



Regional Council of
NORTH KARELIA



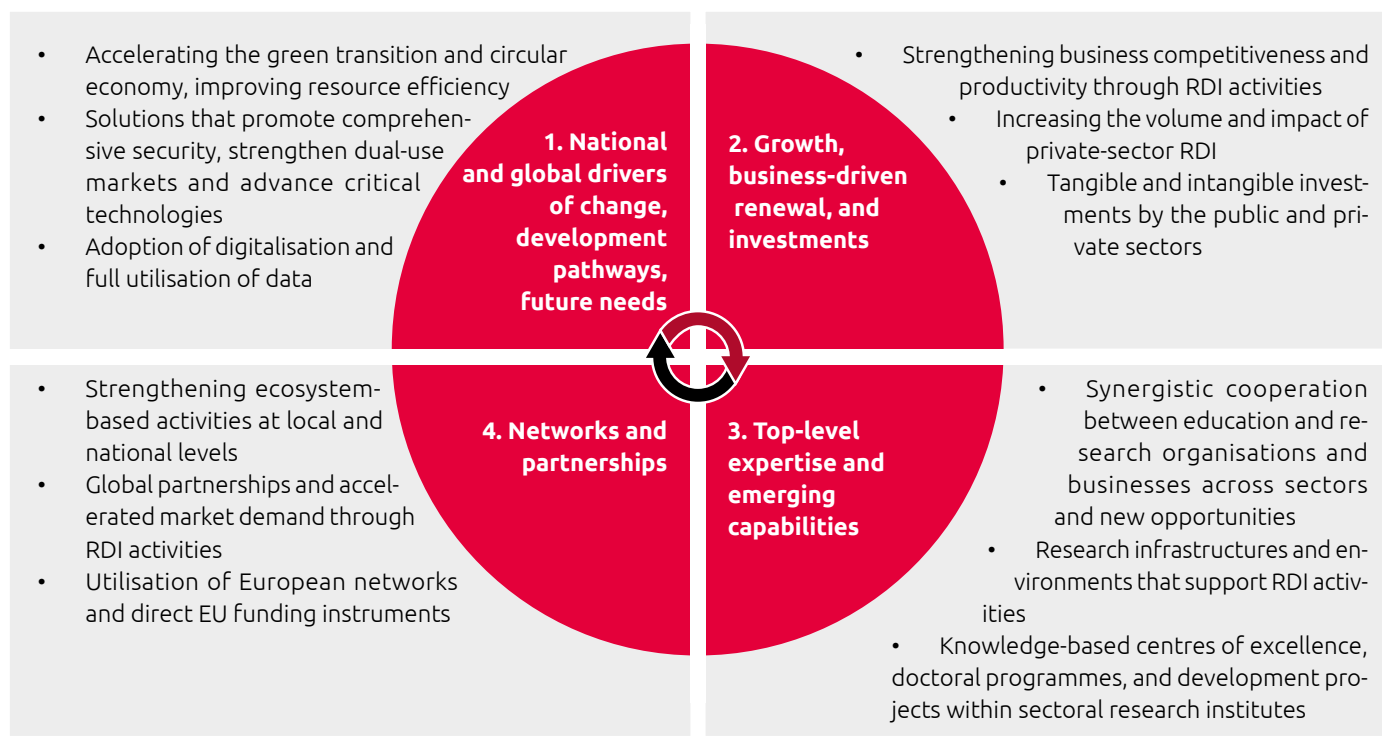
Smart Specialisation in North Karelia

Framework for Smart Specialisation

Smart specialisation is a place-based concept within the EU's innovation policy. Its purpose is to strengthen regional economic growth by focusing on regions' own identified strengths. Through smart specialisation, regions seek to build strategic competitive advantage and improve the impact of research, innovation and development investments.

North Karelia's smart specialisation framework draws on the approach of Finland's national Research and Innovation Council, which has defined the national strategic priorities for RDI and provides direction for regional RDI activities. The framework is structured around four dimensions that have been tailored to the region's specific characteristics. The aim of the strategic choices is to generate value not only for the region, but also at national and global levels, while embedding development work in innovation policy that drives a more sustainable future.

The preparation of the smart specialisation strategy has been shaped by challenging economic cycle, global geopolitical uncertainty, shifts in the operating environment, and their hard-to-predict interdependencies. For this reason, the process has identified impact pathways, systemic processes and the key drivers that shape the enabling environment for RDI. Innovation activity is inherently systemic and can be influenced by a wide range of external factors. RDI creates value through multiple channels, and its impacts are not always easy to identify or quantify. In some cases, outcomes only materialise over a longer time horizon.



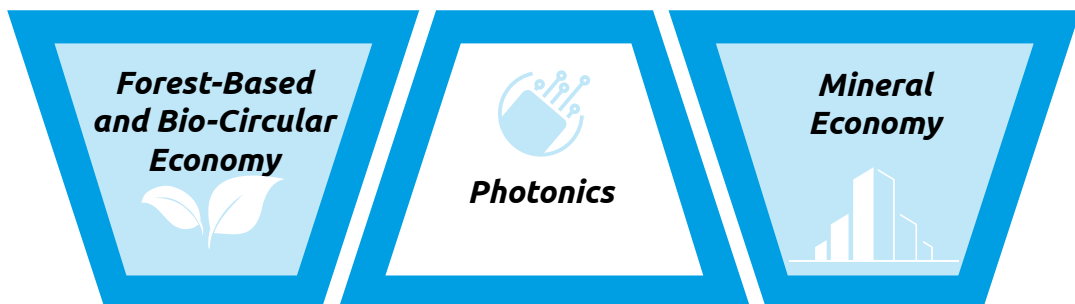


Mission-oriented Approach

Through the lens of mission-oriented innovation policy, the region's leading areas of expertise can be identified as selected global fields of excellence in which North Karelia's capabilities play a disproportionately significant role relative to its size. In these domains, competence is fully or partially at the international cutting edge, and they display clear features of transformative, challenge-driven innovation. These areas of excellence combine high-level expertise, economic competitiveness and the pursuit of solutions to societal challenges.

A second level can be understood as national-level excellence, where capabilities are advanced and the capacity for impactful RDI is significant and increasing. Its relevance becomes particularly evident through linkages to other sectors and via multiplier effects.

Global Excellence



National Excellence

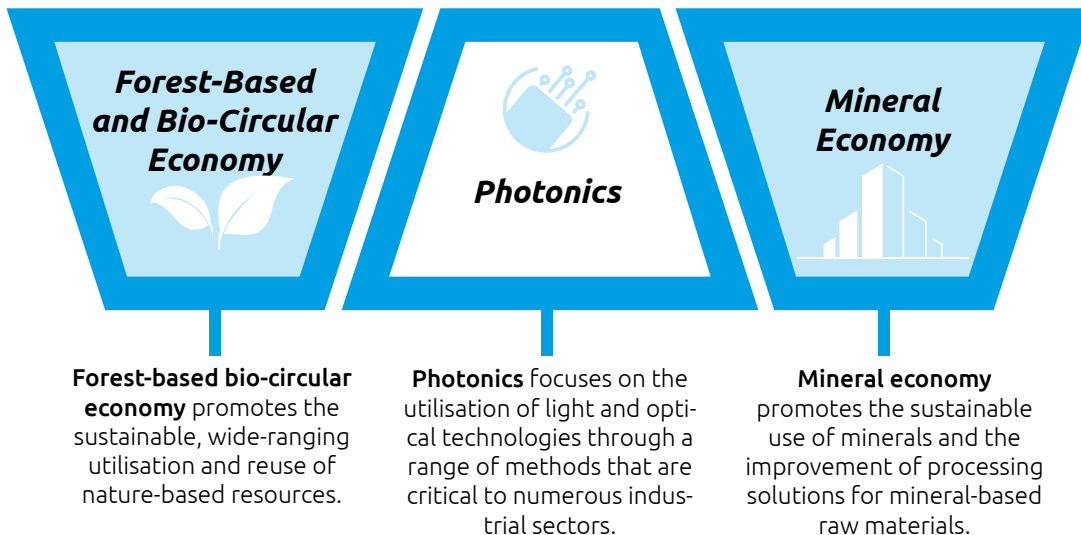


Strategic Fields of Excellence

North Karelia positions itself in the European and international arena particularly through three global fields of excellence: the forest-based bio-circular economy, photonics and the mineral economy. These strategically important domains currently play a substantial role in generating RDI added value and, looking ahead, also hold significant growth potential.

The fields of excellence of the University of Eastern Finland, Karelia University of Applied Sciences, the Geological Sur-

vey of Finland (GTK), the Natural Resources Institute Finland (Luke), the European Forest Institute (EFI) and the Finnish Environment Institute (Syke) are enabling new business ecosystems and value networks not only within their own domains, but also at the interfaces between sectors. In the mineral economy, photonics and the forest-based bio-circular economy, there is strong potential to develop market- and demand-driven innovation with clear societal relevance.



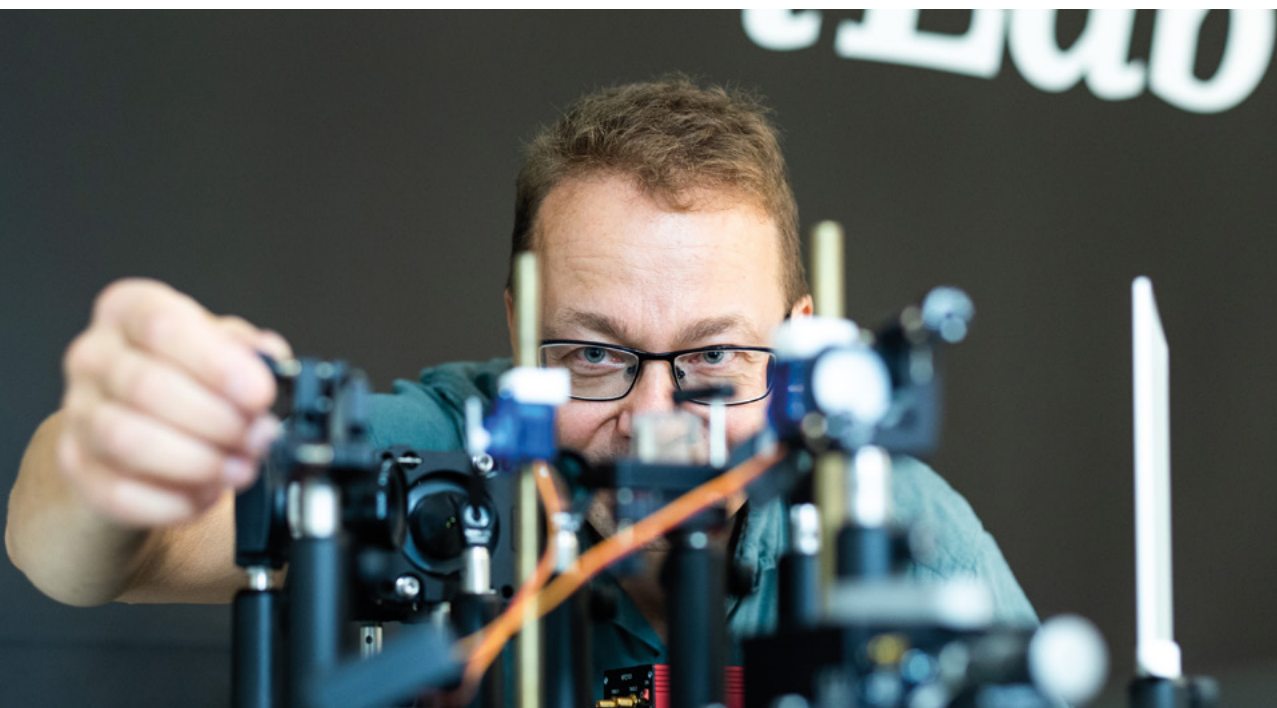
Global excellence provides solutions to mix of challenges:

Raw materials and resource efficiency: Efficient and sustainable use of resources is essential to ensure the sufficiency of natural resources.

Resilience and the security transition: Local resilience is built on international expertise and the added value generated by the region.

Disruptive technologies and their applications: New technologies are transforming society, industry, and services.

The energy transition and low-carbon development: Shifting to renewable energy sources and reducing carbon dioxide emissions are crucial for mitigating climate change.



Mineral Economy

Expertise in the mineral economy refers to the sustainable utilisation of minerals and the development of processing solutions for mineral-based raw materials. GTK Mintec, located in Outokumpu, provides a research and testing platform for processing expertise related to mineral raw materials and circular economy feedstocks. The unit is a strong international forerunner in Europe and a recognised research and development partner in projects worldwide.

Thanks to its unique research infrastructure and competence base, GTK Mintec can address major challenges in the mineral economy, such as the utilisation of secondary raw materials, the development of methods for managing extractive waste and monitoring long-term behaviour. A particularly important theme in the mining sector is water management, which also offers potential for new deployable solutions.

In connection with GTK Mintec's RDI environment, there is an opportunity – through collaboration between different actors – to create value networks and value-added services that increase the degree of processing and improve the utilisation of raw materials in line with circular economy principles. The University of Eastern Finland has recognised expertise in managing environmental conflicts and assessing societal impacts. These will increasingly become fundamental pillars of the mineral economy and sustainable raw materials policy.

The mineral economy is a key factor in geopolitics, as it affects the economic and strategic position of states and regions in global competition. It is also closely linked to security of supply and resilience – areas where the region can influence certain elements. The EU Critical Raw Materials Act (CRMA) creates opportunities for North Karelia to profile itself not only through its mineral potential, but also as a developer of responsible mining methods and circular economy solutions.

Photonics

Photonics is the science of light, leveraging a wide range of optical technologies. The photonics sector is developing rapidly and is widely applied across industries globally. North Karelia has a long history in micro- and nano-optics, academic photonics research as well as applied research serving the needs of industry.

The University of Eastern Finland hosts Finland's largest photonics education and research cluster and coordinates Finland's national photonics flagship programme. Key enabling technologies include 3D printing, hyperspectral imaging and various lithographic methods for manufacturing micro- and nano-photonics applications. Joensuu also coordinates the activities of Photonics Finland, a broad national ecosystem of photonics actors. In addition, the headquarters of the European Optical Society is located in Joensuu.

Photonics is essential for numerous applications in quantum technologies and quantum computing. Furthermore, photonics enables the development of advanced optical components and systems that are critical for many semiconductor technology applications. In semiconductors, Europe is seeking to strengthen strategic autonomy and attract pilot lines and advanced manufacturing capabilities for semiconductor components within the EU. Strengthening Europe's semiconductor industrial capacity is one of the developments accelerated by geopolitical change and shifts in global trade relations. Joensuu's broad photonics competence and excellent networks create an opportunity to play a key role in these initiatives both nationally and at EU level.

Forest-based Bio-circular Economy

The forest-based bio-circular economy promotes the sustainable use and reuse of nature-based resources. The University of Eastern Finland, the Natural Resources Institute Finland (Luke), the European Forest Institute (EFI), Karelia University of Applied Sciences and North Karelia Municipal Education and Training Consortium Riveria together form a world-class competence hub in forestry, agriculture and water economy research and education.

Resource wisdom and the overall sustainability of natural resource use sit at the core of the bio-circular economy. Increasing the value added, efficient utilisation of side streams, and extending product lifecycles – including cascading use – create opportunities for new business and the renewal of existing business. This competence is also an important future export asset. More efficient separation and further processing of different wood components, such as lignin, requires specialised expertise and technological development.

The bio-circular economy is closely connected to the energy system. Forest energy provides an important local energy source from the perspective of security of supply and can be efficiently generated from side streams of wood production and the forest industry. From an EU perspective, forest-based bioeconomy offers solutions for reducing critical dependencies and achieving climate and sustainability objectives. North Karelia can act as a frontrunner in implementing the EU bioeconomy strategy in multiple ways.

Biogas produced through anaerobic digestion of agricultural side streams and municipal waste is an ecological energy source, for example for heavy transport, and holds potential for further scale-up. Charcoal production provides fossil-replacing inputs for industries such as steelmaking. Side streams generated in the carbonisation process also offer potential for new products. Waste heat produced in these processes and its utilisation will require future solutions to improve energy efficiency.

National-level Fields of Excellence

Sustainable Use of Natural Resources and Clean Energy

North Karelia has a strong track record in renewable energy production. In addition, solar energy, green hydrogen and its derivatives have growing potential. The transition towards a low-carbon economy creates demand for CCUS technologies – carbon capture, utilisation and storage – and their applications. A regional strength lies in a broad-based research community and industrial facilities that generate biogenic carbon.

Digital services and modelling related to forests – where forest-related data is collected, processed and applied in new ways – represent an emerging market area. These can be utilised, for example, in tackling forest damage or in forest planning solutions. Laboratory and testing environments for timber construction serve different actors across sustainable wood construction value chains. Clean natural products and their refined derivatives also offer growth opportunities. Further value chain development is needed to ensure that the region captures a greater share of the value created in end products.

Industrial Renewal and Emerging Technologies

The region's manufacturing cluster is built around strong anchor companies that act as key enablers of value networks and develop scalable solutions in machinery and equipment manufacturing as well as component production. Industrial renewal requires investments, RDI inputs and a transition to low-emission, material-efficient and climate-neutral solutions. Digitalisation and the integration of services into production increase industrial efficiency and resilience. Regional piloting and demonstration environments support the development of smart automation and digitalisation. Growth in the security and defence sector creates new application and market opportunities.

Joensuu's strong ICT cluster forms a significant regional concentration of technology expertise. Companies are specialised in, among other areas, international software services, industrial internet solutions and healthcare digitalisation. ICT education at the University of Eastern Finland, Karelia University of Applied Sciences and Riveria provides a strong competence base, further strengthened by the Master of Science (Tech) programme in data engineering. Expertise in processing and analysing large data sets is a key competitive factor in industrial digitalisation and in advancing technological development across the region.

Innovative and Sustainably Produced Services

Tourism in North Karelia is strongly grounded in pristine nature and principles of sustainability. Growth in tourism requires investments, service and product innovations and strong emphasis on digital visibility, communications and sales. The role of creative industries and events as drivers of tourism attractiveness is significant, and through concept development it is possible to build increasingly compelling tourism products – some of which can evolve into nationally or internationally recognised events.

The creative economy and experience design generate added value both for tourism and for other sectors, particularly in the context of the green transition and the digital transformation. North Karelia stands out as a strong region for film production, and leveraging creative competences can accelerate broader business growth and renewal. Experience production combines storytelling, technology and customer-centricity. Moreover, emerging technologies such as VR, AR and AI continuously expand possibilities for creating meaningful experiences.



Strategy Implementation

The smart specialisation strategy provides a comprehensive view of the directions of the region's RDI activities. Implementation emphasises collaboration between actors and the added value created through cooperation. Building thematic, network-based project portfolios through interregional cooperation is one way to increase the impact of RDI activities. It will be increasingly important to develop integrated packages of measures that can simultaneously accelerate private investment and growth ambitions. Piloting is one practical model, with public and private actors sharing the financial risk.

International cooperation networks and structures provide a foundation for implementation. North Karelia participates, among others, in the European Commission's Smart Specialisation Mining Regions thematic partnership, and through Photonics Finland in the EU-level Photonics21 platform. Building value networks is a way to transfer knowledge and create bridges from research to business and back.

Active development is advancing both security-of-supply and resilience solutions and the adoption of new technologies. New ecosystems are being developed in North Karelia as well as more broadly in Eastern Finland. Comprehensive security and security of supply also involve critical capabilities, where regional expertise can bring new perspectives, for example to manufacturing processes in the defence industry.

Education and skills are among the most important components of regional competitiveness. A key smart specialisation perspective is the utilisation of competence as the engine of new innovation-driven growth. Knowledge transfer between research and education organisations and businesses – both directions – should be strengthened. Harnessing data economy and AI technologies in innovation activities can help identify new business opportunities and accelerate innovation processes. AI in particular creates potential for service business innovations.

- Deepening ecosystem-based approaches and leveraging value networks
- Implementing network-based packages of measures and initiatives
- Creating added value from national and international research and innovation networks



- Strengthening expertise in selected areas of excellence
 - Strengthening expertise in selected high-level domains
 - Facilitating the transfer of knowledge between companies and organisations
- Full-scale adoption of digitalisation and artificial intelligence in innovation activities

- Accelerating business investments through RDI activities
- Boosting business investments through RDI activities
- Enhancing pilot and testing activities
- Leveraging public-sector catalytic effects on business RDI activities and investments

Strategy Financing and Monitoring

The synergistic use of different funding instruments is essential for implementation. Resources for direct investments and development measures by SMEs are channelled through Finland's Regional and Structural Policy Programme (AURA), Renewing and Competent Finland 2021–2027. A precondition for AURA funding is that business support contributes to implementing smart specialisation. The competence base of research and development organisations, the renewal of RDI structures and environments are supported with public funding through the same AURA programme as part of EU cohesion policy delivery. Funding for the City of Joensuu's ecosystem agreement is provided via the EU's sustainable urban policy programme.

The role of competitive EU funding and international funding instruments is expected to increase in the near future. Especially in areas of global excellence, RDI organisations and companies have the capabilities to engage in major inter-

national project consortia. The importance of Business Finland's innovation funding in the region should be strengthened further and it should be ensured that the region is able to utilise new funding programmes. Business Finland's ecosystem work and international networks are also highly significant. Funding opportunities in the security and defence sector have expanded and provide potential new pathways for scaling innovation activities.

Monitoring and coordination responsibility for the smart specialisation strategy lies with the Regional Council. Monitoring is carried out both separately and as part of the implementation of the regional strategic programme. The monitoring and impact assessment of business funding and regional development support is carried out, among others, through the Regional Cooperation Group and its secretariat. At national level, monitoring is linked to RDI indicators and measurement frameworks that provide clear key figures.



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