

POLICY BRIEF



The potential of the Finnish arctic bioeconomy depends on entrepreneurial spirit and cooperation

In this policy recommendation, 'Arctic' refers to a concept covering competence and creativity, high standards of living, a well-functioning infrastructure, living values that relate to pure nature, and the ability to solve various Arctic problems.

The Arctic approach deserves to be a major source of growth and competitiveness for Finland.

The Finnish Arctic Strategy (2013, updated 2016 and 2017) and the related action plan define Finland's key measures in Arctic cooperation. As the Presidency of the Arctic Council in 2017-2019, Finland emphasizes the implementation of the Paris Climate Agreement and the UN's sustainable development goals in arctic cooperation.

The development of a sustainable bioeconomy in the Arctic requires:

- Courageous and open-minded ideas and new solutions
- New forms of cooperation within the Barents region and between northern and southern Finnish actors.

- Clusters of comprehensive business, research and development organizations in Finland that build and strengthen trust and shared competence.
- International Arctic cooperation and business partnerships, whose development is safeguarded by pooling resources and collaborating.
- Specialization into the production of sustainable and highly value added services and products based on Arctic resources and their export to international markets.
- Constant care of the resilience of the unique and sensitive production environment.

Know-how concerning the Arctic bioeconomy is found in different sectors in Finland ranging from modern bio-processing to welfare products and technology services.

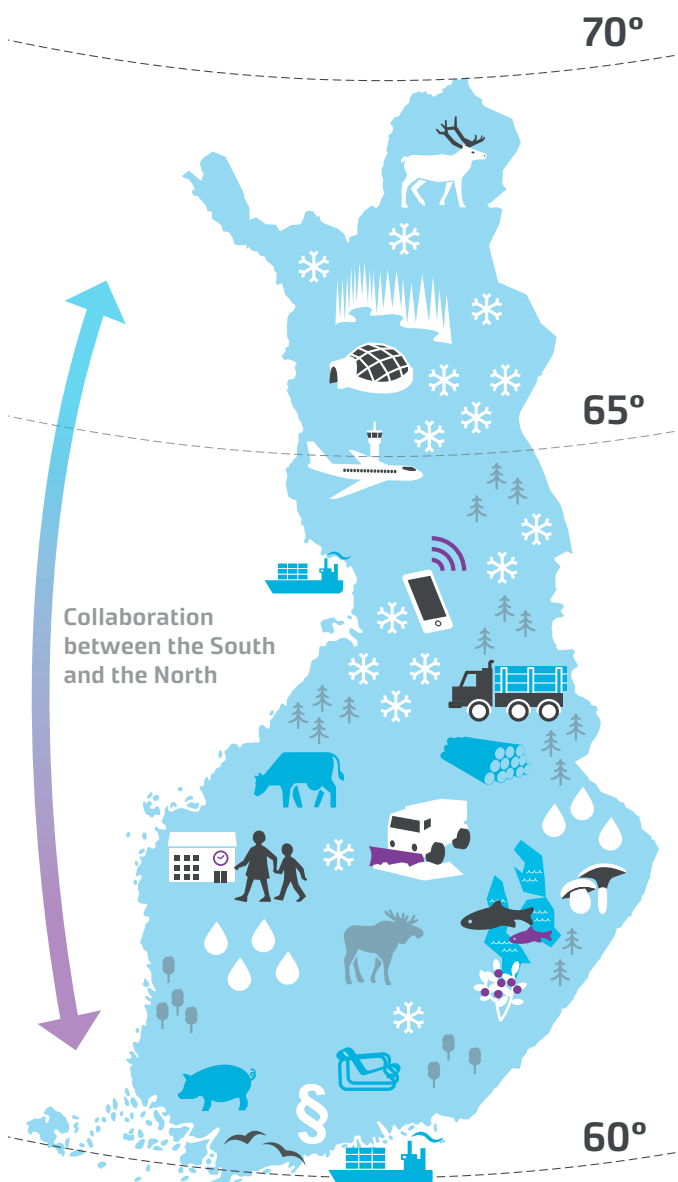
The Arctic counties of Finland are internationally desirable partners.

The EU's financial structure requires strong cooperation between regions and sectors.

Arctic resources in Finland

ARCTIC NATURAL RESOURCES

- The development of an Arctic bioeconomy specializing in the exploitation of natural resources, i.e. agriculture, forestry, tourism, fisheries, reindeer herding, hunting and new businesses based on the aquatic economy, requires special know-how and technology. In order to benefit from the growth potential of the Arctic bioeconomy, the various regions and actors in Finland must build a shared partnership. A sustainable bioeconomy based on regional resources is founded on four dimensions of human activity: regional entrepreneurship, regional population activity, regional research and public administration.
- The natural and climatic conditions of Finland are due to the Gulf Stream and offer the possibility to conduct a diverse bio-economy even north of the Arctic Circle (66.5 ° N).



THE FINNISH ARCTIC BIOECONOMY IS BASED ON

- The excellent condition and cleanliness of natural resources, the production environment, soil and air, and waterways
- Richness in raw materials, land, forest and water resources and their sustainable use.
- Unique wild and nature-based resources and their products and services
- Technical excellence in the bioeconomy
- Co-operation between industries
- Businesses adapted to the cultural environment and arctic conditions

HUMAN RESOURCES AND KNOW-HOW

- Specific know-how on conditions, creativity, well-functional infrastructure, commitment and the ability to live under the conditions of the natural cycles is required to achieve high standards of living and the sustainable use of natural resources, in the Arctic environment.
- Seasonality and strong natural phenomena have developed the ability of residents to adapt to demanding conditions and the persistence of society.
- Arctic nature, silence, darkness and light fluctuations inspire artists, architects and designers.
- Pure nature offers opportunities for exploiting wild, nature harvested products.
- The respect for nature and indigenous peoples is an imperative prerequisite for activities in the Arctic
- The developmental strengths of Finnish society in the Arctic include a high level of education, decent levels of basic security, the Nordic tradition of democracy and the rule of law and equality.

Regional strengths of the arctic biotechnology and development strategy

Lapland, Kainuu and Northern Ostrobothnia account for nearly half of Finland's land area. They are largely located in the boreal coniferous forest zone. The gross domestic product of the provinces is mainly based on products from the forest. In recent years, regions have invested in the development of resource-based livelihoods and building networks. Thanks to cooperation, North Finland has demand and growth opportunities in the international market.



Lapland's strengths include its nature, snow and mountain scenery. Lapland has good international traffic and communications links and the agility to operate in the climatic conditions of the Arctic. The social structure is highly organized, flexible and well-functioning. Natural resource-based

industries, agriculture, forestry, reindeer husbandry, fisheries, tourism, mining and civil engineering carried out in a by Lappish style have challenged the solutions proposed by others.

The versatility of the use of natural resources in Lapland and the degree of value addition of the Arctic specialty products as well as service environments should be raised. Northern wild fish and berries can be exported for health promotion or as a gourmet product to the international market. These can be combined with the unique supply of wilderness hotels. Additionally, the integration of the Kemi-Tornio area's expertise in the circular economy and bioeconomy knowledge is a great opportunity.



Kainuu has become a major bioeconomic actor in forestry and tourism. Through research and technology, new products and services have been developed from the natural resources of the region. The long-term goal of Kainuu is to achieve vigorous and competitive business life.

The most important development targets in Kainuu have been chosen for a vibrant and renewable business sector that is being built by: (1) supporting business growth and renewing jobs; (2) developing knowledge and pioneering innovation activities; and (3) taking care of the versatile and efficient supply of skilled labour, especially in areas of growth and structural change.

To achieve its goals, Kainuu has an opportunity to develop a refinery business integrated with the Kainuu forests for the production of bioplastics and various building materials. In addition, Kainuu aims to develop logistics and digital communications to bring products and services to the world market and to bring international travellers to Kainuu. The need to develop marketing cannot be overemphasized.

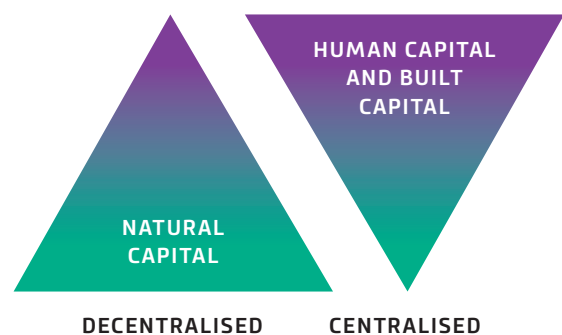


The specialization of **Northern Ostrobothnia** in the ICT sector brings new opportunities to the bioeconomy business. As a bioeconomy county, North Ostrobothnia has a strong grip on business development and innovation. Business activity focuses on value added processing, products and services.

Northern Ostrobothnia, focusing on its environment, is aiming at the development of clean-tech solutions. Examples of this area include materials, products and services based on the circular economy; industry resource efficiency and environmental responsibility as well as decentralized and smart-grid bio-based energy. A great opportunity for developing a bio-economy lies in cooperating with the ICT and welfare industry.



The rest of Finland must invest in know-how and technology so that the role of the Arctic can be supported. High-quality expertise is required to develop the high quality of many products and services, for example health-promoting food products and cosmetic products. From the Arctic regions, pure raw materials can be obtained, whose refinement can be utilized by extensive Finnish know-how.



Interaction Cascade of Natural and Human Capital: Human capital focuses more on cities and natural capital focuses on rural area such as the Arctic countryside

The arctic bio-economy – opportunities and challenges

OPPORTUNITIES

- In the future, the Arctic bio-economy will have the potential to grow and develop in all areas. The shortage of fresh water in southern Europe will force global bioenergy production processes to move north.
- The annual growth of the forests in Lapland, Kainuu and North Ostrobothnia is projected to be 3-4 m³ per hectare in 2050. If the growth is in line with the forecast, the yield potential of northern forest biomass at the end of the century will almost be the same as that of the southern Finnish forests, in the 1980s.
- Northern agriculture and nature harvested products are needed as raw food materials. For example, fish caught in Lapland's clean waters are already in more demand than the supply can meet.
- The reindeer herding products, such as meat and reindeer hides, and the culture associated with it, are attractive to tourism and are also economically important. Northern reindeer herding is linked to the traditional livelihoods of the indigenous peoples of the region. In the South, reindeer herding is also linked to agriculture because supplementary feed in southern reindeer herding is produced in the agricultural field.
- Bioeconomy products and services support the growing tourism industry in the Arctic region, which benefits from a wide range of Finnish nature and culture as well as the so called Green Care products and services. International tourism increased in Lapland by 13% in 2016.
- The recreational value of clean lakes and rivers in Northern Finland is very high for both domestic and foreign tourism. In the summer tourist season, the clean water and landscape have not yet been fully utilized. Water landscape tourism should be developed as a modern option for summer cottage culture.
- Value-added products, as well as food produced in arctic from clean, high-quality and safe raw materials form a strong potential in the export market.

Our food production has adapted to arctic conditions that promote:

- the cleanliness of the crop production environment
- the healthiness of the livestock production environment
- the cleanliness of the food
- the high nutritional value for many products
- the high hygienic quality of the products

In addition, our production system is traceable and transparent

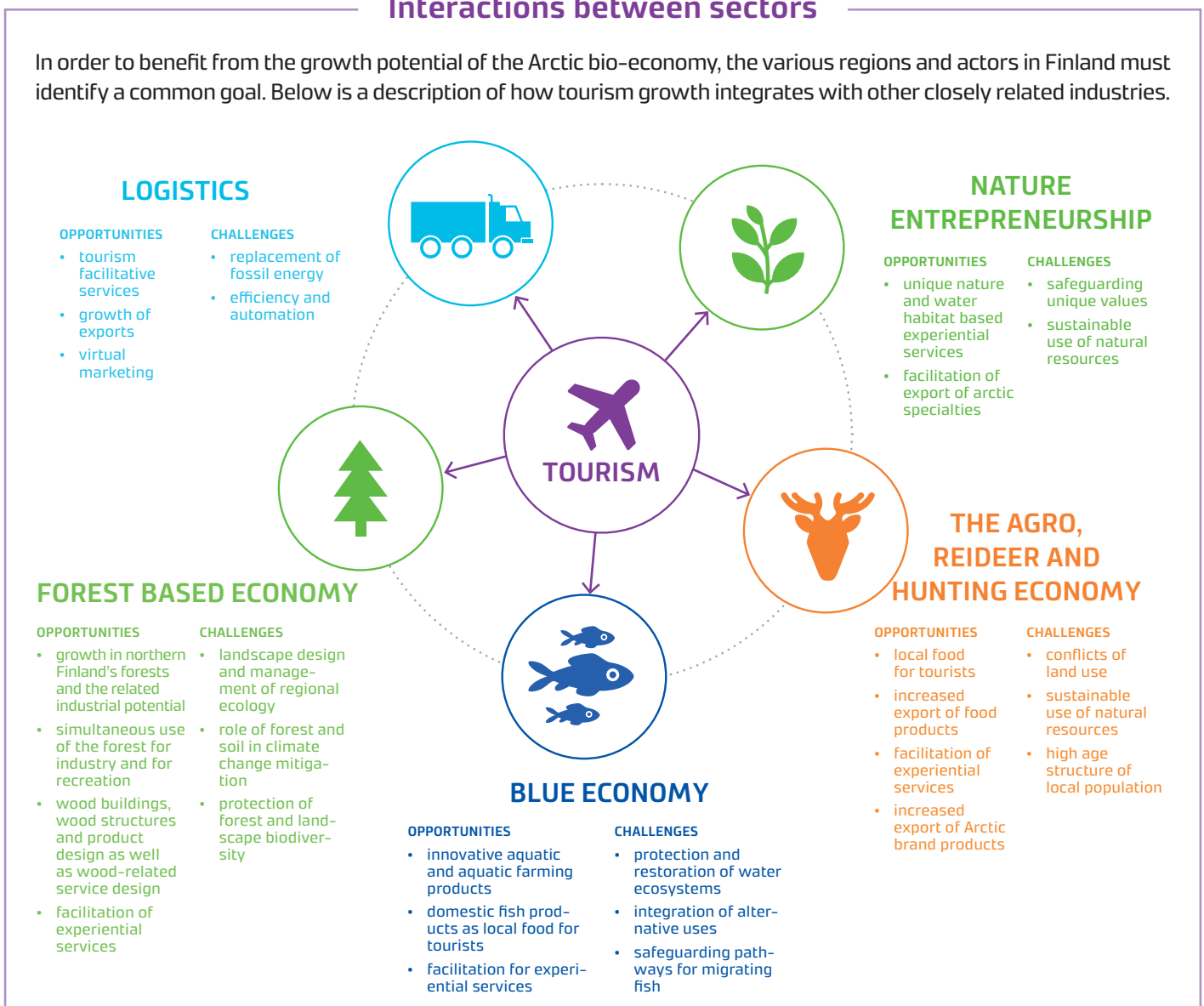
CHALLENGES

- The challenges facing the Arctic bio-economy are related to the sustainable use of renewable resources, land use conflicts, long distances and unfavourable demographic structures.
- How can the value added by natural resources be further raised to enable intelligent solutions and products and services in the bioeconomy to be exported to the international markets? How can we minimize climate change, eutrophication and chemical impacts from the use and process of natural resources? How can we ensure that non-renewable natural resources are replaced by bio-products and services that are a viable option in the international market?
- Land use is becoming a critical international issue. Land use involves a wide range of problems and phenomena, such as the abandonment and externalization of food production by consumers through urbanization. The ability of the soil to act as a carbon sink may deteriorate. Especially in the north of Finland there are plenty of organic soils and marshlands that form a sink of large amounts of carbon.

- Land-use decisions always relate to ownership, but its effects are societal. Metsähallitus is a strong public actor in land use. Private (private, municipal and parish) ownership accounts only for about 40 percent of the area of forest land, in Lapland.
- Because of competition between industries, land use solutions require expertise and skilful cooperation. Reciprocal problems arise between agriculture, forestry and reindeer husbandry due to damage caused by reindeer to fields, the adequacy and quality of reindeer pastures and the right of indigenous people to continue their traditional livelihoods.
- Nature-based entrepreneurship serving tourists looks to the forest for services other than forestry. In the Nordic countries, everyman's right guarantees the potential for land use related to recreation and the utilization of wild berries, mushrooms and herbs.
- There is also a conflict between reindeer herding and game hunting, as well as between fishing tourism and other fisheries. The simultaneous expansion of nature entrepreneurship and the mining industry creates its own challenges.
- Fossil fuels are still mainly used for transport, which cannot be continued if the aim is to develop an environmentally sustainable production structure. The capital outflow related to the purchase of imported energy takes up a large part of the purchasing power and resources of the potential to develop new products and services.
- The Arctic population is aging faster than average; while the need for services increases, services are also departing the region. How will the unfavourable development of the population's age structure be solved?

Interactions between sectors

In order to benefit from the growth potential of the Arctic bio-economy, the various regions and actors in Finland must identify a common goal. Below is a description of how tourism growth integrates with other closely related industries.



DEVELOPMENT TARGETS OF THE DIFFERENT SECTORS

- Developing growth-oriented entrepreneurship through collaboration and specialization in seasonal, high-quality and long-life-cycle products and services.
- The focus of agriculture, forestry, reindeer, fish and hunting economy should lie in the export of high value products from the world's cleanest production environment, but also local food, which supports a diversified and decentralized food and circular economy.
- The strong focus on nature entrepreneurship and nature tourism services to provide tailor-made entertainment services to both international and domestic customers, as well as tourism products for wellness and health.
- Development of energy production based on different alternatives to renewable energy for the needs of decentralized production systems.
- Building the potential of blue bio-economy that can be found in new products and services based on aquatic resources.

DEVELOPMENT TARGETS FOR KNOW-HOW

- Innovative identification of arctic raw materials, assessment and development of their potential and service design.
- Bioprocessing and service development that utilizes high technology and highlights natural values and generates long life-cycles.
- Exploiting ecosystem models, closed cycles and regional land use, as well as the material and energy economy for sustainability and optimization.
- Ecosystem service analysis and resilience research.
- Development of cleanliness, high quality, eco-design and sustainability criteria.
- Developing skills and ownership structures and building new business models, networking and clustering.

RECOMMENDATIONS FOR DEVELOPMENT MEASURES

- ✓ Ensuring sustainability, regeneration and the circular use of Arctic resources.
- ✓ Making use of Arctic-focused and inclusive planning and joint management models.
- ✓ Ensuring greater co-operation between the bio and circular economy in the Arctic region.
- ✓ Ensuring good arctic communication and interaction.
- ✓ Raising the rate of processing by enabling innovative financing tools to attract investors to arctic products.
- ✓ Supporting the renewal of multilateral Arctic entrepreneurship by increasing marketing training, sustainability-based product development and business management.
- ✓ Developing Arctic logistics, digitization and platforms.

- Developing shared value marketing processes and paths.
- Identification, support and evaluation of transformation processes.
- Training of new bio-economic experts.

Natural diversity and sustainability based entrepreneurship is safe ground for the arctic bioeconomy

Sustainable competitiveness requires the preservation of biodiversity and natural regeneration capacity. As production grows, the business structure must be based on the sustainable exploitation of natural resources.

SUSTAINABLE USE AND CAPABILITY OF SURVIVAL

It is necessary to look at competing land use patterns and to take better account of the needs of the various interest groups involved through participative planning and decision-making. At the same time, it is important to take into account the sensitive and slow-regenerating nature of the Arctic region and its diversity.

The key preconditions for social sustainability are the diverse demographic structure and people's ability and adaptability. These features should be supported and developed. The prerequisites for social sustainability are an important research topic.

Ensuring overall sustainability requires continuous evaluation and transparency. Finding partnerships in the business sector is important for both decentralized and centralized systems.

VALUE ADDITION AND CLOSED CIRCLES

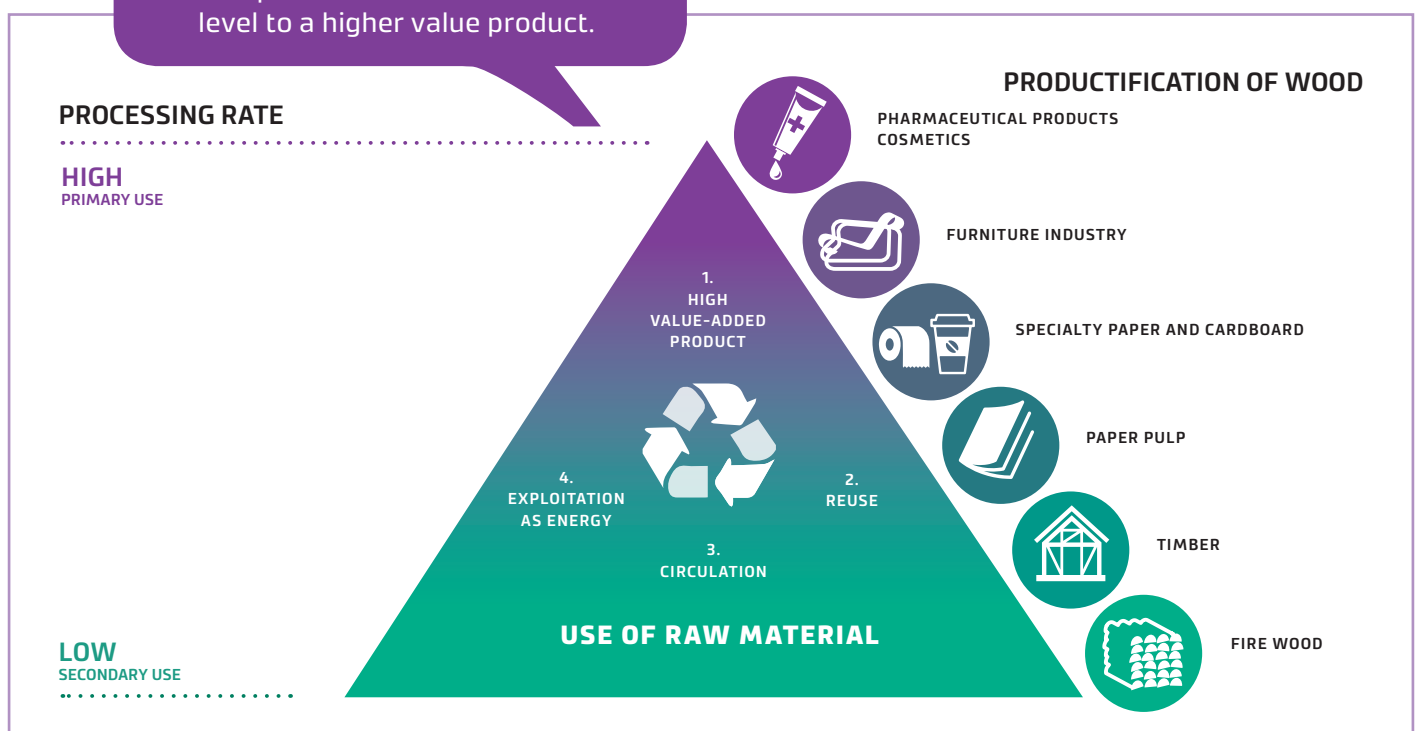
The circular economy, combined with cascading principles and responsible production, improves the creation of new products and services in the bioeconomy, closes material flows and helps to increase the processing rate. The value cascading principle means that raw materials are primarily used for high-grade products and services. In the circular economy products are first reused and recycled and ultimately used for purposes such as energy. Implementing the value cascading principle requires the emergence and interaction of networks and supports multidisciplinary entrepreneurship and climate resilience.

ADAPTATION TO CLIMATE CHANGE

Managing climate change risks requires a strong knowledge of climate resilience in all dimensions of sustainability. Adaptation to climate change should be taken into account in the foreseen bioeconomy sector development and especially in the planning of investments as well as in planning and licensing practices and in water conservation constructions.

THE SPECIAL POSITION OF NORTHERN COUNTRIES

The business activities in Lapland, Kainuu and Northern Ostrobothnia, clusters of research and development organizations and cooperation between public and private actors are leading strengths in building international partnerships. The opening of northern transport connections also supports the development of the bioeconomy.



Natural resources economy in the society

Authors

SIRPA KURPPA, Research Professor, Luke
ANNE TOLVANEN, Professor, Luke
VIRPI ALENIUS, Development Manager, Luke
ANU REINIKAINEN, Researcher, Luke

EMAIL: firstname.surname@luke.fi

INTERNET: www.luke.fi

© Natural Resources Institute Finland 2018



ISSN 2343-4252

ISBN 978-952-326-596-7 (ONLINE)

ISBN 978-952-326-595-0 (PRINT)

<http://urn.fi/URN:ISBN:978-952-326-596-7>