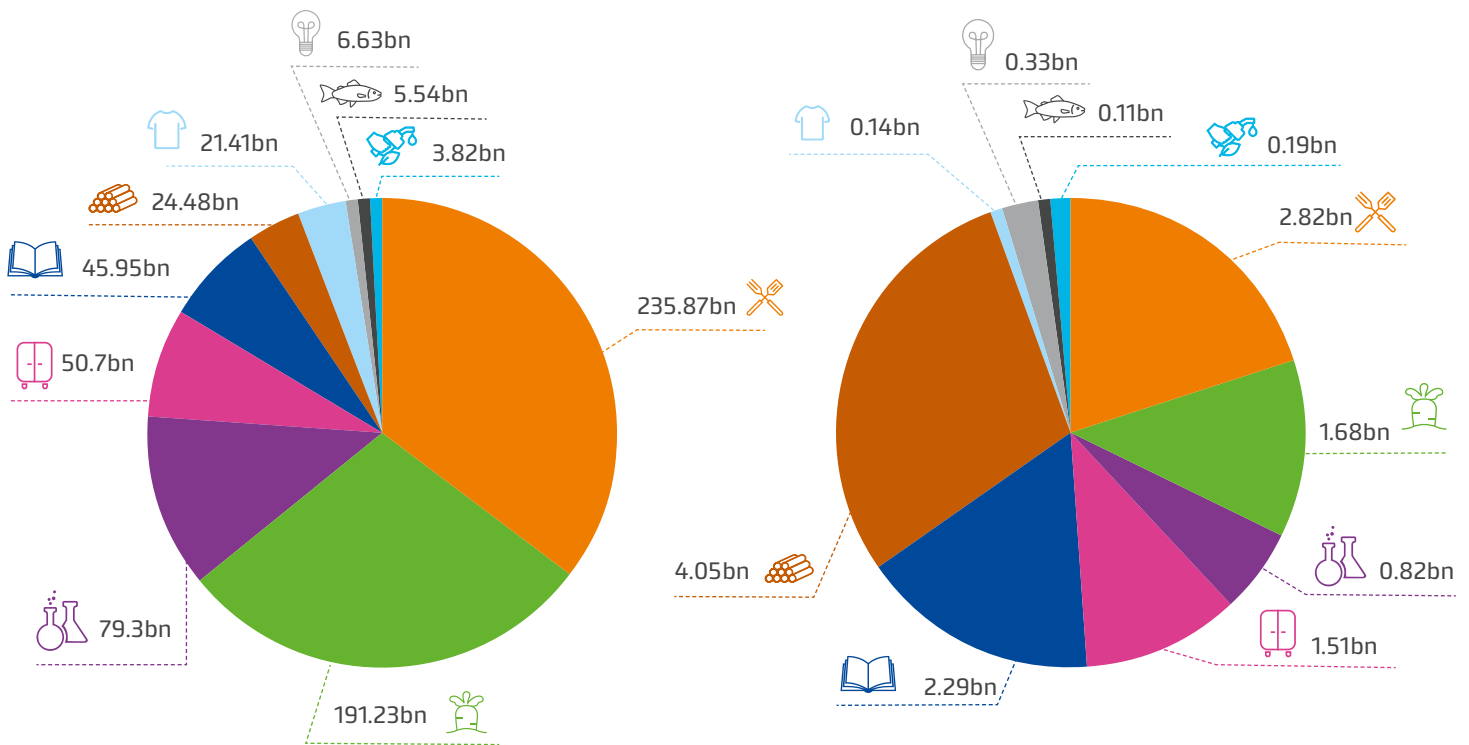
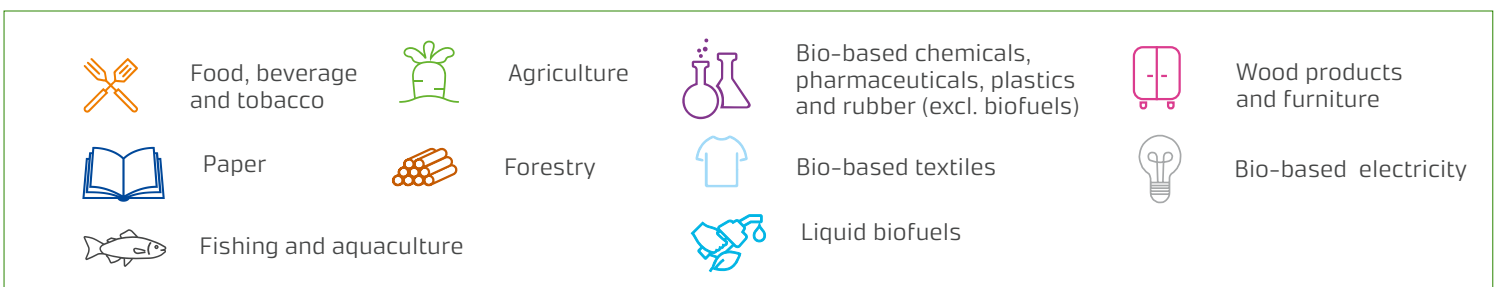


Fig 1a. Value added by sector in EU27 (2020) (billion €)

Fig 1b. Value added by sector in Finland (2020) (billion €)



We emphasize five themes concerning the green transition to be in the future EU agenda

- 1. In the forest bioeconomy, economic, social, climate and biodiversity aspects can be reconciled to strengthen the European economy.**
- 2. The focus of global food production shifts to Northern Europe.**
- 3. The transition from fossil energy to domestic renewable energy increases security of supply and resilience to crises.**
- 4. Terrestrial, technological and aquatic carbon sinks complement each other in climate change mitigation and adaptation.**
- 5. Future Bioeconomy is an essential part of industrial policy.**



Theme 1: In the forest bioeconomy, economic, social, climate and biodiversity aspects can be reconciled to strengthen the European economy.



GOAL 1. ENHANCE FOREST GROWTH AND RESILIENCE THROUGH DIVERSIFIED FOREST MANAGEMENT

In Northern Europe we are heading towards regenerative forest management in which management practices will be diversified to ensure healthy and well growing forests with multiple benefits. Targeted tree breeding, accelerated breeding cycles, precision technologies, and entrepreneurial incentives can increase productivity, enable economic activity, and ensure resilience.



Actions

- Develop EU and national policies to incentivize diversified forest management, resulting in a balanced array of forest products and ecosystem services and reducing risks of severe natural disturbances such as windfalls and devastating forest fires.
- Increase investment in research that focuses on forest productivity and insect or pest resistance through targeted breeding, biotechnology, remote sensing and regenerative practices.
- Encourage building of public-private partnerships to scale new innovations and incentivize sustainable entrepreneurship around natural resources.



GOAL 2. DEVELOP COST-EFFICIENT SOLUTIONS AND INDICATORS TO SAFEGUARD FOREST BIODIVERSITY

Monitoring schemes and indicators to assess the state of forest biodiversity are needed to evaluate the effectiveness of conservation measures on managed forest lands. Implementing cost-effective protection measures on managed lands promotes the reconciliation of wood and energy supply with other ecosystem services and is in accordance with the EU's biodiversity goals.



Actions:

- European forest monitoring makes full use of remote sensing, eDNA sampling, AI methods and information provided by existing national forest inventories.
- Develop novel, cost-efficient approaches to increase forest biodiversity on managed lands.
- Modify metrics to better assess and verify biodiversity impacts of forest management and conservation actions.

Theme 2: The focus of global food production shifts to Northern Europe.



GOAL 3. ADVANCE A SUSTAINABLE NORTHERN FOOD-ENERGY NEXUS

The interaction of food production and renewable energy is of utmost importance in Europe. Modifying cultivation practices through, for example regenerative farming, improves soil health, fertility, biodiversity and crop yields and decreases soil erosion and greenhouse gas emissions (see Luke Position paper 2023: Three key messages concerning the proposal for EU Soil Monitoring Law). Strengthening value chains is pivotal for intergration of current and emerging production methods. Sustainable intensification is essential for the food system transition. Breeding and genomics has been pivotal in improving raw material and food production in current production systems and is fundamental for renewal and integration of food and energy nexus.



Actions

- Establish an innovation pipeline that links understanding of plant and animal quality traits and their genetics to breeding and enhances sustainable food production and processing.
- Establish an RDI effort to develop production technologies, such as aquaculture, greenhouse production and cell agriculture, in a controlled environment and integrate these in an efficient way with the current production practices.
- Increase research funding to study mechanisms and genomic characteristics that contribute to breeding of stable crop yields, improved nutritional and processing quality, efficient nutrient use, and the health of both plants and animals. This research is essential to address future challenges posed by climate change and decreased resources.



GOAL 4. NURTURE CARBON NEUTRAL CIRCULAR BIOECONOMY: INTERLINK FOOD, FARMING, AND ENERGY NETWORKS

Future regional livelihoods will be enabled by circular bioeconomy. Profitable and sustainable circular bioeconomy enforces a seamless alignment of sustainable food, regenerative farming, and renewable energy systems. The development of decentralized energy systems relies on renewable by-products and waste, including biogas.



Actions

- Establish an RDI programme to promote bioenergy production from food waste and agricultural by-products.
- Integrate low-environmental impact fish farming, aquaculture and grass bioeconomy in EU RDI and industrial policies.
- Develop an Action Plan for European production of recycled fertilizers to improve carbon sequestration, reduce GHG emissions, prevent nutrient leaching, and contribute to soil fertility and biodiversity.

Theme 3: The transition from fossil energy to domestic renewable energy increases security of supply and resilience to crises.



GOAL 5. BOOST SUSTAINABLE AND JUST TRANSITION TO RENEWABLE ENERGY, WITH A FOCUS ON WIND AND SOLAR POWER

Research and development in energy storage technologies is needed to address intermittency challenges and facilitate integration of renewable energy into grids. A just transition should be ensured through training and job opportunities in the renewable energy sector, particularly in regions affected by the phasing out of fossil fuel-based energy sources.



Actions

- Develop an RDI program to study and evaluate the effects of the rapid growth of solar and wind energy on land, coastal and offshore areas, to investigate the benefits and disadvantages for economic activities, and to assess the acceptability from the perspectives of landowners and the public.
- Create measures along the mitigation hierarchy to balance energy production with environmental and biodiversity targets.
- Conduct techno-economic studies and demonstrations on fully electrified forest and agriculture value chains - from soil preparation, sowing, fertilizer spreading machinery and robotics to harvesting and deliveries to food industries.



GOAL 6. BIOENERGY AND BIOGENIC CARBON AS INTEGRAL PARTS OF THE ENERGY TRANSITION

Bioenergy ensures the green transition of the whole energy system as it can provide balancing capacity for intermittent energy sources such as solar and wind power, and an alternative to fossil fuel consumption. Bioenergy and biogenic carbon contribute to the energy transition, so policies must ensure their functionality and acceptability.



Actions

- Create EU policy actions to secure functionality and acceptability of bioenergy and use of biogenic carbon in EU and national level policies.
- Promote the biobased CO₂ capture and utilization concepts in the hydrogen economy, focusing on pilot and industrial scale demonstrations.
- Develop a strategic hydrogen roadmap for the EU, including carbon capture and utilization (CCU).

Theme 4: Terrestrial, technological and aquatic carbon sinks complement each other in climate change mitigation and adaptation.



GOAL 7. REASSESSMENT OF NATURE-BASED CARBON SINKS AND TECHNOLOGICAL CARBON CAPTURE IS NEEDED

Further research is needed to clarify the role of the land use sector in EU-level carbon neutrality targets.



Actions

- Develop climate-proof and societally acceptable models for reconstruction of the infrastructures. Develop incentives and markets to support climate proofness, resilience and biodiversity.
- Enhance the RDI program on sustainable forest, peatland management and land use that can contribute to carbon sequestration and ecosystem resilience to natural disasters.
- Boost business opportunities for technological carbon sinks and bio-based carbon dioxide and ensure the scalability of innovations.



GOAL 8. INTEGRATED WATER AND LAND MANAGEMENT POLICIES HELP TO ADAPT TO CLIMATE CHANGE AND ENSURE THE PRODUCTION AND RESILIENCE OF AQUATIC ECOSYSTEMS

The role of aquatic systems in climate change mitigation and adaptation should be elaborated: Europe's marginal seas may play a larger role in Europe's carbon budgeting than expected. We need to ensure that our water resources maintain a healthy ecological balance and are accessible for food and energy production, and also in a changing climate.



Actions

- Develop effective catchment area level management to provide solutions to land-based nutrient leakage and pollution control in waters.
- Develop concurrent measures taken on land to ensure the success of the ecological restoration of aquatic ecosystems.
- Develop mechanisms to prioritize and co-ordinate restoration measures alongside hydropower production in constructed rivers.

Theme 5: Future Bioeconomy is an essential part of industrial policy.



GOAL 9. INTEGRATE BIOECONOMY INTO THE EU INDUSTRIAL POLICY TO FOSTER STRONG REGIONAL CIRCULAR AND BIOECONOMY PRODUCTION ECOSYSTEMS

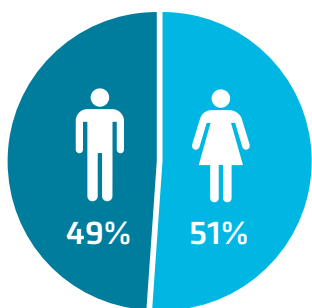
It is time to harmonize circular bioeconomy, bioeconomy and industrial policy target priorities and measures within existing regulatory and sectoral base frameworks. The EU's future competitiveness and wellbeing largely depends on how European research and innovation actions succeed in developing, up-scaling, implementing and commercializing innovative sustainable solutions.



Actions

- Develop a cross-sectoral EU level policy framework and action plan for Industrial Bioeconomy enabled by circular economy.
- Support the piloting and scaling up of the production of new high-added-value products and especially the innovative regional clusters.

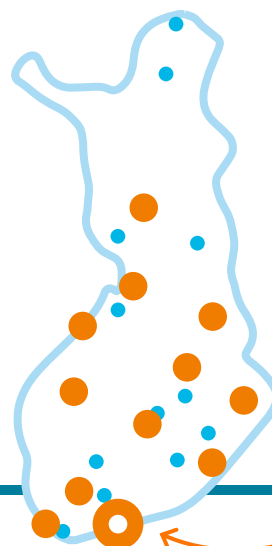
1337
Employees



686



651



12 Locations

12 Experimental stations and Research co-operation sites

HEADQUARTER
in Viikki, Helsinki

You can find us online

› luke.fi



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Luke Position Paper

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