

**North Savo
Regional Plan 2040 and
Regional Programme 2026–2029**

NORTH SAVO
REGIONAL PLAN 2040 AND REGIONAL
PROGRAMME 2026–2029



Photos in this publication: North Savo Image Bank/SavoGrow, Wille Markkanen, and Jarmo Kuittinen

The Regional Plan defines North Savo's long-term development objectives, the strategy for achieving them, and its population targets.

The Regional Programme identifies the concrete measures that will guide regional development work and the allocation of regional development funding over the next four years. It is based on the Act on Regional Development and the Implementation of the European Union's Regional and Structural Policy (47/2021) and the supplementary Government Decree (756/2021). The Regional Plan and Regional Programme are prepared for the four-year term of the municipal councils and adopted by the Regional Assembly.

The North Savo Regional Plan 2040 and Regional Programme 2026–2029 are combined in a single document. The Regional Programme specifies the policy directions and priorities for the coming years through which the Regional Plan's long-term objectives and strategy will be implemented.

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1

Regional plan

STRATEGIC DEVELOPMENT OF NORTH SAVO TOWARDS 2040

The Regional Plan defines North Savo's long-term development objectives, the strategy for achieving them, and the population targets. The Regional Programme identifies the concrete measures that guide regional development work and the allocation of regional funding over the next four years. The Regional Programme is based on the Act on Regional Development and the Implementation of the European Union's Regional and Structural Policy (47/2021) and its supplementary Decree (756/2021). The Regional Plan and Programme are prepared for the four-year term of the municipal councils and approved by the Regional Council Assembly.

The North Savo Regional Plan 2040 and the Regional Programme 2026–2029 are presented in a single document. The Regional Programme specifies the operational guidelines and priorities for the coming years, implementing the long-term objectives and strategy of the Regional Plan.

The Government's 2024 decision on the national priorities, cross-cutting themes, and conditions for regional development has been taken into account in the preparation of the Regional Programme. The views of stakeholders, as well as other strategic steering documents influencing the region, have also been considered. Based on these, a set of cross-impact themes has been formulated to serve as perspectives on the development needs of North Savo's key sectors. These themes have guided both the data collection process and the presentation of objectives in the final Regional Programme. The cross-impact themes are:

- 1. Sustainable Prosperity:** Renewal of key sectors under the conditions of sustainability and productivity; opportunities for growth and entrepreneurship; utilisation of research data; innovation potential; achieving climate and environmental goals.
- 2. Technological Transformation:** Digitalisation including artificial intelligence, electrification, utilisation of research data, sector-specific technological innovations, investments, competence needs, and cost competitiveness.
- 3. Skilled and Thriving People:** Education needs and supply; research; regional labour markets; international recruitment; demographic attractiveness; health, wellbeing, and work ability; culture and sports.
- 4. Accessibility and Regional Structure:** Maintenance and development of the transport system; service availability; digital infrastructure; service provision and development potential of regional towns and rural areas.
- 5. Comprehensive Security:** Knowledge-based management; development of security-of-supply sectors; regional value chains; internal cohesion; cooperation between enterprises, the public sector, and research and education actors; preparedness and adaptation to climate change.
- 6. Biodiversity and Climate Adaptation:** Development work guided by a problem-solving and holistic approach that supports wise choices ("do no significant harm" principle, DNSH).

The North Savo Regional Plan and Programme identify the UN 2030 Agenda for Sustainable Development as their broader guiding framework. Through the combination of regional strengths and cross-impact themes, North Savo aims to create a practical set of actions that contribute to the achievement of the Agenda 2030 goals at the regional level.

To define North Savo's strategic direction for regional development towards 2040, it is necessary to outline a concise vision of the desired future state – how North Savo is envisioned to look fifteen years from now.

North Savo in 2040

By 2040, North Savo's regional economy has undergone strong renewal and internationalisation by seizing the opportunities offered by the green transition, data economy, and the Fourth Industrial Revolution. Investments planned by regional companies, supported by favourable development dynamics, have been realised on a large scale, and solutions have been found to ensure the availability of business financing. Public infrastructure has been efficiently harnessed to serve research and product development, strengthening productivity and regional vitality. These developments have resulted in a significant increase in regional turnover, with value added growing particularly favourably.

North Savo has found a diverse set of tools to adapt to demographic change. This has been supported by a wide range of educational opportunities, well-functioning regional labour markets, a successful model for immigrant reception, and a comprehensive and technologically renewed public service system.

The energy transition has advanced substantially, and the region has achieved carbon neutrality. The production of renewable energy has enabled industrial development. The structure of the regional economy is diversified, which also supports the needs of comprehensive security. The core of the economy lies in advanced machinery, energy, and forest industries, based on profitable and environmentally sustainable agriculture, forestry, and a specialised mining sector. Expertise in forest, bio- and circular economy, water systems, machinery and energy technology, and health technology and pharmaceuticals enables high RDI activity, high-quality education, and service exports. New growth is generated by a strong data economy and a software expertise cluster in the Kuopio region.

Adaptation to climate change and improvement of biodiversity have been achieved broadly, increasing the attractiveness of North Savo. The region has become an internationally appealing travel destination, whose distinctive culture, high quality of life, and intriguing combination of cultural and natural environments attract moderate but steady visitor flows. The economic diversity of the region has supported a balanced regional structure, where municipalities of different types have found growth paths based on their own strengths. Demonstrating development potential and ensuring participation in national policy-making have enabled the maintenance and development of the transport system, ensuring that North Savo is well accessible by air, rail, and road.

As a guide for the following chapters, the reader is encouraged to reflect on what you can do to help achieve this vision for the year 2040.



1.1

NAVIGATING GLOBAL WINDS REQUIRES STRATEGIC FORESIGHT: FACTORS OF UNCERTAINTY AND SOCIETAL TRANSFORMATION

The current Regional Programme (2022–2025) was prepared in a different political and economic context. However, the previous North Savo Regional Plan already stated that the region would face a profound societal transformation over the next 10–20 years. The changed international operating environment, economic developments, and, among others, reforms in regional administration have confirmed the accuracy of that earlier assessment.

For this reason, it is useful for the Regional Plan to examine the key uncertainty factors currently influencing development in order to correctly identify the ongoing societal transformation.

1.1.1 Factors of uncertainty

Geopolitical Instability

In recent years, the international political situation has become significantly more unstable, making future developments increasingly difficult to anticipate. Russia's aggressive foreign policy, internal divisions in the United States, and the crisis in transatlantic relations have weakened Europe's security environment. At the same time, China is challenging the traditional international order and the structures of economic power, influencing Finland's position both politically and economically.

Any weakening of Europe's stability affects North Savo's development prospects and the operating conditions of its enterprises. This has implications for export opportunities in international markets as well as for the feasibility of investments directed toward North Savo. Therefore, from the perspective of regional development, it is important to monitor global security developments alongside market trends and to prepare for different scenarios, for example through foresight activities. The focus on comprehensive security within North Savo's regional development efforts aims to encourage this kind of proactive thinking, preparedness, and systematic use of knowledge-based management.

The European Union has undertaken a range of initiatives to respond to geopolitical challenges. The EU has strengthened its defence cooperation through, among others, the Permanent Structured Cooperation (PESCO) and the European Peace Facility. It has also sought to reduce its energy dependence on Russia by advancing the green transition and developing renewable energy sources.

Economically, the EU has enhanced its strategic autonomy by supporting key industries and digital infrastructure. These measures have consequences for market operations, opening up new opportunities for companies in North Savo. At the same time, it is increasingly important to actively follow EU initiatives and the opportunities they provide for public actors and enterprises. The significance of utilising international connections has not diminished under the current circumstances — on the contrary, it has become even more critical.

The international situation also affects regional development in another way: a growing share of both European and national development investments is being channelled into strengthening military capabilities. Depending on how effectively national defence and crisis preparedness needs are recognised, this may lead to reduced regional development funding and difficulties in financing both business activities and public RDI projects. For this reason, North Savo has emphasised a comprehensive security approach to regional development, which highlights the importance of well-functioning normal conditions as the foundation for preparedness and resilience in times of crisis. Regional development should therefore be recognised as a core component of comprehensive security and as a prerequisite for national defence capacity.

Global Economic Transition – From Globalisation to Geoeconomics of Major Power Blocs

The traditional model of globalisation is changing as the world economy shifts toward a geoeconomic order driven by competition between major regional blocs. Economic areas such as the EU, the United States, and China are seeking to strengthen their self-sufficiency, protect strategic industries, and, in some cases, implement large-scale state-led investment programmes. This development is leading to increased protectionism, rising costs, and market disruptions — all of which affect Finland's and North Savo's export-oriented economies.

In the prevailing geopolitical situation, globalisation as it was previously understood has effectively been reversed. This means that outsourcing production is no longer as feasible as before and involves considerable risks. The phenomenon is already visible in industry, leading to the reorganisation of supply and value chains. In this regard, actors that have invested in nearby, regional value

chains are now ahead of others.

The rapid pace of digitalisation and technological advancement presents both challenges and opportunities. Automation, artificial intelligence, and technologies related to the green transition are reshaping labour markets and production structures, requiring continuous development of skills and adaptation of the economic base to meet new demands.

The European Union has sought to respond to this economic transformation through several initiatives. The EU Industrial Strategy supports strategically important sectors such as semiconductors and battery production, to ensure Europe's competitiveness and technological sovereignty. In addition, the NextGenerationEU recovery instrument provides funding for digitalisation and the green transition, helping regions adapt to the new economic environment. Through its trade policy, the EU also aims to ensure fair and sustainable international trade relations and strengthen Europe's position in global economic competition.

For North Savo, it is important to monitor the progress of these initiatives and to seek influence in their national implementation so that the region can seize the opportunities they create. At the national level, a key question is whether the Finnish government has the strategic foresight and capacity to undertake ambitious, large-scale investment programmes or targeted regional development measures that can influence the direction of private investment and stimulate economic dynamics.

Climate Change and Biodiversity Loss

The effects of climate change are becoming increasingly evident, both globally and locally. More frequent extreme weather events — such as droughts, heavy rainfall, and heatwaves — are expected to affect food production, water resources, and infrastructure. The loss of biodiversity threatens ecosystem functions and the ecosystem services that nature provides, which may reduce both the quality of life and the attractiveness of the region, as well as undermine the resilience and sustainability of its economy.

In North Savo, the impacts of climate change may be seen in challenges for forestry, changes in the condition of water bodies, and the need for agricultural adaptation. Regional development planning must therefore take into account

both climate change mitigation and adaptation, as well as the safeguarding of biodiversity as integral parts of sustainable regional development.

In line with the goals of North Savo's Climate Roadmap and the Carbon Neutral North Savo project, the region aims to achieve carbon neutrality by 2035. This requires emission reductions particularly in energy production, transport, and agriculture. Key measures include increasing the use of renewable energy, improving energy efficiency, developing low-emission transport modes, and strengthening forest and soil carbon sinks.

Protecting biodiversity is a central goal, pursued through water protection, ecosystem restoration measures, and sustainable agriculture and forestry. An important guiding principle is to weigh the costs and benefits of development measures in relation to their environmental impact, and to choose implementation methods that avoid unnecessary harm and, where possible, create a positive "biodiversity handprint."

The region is also promoting circular economy practices and resource efficiency to ensure that natural resource use is as sustainable and low-emission as possible. The Carbon Neutral North Savo project supports businesses and municipalities in their climate work by providing expert advice, data, and identification of funding opportunities for emission reduction measures. Regional actions must be aligned with national and EU climate policies and the instruments they provide, to ensure that activities are adequately resourced and have scalable impact.

1.1.2 Societal Transformation in Finland

Diverging Regional Development

Regional development in Finland has become increasingly polarised in recent years. The largest urban areas continue to grow, attracting investment, skilled labour, and new businesses, while many rural regions and smaller towns struggle with population decline, weakened public services, and economic challenges. This trend creates growing disparities between regions and increases the need for balancing policy measures.

In North Savo, it is important to recognise the role of Kuopio as the

regional driver — the main engine of population growth, RDI activity, and service structures. However, North Savo must function as an effective network to ensure that the benefits of growth are genuinely channelled to all sub-regions. For the region's vitality, it is essential that Kuopio, as the central city, continues to be included in national urban policy agreements. Current urban policy instruments include the Land Use, Housing and Transport Agreement (MAL), the Innovation Ecosystem Agreement, and the Partnership for Regional Vitality, as well as active participation in national urban networks. Future urban policy directions will be defined in the next government programme, and Kuopio's objective is to remain among Finland's major cities in this policy framework.

Challenges in public finances are also reflected in regional development. Population ageing and declining tax revenues limit the capacity of the state and municipalities to invest in services and infrastructure. This may deepen regional disparities as growth centres are better positioned to influence national resource allocation, maintain their services, and attract further investment. Without balancing regional policy, this leads to the depletion of resources and decline in areas outside the main growth centres. In recent years, the focus of state regional policy has shifted increasingly toward the largest urban regions, particularly Helsinki, Tampere, and Turku. This is evident in major transport projects, the concentration of education and research resources, and the allocation of business subsidies and public investment to large cities. Such development widens regional disparities and challenges the vitality of Eastern and Northern Finland.

For North Savo, it is crucial to influence national urban and regional policy to ensure balanced national development and the utilisation of the country's full potential. The region must find a functional model in which the dynamic growth of the Kuopio region generates sustained uplift for other sub-regions — ideally in a way that can serve as a national example for addressing regional development challenges more broadly.

The Question of Eastern Finland

The development prospects of Finland's inland regions have long been linked to cross-border economic relations and cooperation with Russia. Russia's changed policies and the collapse of trade have had a negative impact on Finland's overall

economy, particularly weakening the operating conditions of the forestry, bioeconomy, and tourism sectors.

In Eastern Finland, these effects have been especially pronounced, compounding a long-term relative decline compared to Southern and Western Finland. Although EU regional and structural policy funds have been allocated at higher levels to Eastern and Northern Finland, this alone has not reversed the pattern of diverging development — a pattern that is closely tied to national policy choices and the allocation of public investment.

Safeguarding the vitality of Eastern Finland requires new strategic initiatives and investments to compensate for lost markets and to develop new business activity. The Eastern Finland Programme, prepared through broad cooperation, may offer tools to achieve this — but only if the measures identified as necessary are adequately resourced.

The Eastern Finland Programme tests Finland's willingness to address regional development challenges through targeted, problem-solving-oriented programmes requiring long-term public investment and specific regulatory flexibility (for example, in taxation, business subsidies, or student loan repayment conditions). This is not about granting special treatment to Eastern Finland, but about developing national policy tools and models for regional problem-solving. If the challenges of Eastern Finland were addressed consistently and over a long horizon — say, a fifteen-year perspective — this model for reversing negative development could become a nationally applicable approach for tackling the structural challenges of any major region.

Sub-regional Towns and Rural Development Prospects

Sub-regional towns and rural areas face significant challenges due to population decline, service centralisation, and the disappearance of jobs. However, they also have important opportunities, for instance in the bioeconomy, tourism, and the growing trend of multi-locality and remote work. Development measures should capitalise on local strengths such as natural resources, living environments, and the availability and affordability of properties.

Investments in local prosperity may focus on business activities based on renewable natural resources and on improving digital connectivity. The realisation

of development opportunities and investments depends crucially on the evolution of the transport system, services and infrastructure.

Changes in energy policy also affect the development of sub-regional towns and rural areas. The growth of renewable energy production — such as wind power and biogas — can generate new business opportunities and jobs in local economies. The development of energy infrastructure is essential for the renewal of energy production and distribution and therefore requires continuous attention in policy influence. The successful construction of decentralised energy systems also creates conditions for industrial development, especially in sub-regional towns.

Political Polarisation

Finnish society has become increasingly polarised politically and ideologically. A key driver behind this trend is the diverging regional development itself, together with public discourse that questions the vitality and future of certain areas and communities. This is particularly evident in the unnecessary opposition between urban and rural areas, the sharpening of differences between population groups, and the erosion of trust in political institutions. Political polarisation can hinder long-term policymaking and increase social tensions, which in turn feed back into regional development and economic dynamics.

This process can be seen, for example, in the way state administration and education resources are increasingly concentrated in large cities, reducing smaller regions' ability to maintain competitiveness and develop their own solutions. Such developments can further intensify competition between regions and affect how residents of different areas engage in political debate and decision-making.

The clear conclusion is that balanced regional development must remain a core element of policy influence. In North Savo, it is essential to build a credible and unifying vision of regional development potential, enabling cooperation across the region and the creation of solutions that benefit the entire province.

Demographic Change – Shrinking Age Cohorts, Skills Challenges, Migration, and Labour Market Transformation

All of Europe faces a major demographic challenge in the coming decades. In Finland, thinking about demographic change has often been reduced to dividing regions into “winners” and “losers” based on population forecasts. Without a better approach, there will only be losers – since demographically declining regions cannot sustain the growth of urban areas either. Falling birth rates and a shrinking working-age population put pressure on the welfare state’s finances and labour markets. At the same time, declining education levels and skills may erode Finland’s competitiveness and innovation capacity, further aggravating the problem of weak productivity growth.

Immigration is increasingly seen as part of the solution to labour shortages, but its success depends on effective integration measures and the strengthening of public acceptance.

Digitalisation, artificial intelligence, and the transformation of work are rapidly reshaping labour markets. Finland also faces a significant skills mismatch: there are open jobs, but jobseekers often cannot find their way to them. This is particularly visible outside major cities, where attracting skilled labour can be difficult, impacting regional prosperity. As actual development is the outcome of many interacting factors, structural patterns may also be influenced by the rise of multi-local living and remote work, which create new opportunities for rural regions.

Demographic change affects all of Europe and should be seen not only as a challenge but as a strategic development context in itself. From a regional development perspective, this calls for a different conclusion than has often been drawn in Finland: whether a region loses or gains population does not alone determine its future potential. Rather, the key issue is the ability of societies to adapt to a fundamentally new demographic structure.

For regions, cities, and municipalities, this means recognising and planning their own development paths under the conditions of demographic change. Public policy – including service provision – can no longer be modelled on the demographic structures of the 1950s.

Demographic change poses challenges for labour supply, labour renewal,

and the balance of service demand and provision. This requires regions to apply diverse and flexible adaptation measures suited to their circumstances. As a rule, as the working-age population declines, labour mobility and adaptability to changing skills requirements must increase. This underscores the importance of well-functioning labour markets, flexible work arrangements, continuous learning, multi-locality, and the internationalisation of work and workforce – including the readiness to receive immigrants and adapt workplace practices to a diverse, multilingual labour force.

The views and experiences of young people in North Savo are crucial for demographic development: their needs and expectations must be heard. Equally important is to communicate early on the opportunities that the region offers in education, employment, and quality of life. This requires continuous cooperation between education providers and businesses. Young people are the future entrepreneurs, employees, and decision-makers. For North Savo, it is therefore vital to improve young people’s opportunities for employment, entrepreneurship, and participation in decision-making.

The region’s attractiveness largely depends on whether young people can envision their own future there – through access to high-quality education and internships, opportunities to develop language skills and international experience, and low-threshold pathways to entrepreneurship.

Demographic change must be examined not only through statistical indicators but also through perceived wellbeing. The wellbeing of North Savo’s residents is described in greater detail in the region’s Wellbeing Report and Plan. In the Regional Programme, this perspective is integrated across the cross-impact theme Skilled and Thriving People. It is clear, however, that challenges related to wellbeing and inclusion require continuous attention in North Savo.

Going forward, greater emphasis must be placed on subjective wellbeing, which is a clear strength of rural areas and should be better utilised in regional development efforts. Further qualitative research is needed to identify practical opportunities for doing so.



1.2.

THE DIRECTION OF ECONOMIC DEVELOPMENT POLICY

In economic development policy, problem-solving must be combined with purposefully targeted development investments. When defining the desired direction of regional development towards 2040, the following factors influencing economic development policy must be considered in the current context.

The core challenge of Finland's economy remains the long-standing stagnation of productivity growth. This fact, along with the ongoing structural transformation of the economy, must be reflected in the strategic choices guiding North Savo's economic development policy in the coming years. Based on recent developments, the main drivers of North Savo's economy have been machinery and energy technology, the forest industry, and, increasingly, professional services across various sectors. The decoupling of employment growth and GDP growth indicates a structural shift, which calls for a focus on qualitative development of jobs rather than mere quantitative expansion — particularly in light of demographic change, labour market performance, and productivity.

The prevailing economic climate is characterised by uncertainty and caution. In practice, many sectors face obstacles to growth due to a lack of capital in the region and tightening solvency requirements in banking. Without sufficient own capital, investments in real estate, machinery, and equipment are difficult, as collateral values are typically assessed at a low level. Nevertheless, investment needs and potential among North Savo's enterprises are significant. Large-scale investments in the data economy, energy production, and related industries require broad regional-level coordination and foresight.

Realising these investments calls for active engagement and a strengthened outlook for Eastern Finland's regional development. In this regard, the development of regional and eastern Finnish Invest in activities through cooperation between municipalities and the state is of great importance. At the same time, the ageing of entrepreneurs weakens growth prospects, creating a need for a proactive ownership transfer policy.

North Savo possesses a strong research and innovation ecosystem — a close network of research organisations and companies forming the foundation for the region's smart specialisation model. This ecosystem should be seen as a cross-cutting resource within economic development policy, enabling innovation-driven growth. It is also essential to recognise that innovations are not confined to technology: social and service innovations can generate new growth, reduce

labour market and entrepreneurial segregation, and help address health and wellbeing challenges in pioneering ways.

In the long term, export growth and a positive trade balance have been key strengths for North Savo. This must remain an objective, despite the current economic downturn. Efforts should focus on diversifying export markets — for example, through measures that strengthen market insight and internationalisation skills in the SME sector. The importance of this goal is underlined, particularly in the context of the regional food system, by Finland’s national ambition to expand food exports.

Tourism is one of North Savo’s key sectors, with substantial untapped potential according to both national (the Eastern Finland Programme) and international (OECD) assessments. Realising this potential depends on addressing challenges related to international attractiveness, price levels, accessibility, and labour shortages. Tourism development therefore requires differentiation from other nature-based destinations. Strategic niche areas where North Savo could stand out might include company-based experience packages, fishing tourism, wellness and health tourism, cultural heritage tourism, and industrial tourism. Such approaches also highlight the need to strengthen skills and entrepreneurship in the sector.

Educational attainment in North Savo varies considerably between municipalities, which affects local development prospects. The continuity of education provision in sub-regional towns must be ensured. Consideration should be given to increasing locally targeted competence investments in municipalities with lower education levels, especially in digitalisation, health and social services, and the circular economy.

For future labour availability, special emphasis must be placed on language training and career pathways for immigrants. These services must be developed proactively and functionally — for both strategic and demographic reasons — by means of social and service innovation.

1.2.1. North Savo’s key development sectors and smart specialisation strategy

The previous North Savo Regional Programme 2022–2025 and its Smart Specialisation Strategy identified seven key sectors:

1. Machinery and energy technology
2. Forest industry
3. Food industry
4. Health technology
5. Tourism
6. Smart water systems
7. Biorefining

Machinery and energy technology, the forest industry, and the food sector form the foundation of North Savo’s regional economy, while health technology, tourism, smart water systems, and biorefining are seen as enablers of future growth. From the perspective of smart specialisation, this combination reflects a strategic diversification approach grounded in the region’s actual strengths.

The new Regional Programme builds on feedback and experience from the previous programme. The external evaluation of the North Savo Regional Programme 2022–2025 was carried out in 2024 in cooperation with the Regional Councils of South Savo and North Karelia, conducted by Owl Group. The evaluation found that the selected key sectors were well chosen, accurately reflecting both the realities and growth potential of the regional economy.

According to the evaluation, the programme’s key development sectors are aligned with North Savo’s strengths and future outlook. They take into account the specific characteristics of the region’s industries and their growth visions. The programme is perceived as providing appropriate strategic guidance, and its objectives remain relevant. Cooperation among regional stakeholders has been smooth, and further strengthening of cross-sectoral interaction is recommended.

Based on the evaluation findings, the Regional Programme provides direction for regional development and enables growth. The existing key sectors require continuous strengthening — they will not develop without systematic investment.

It is recommended to integrate the perspective of comprehensive security across all key sectors. Looking ahead, it is important to further advance the use of digital solutions, data, and artificial intelligence to enhance competitiveness and production efficiency.

The key sectors may also be renewed by connecting them more strongly to national and international networks and by refining priorities through the lenses of industrial renewal and accessibility.

Based on evaluation feedback, the North Savo Regional Programme 2026–2029 includes moderate adjustments. The number of key sectors has been streamlined from seven to six: the forest industry and biorefining are merged into a new combined sector of forest, bio- and circular economy. The food industry has been renamed the food system based on stakeholder feedback. Likewise, health technology has been more precisely defined as health technology and pharmaceutical development. The tourism sector has been expanded to include the creative economy, recognising its potential to strengthen the region's service offering and attractiveness. Machinery and energy technology, as well as smart water systems, remain unchanged.

These modifications also entail an update of North Savo's Smart Specialisation Strategy. The adjustments described above are sufficient, as North Savo's practical and clear approach to applying smart specialisation has already been praised as exemplary.

North Savo's Smart Specialisation Strategy is linked to interregional cooperation and internationalisation through the Joint Smart Specialisation Strategy for Eastern and Northern Finland. This joint strategy enables cross-regional cooperation and, when necessary, the preparation and funding of joint projects. Its goal is to strengthen cooperation within and beyond the Eastern and Northern Finland regions.

The joint strategy identifies three overarching priorities:

- Clean solutions
- The utilisation of digitalisation
- Sustainable service production

The development potential of Eastern and Northern Finland is closely tied to addressing global and European challenges — particularly in climate policy, the energy transition, and strategic self-sufficiency. The cross-cutting competences

in clean solutions, digitalisation, and sustainable service provision create opportunities for new multidisciplinary development and strengthen the entire business structure of Eastern and Northern Finland.

Six Key Sectors:

1. Machinery and Energy Technology
2. Forest, Bio and Circular Economy
3. Food System
4. Health Technology and Pharmaceutical Development
5. Tourism and the Creative Economy
6. Smart Water System





1.3.

MAIN PRIORITIES OF THE REGIONAL PROGRAMME

Division of Responsibilities in Economic Development Policy

The implementation of economic development policy begins with a clear division of tasks and responsibilities among regional actors. The prosperity of North Savo is strengthened by building efficient services and networks that support business investment and growth. When a company plans to establish operations or expand, it must be able to access a coherent package of regional support — from permitting and infrastructure to the availability of skilled labour and partnership networks.

Municipalities play a decisive role in creating the conditions for investment. They are responsible for land use, zoning, municipal infrastructure, and business-critical services. Municipalities act as the first partners for companies seeking locations or smooth solutions to start or expand operations.

The state's regional administration ensures a predictable and equitable operating environment. Its role is to guarantee that permitting and administrative processes progress efficiently and that state-managed infrastructure — such as transport networks and safety systems — supports business investments.

Business Finland, Finnvera, and the new Economic Development Centres (Elinvoimakeskus) bring national financing and development instruments into the regional network. These tools can accelerate business growth, internationalisation, and new investments. A particular priority is improving access to private capital to support regional investments. In this context, regional venture funds also play an important role as financing channels and risk-sharing mechanisms for growth-oriented companies.

The role of the **Regional Council** is to bring actors together and ensure that the network operates in a coordinated way. When the Regional Council, municipalities, regional administration, financing and development agencies, and civil society organisations work together, companies find it easier to locate in the region, investments are realised more smoothly, and the long-term prosperity of North Savo is reinforced.

Strategic Framework for Regional Development

National Strategies Supporting North Savo's Prosperity: The North Savo Regional Programme supports the implementation of national development strategies at

the regional level. Finland's national development framework is guided by several strategic documents that define the country's future direction and provide a foundation for regional choices. The goals and priorities of these strategies are reflected in North Savo through the region's strengths, resources, and expertise as integrated elements of the Regional Programme.

Research, Development and Innovation Strategy 2030: This national strategy sets an ambitious goal to increase Finland's RDI expenditure to four percent of GDP by 2030. In North Savo, this is reflected in stronger collaboration among the university, universities of applied sciences, research institutes, and enterprises. It aligns with the region's smart specialisation themes, such as health and wellbeing technology, the bioeconomy, and digitalisation. The key objective is to support projects that promote business growth and innovation capacity.

Finland's Mineral Strategy: The Mineral Strategy highlights the importance of critical raw materials as enablers of the green transition. North Savo's mineral resources and processing expertise support both national security of supply and sustainable growth. A responsibly developed mining industry provides new opportunities, provided that environmental sustainability and value-added creation in Finland remain the guiding principles. Municipalities play an important role as local decision-makers, and the region also has strong competence in research and implementation related to the sustainable use of mineral resources.

Growth Programme for the Creative Economy: The Growth Programme for the Creative Economy strengthens the role of culture and creative industries within Finland's economic structure. In North Savo, creative industries are linked to cultural life, tourism, digital services, and wellbeing. They generate new business activity and attract talent, thereby enhancing the region's attractiveness and diversifying its economic base.

Finland's Bioeconomy Strategy: The Bioeconomy Strategy provides direction for a region where forestry and agriculture form the backbone of the economy. Sustainable use of natural resources, the processing of side streams, and the development of bioproducts support North Savo's position as a pioneer in the bio- and circular economy and create new growth opportunities for local enterprises.

Digital Compass 2030: The Digital Compass 2030 accelerates digitalisation and the growth of the data economy. In North Savo, the progress of digitalisation

strengthens the competitiveness of SMEs, supports the adoption of new solutions in agriculture, tourism, and healthcare, and improves connectivity even in sparsely populated areas. Implementation of the strategy contributes to regional comprehensive security and enhances labour availability.

Energy and Climate Strategy: The Energy and Climate Strategy leads Finland toward carbon neutrality by 2035 and emphasises the importance of energy self-sufficiency. In North Savo, renewable energy production — including biogas, forest biomass, solar, and wind power — offers significant opportunities to transition away from fossil fuels. The region's strong primary production and renewable energy development provide a foundation for industrial renewal. Simultaneously, improving energy efficiency and implementing climate-resilient land use solutions reinforce the region's sustainable development.

Together, these national strategies form an integrated framework that, when implemented regionally, enables North Savo to strengthen its prosperity and competitiveness. They support knowledge and innovation capacity, sustainable use of natural resources, growth of the creative economy, and the development of energy and climate solutions. In doing so, North Savo becomes an active contributor to national objectives through its own regional strengths.

Strategic Focus Areas and Development Measures

Investments in key sectors must be allocated strategically, particularly in measures that promote RDI activity and investment attraction.

The RDI ecosystems and clusters of the key sectors provide a solid foundation for future development. However, RDI efforts require stronger coordination and more coherent strategic frameworks. A central challenge is to engage SMEs in RDI activities — they need more advanced service models to participate effectively. Considerable potential remains to be harnessed within the **public innovation ecosystem**, particularly in the use of research infrastructures. Therefore, systematic and practical ecosystem development aimed at the **commercialisation of innovations** emerging from research and product development must remain a continuous priority.

In the coming years, it will also be essential to identify consistent models

for utilising EU funding and for coordinating investment promotion activities. This includes multi-actor *Invest in* initiatives, venture capital funds, targeted training solutions for growth sectors, and results-based approaches to strengthening local labour markets.

Strategic Sectors and Thematic Priorities

In light of the EU's Critical Raw Materials Act, **responsible mining** is a strategically significant field. Although mining is not a separate key sector in the North Savo Regional Programme or the Smart Specialisation Strategy, its content contributes to three key areas: machinery and energy technology, the forest–bio–circular economy, and smart water systems. This approach enables the development of mining-related technology and expertise within the framework of existing funding instruments and creates favourable conditions for future investments.

Under the cross-impact theme of **Technological Transformation**, digitalisation is identified as a key development area. Its productivity effects and broad applicability call for an ambitious and comprehensive development agenda focused on the **data economy, artificial intelligence, and software industries**. North Savo's attractiveness and business environment could, for instance, be enhanced through a **business-led development programme** aiming to establish a software and IT expertise cluster around Kuopio. This initiative should also incorporate health technology and automation, thereby creating new high-skill employment opportunities in the region.

Health and wellbeing have been recognised nationally as key sources of societal renewal, productivity, economic growth, and fiscal sustainability. Kuopio and the University of Eastern Finland hold significant potential to create new growth in health and pharmaceutical development both nationally and internationally. The number of clinical drug trials conducted in North Savo ranks among the highest in Finland. Research and testing services are already at a national top level and should be further strengthened for the benefit of the entire region and the country. The University of Eastern Finland and the University Hospital of the North Savo Wellbeing Services County are expanding their role as key developers of medical and wellbeing-related RDI. Recognising the wellbeing services county as a research institution, also in terms of funding, is important.

The National Toxicology Competence Centre planned in Kuopio — a government decision from the mid-term budget session — must be provided with sufficient funding as part of the implementation of the Eastern Finland Programme. The funding needs will be specified during further preparation coordinated by the Finnish Institute for Health and Welfare (THL). The background for this initiative lies in a shortage of toxicologists and the need to direct expertise toward emerging challenges (Master's and doctoral education as well as continuing professional development).

At both national and regional levels, it is essential to strengthen the operational capacity and funding of the **Comprehensive Security Competence Centre** to be established in Kuopio. The centre focuses on enhancing comprehensive security from the perspective of regional and local governance in partnership with the state. It will develop cooperation, management, and communication among comprehensive security actors, as well as the functionality and resilience of critical infrastructure and security of supply. The centre will provide expertise on safeguarding vital societal functions and strengthening citizens' psychological resilience under all circumstances. The initiative forms part of the Eastern Finland Programme and also creates a platform for international cooperation in this field.

The Green Transition and Renewable Energy

The green transition and renewable energy production play a decisive role in North Savo's development objectives. They affect most key sectors and are closely connected to the region's existing strengths. Resource allocation should focus particularly on the renewal of energy production and its role as an **enabler of industrial investment**. This highlights the importance of energy storage, hydrogen technologies, and the promotion of energy self-sufficiency. The main goal of development work is to build a **resilient energy system**.

To accelerate the green transition, SMEs must be supported in adopting digitalisation solutions and in the widespread use of artificial intelligence to improve profitability and competitiveness. Given the regional economic impacts of the green transition, it is crucial to allocate development resources to enhance SMEs' ability to capitalise on all opportunities arising from it in both business and

RDI activities.

Investments in renewable energy — including solar, wind, biogas, and hydrogen — generate employment in construction and maintenance. Growing labour demand means that North Savo will require both basic and requalification training for the energy and circular economy sectors.

Developing the Food System

In developing the regional food system, food security and security of supply are as critical as export and processing considerations. The core challenge lies in ensuring access to finance and profitability for agriculture, which forms the foundation of the entire value chain. Addressing this issue is essential for both food security and supply resilience. Solutions depend partly on national policy decisions — for example, guarantees for agricultural loans — and partly on regional and national efforts to expand food exports.

As bank financing conditions have tightened, Finnvera's role and new financial instruments have become increasingly central. To strengthen private financing, new funding solutions beyond public instruments must be sought. Moreover, ensuring the vitality of Eastern Finland as a whole requires legislative reforms to address already recognised challenges in access to finance — challenges that affect not only businesses but also private households, particularly in rural areas.

Ownership Transfers and Entrepreneurship Renewal

Successful ownership transfers will determine the future of many of the region's businesses. It is essential to allocate resources for accelerating ownership succession. The region still lacks a comprehensive ownership transfer programme covering all municipalities. There is also a need for a single coordinating entity responsible for ownership advisory services, valuation processes, financing options, tax guidance, and matching sellers with potential buyers.

Exports and Internationalisation

Enterprises in North Savo already possess strong expertise and competitiveness in export markets. The region has successfully increased the number of exporting companies, yet significant potential remains for expanding export revenues. Advancing internationalisation requires improving SME capabilities across all key sectors — for example, by strengthening export readiness and skills through collaborative export networks. Particular attention must be given to growth-oriented SMEs, where a clear market gap has been identified.

Development Companies and Coordination

Development companies play a central role in implementing economic development policy objectives. They have the capacity to design ambitious and large-scale development initiatives. This work is coordinated through the Savonet working group and other expert forums, ensuring coherence and synergy across the region's development system.

1.4.

POPULATION TARGET

STATISTICS FINLAND PROJECTS CAUTIOUSLY POSITIVE POPULATION DEVELOPMENT FOR NORTH SAVO

According to Statistics Finland's 2024 population projection, North Savo's population is estimated to be 248,896 in 2045. This modest increase (0.3%) can, as such, serve as the population target of the North Savo Regional Plan towards 2040. More important than setting the target itself is to examine the means and causal links through which the target can be achieved.

Statistics Finland's projections indicate that overall population development in North Savo is cautiously positive, but the trend is not evenly distributed across the region. Kuopio clearly functions as the growth centre, and its population increase offsets population losses elsewhere in the region.

Kuopio's ability to attract and retain residents is based on the combined effect of several factors, including a diversified economic base, strong education provision, and comprehensive services. In particular, the University of Eastern Finland, Savonia University of Applied Sciences, and Kuopio University Hospital enhance the city's attractiveness among students, researchers, and healthcare professionals. The quality of the living environment, good transport connections, and diverse housing options further strengthen Kuopio's appeal.

By contrast, many other municipalities in North Savo face net outmigration, as young people and working-age adults in particular move to larger centres to study and work. This creates challenges for regional balance and for maintaining the service network. Looking ahead, it is therefore important to develop strategies that also support the prosperity and population levels of smaller municipalities—by investing in remote-work opportunities, local business activity, attractive housing solutions, and new ways of organising public services. In these objectives, local heritage work and the role of cultural environments in strengthening social sustainability are significant. The role of sports and cultural organisations in strengthening inclusion and community cohesion is likewise important in building municipal vitality.

Special attention must be paid to young people's entry into working life and to preventing social exclusion. This is linked to substance-abuse prevention and the promotion of healthy lifestyles, where, for example, sports clubs and similar actors can make a substantial contribution. Young people's first contacts with working life require active measures; useful tools may include developing schools' work-experience periods (TET), using employment vouchers, and strengthening entrepreneurship education. The differing needs and expectations of girls

and boys in relation to the region and regional identity must also be taken into account. Reducing segregation in education and working life creates new career opportunities.

The region's objective is balanced population development, where Kuopio's growth also supports other sub-regions more broadly. Achieving the population target requires active cooperation between municipalities, businesses, and educational institutions, and support for demographic vitality across the entire region. North Savo must strengthen attraction and retention work as a systematic whole, including a regional brand, employers' recruitment readiness, and increased international visibility. Alongside educational institutions, companies, municipalities, and development agencies, the role of the forthcoming Centre for Regional Prosperity (Elinvoimakeskus) is particularly significant in foresight, skills development, and ensuring well-functioning labour markets.

Measures to achieve the population target by 2040

To achieve the population target, it is essential to invest in three key areas: **education provision, promoting immigration, and the functioning of regional labour markets.**

→ Education provision and skills development

North Savo's volume of education provision should be maintained at its current level. The content of education must continue to be aligned with the needs of the regional economy. This requires, among other things, stronger cooperation between educational institutions and companies to improve labour-market relevance. Measures may include developing workplace mentoring in higher education in connection with work placements, expanding apprenticeship-type training, and staff exchanges between companies and educational institutions. This increases mutual understanding, improves students' awareness of local work and career opportunities, and supports recruitment by employers.

Foresight and knowledge-based management can support these efforts. With new technologies and the green transition, for example the energy and circular economy sectors offer growing employment potential that education

providers must respond to. In addition, remote-study opportunities should be developed to ensure that residents of smaller localities can access education without the need to relocate to major centres.

Schools should pay greater attention to entrepreneurship education, where municipalities and education providers play an important enabling role. Methods should also be identified to offer every young person a summer job or traineeship (a "working life guarantee") and to create incentives for return migration to North Savo.

→ Promoting immigration at regional and local level

To support population growth, immigration must be promoted through both international recruitment and integration measures. This requires, among other things, attractive job opportunities, smooth permit practices, and strong support services such as language training and family settlement services.

In this context, the role of education providers' education export—i.e., fee-paying international students who move to the region—is highly important. Education export should be seen as a key pathway for attracting skilled people who may remain in the region, and it is also closely linked to the long-term success and attractiveness of educational institutions.

Municipalities in North Savo can develop local programmes that support the integration of foreign employees and their families into the community. It is also important to utilise the skills and networks of people with foreign backgrounds already living in the region to support newcomers. Companies should clearly articulate their skills needs and the job opportunities they offer. Cooperation between municipalities, educational institutions, and employers is crucial for creating training pathways for integration as well as for developing skills and language proficiency from the starting level. A strategic approach to immigration requires broad regional cooperation to build a smooth and effective operating model.

→ Functioning regional labour markets

Improving the functioning of labour markets is a key factor in achieving the

population target. The region must ensure that mobility within an increasingly scarce workforce remains smooth and that jobs and skills match efficiently. In this respect, dismantling gender-segregation and providing effective public transport can help create conditions for employment. Cooperation between employers and education providers must be strengthened so that labour demand and education supply remain in balance.

Remote work and multi-local work should also be utilised more effectively so that employees can live in different parts of the region while still being employed within the regional labour market.

Developing the dynamics of regional labour markets is particularly important for preventing “brain drain” among graduates of North Savo’s educational institutions. This can be supported through several measures:

- ✓ **Increasing the diversity of jobs:** Readiness for international recruitment must be improved. Support is needed to help different types of workplaces set practical language-skill requirements. Alongside traditional sectors, new and innovative job opportunities are needed, especially to attract highly educated talent.
- ✓ **Supporting flexible forms of work:** Opportunities for remote work, part-time work, and project-based work should be expanded so that working life adapts to different life situations and appeals to a broader talent pool. Location-independent livelihoods and work should be promoted.
- ✓ **Upskilling and skills development:** As working life continuously changes, it is important to offer locally targeted training programmes that support new skills, reskilling, and career transitions.
- ✓ **Strengthening regional and international networks:** Increased cooperation and international contacts among companies, educational institutions, and other actors can support the creation of new jobs and help North Savo develop into an attractive labour market region.
- ✓ **Dismantling gender-segregated structures:** This means both increasing the attractiveness of traditional sectors to all genders and breaking stereotypical labour market roles, for example through educational guidance. Gender equality in labour markets is not only an issue of fairness; it is directly linked to labour market flexibility, labour availability, and the capacity of the regional economy to renew itself.

→ Housing and living environment development

Housing quality and the living environment strongly influence migration decisions. North Savo should develop high-quality and affordable housing options in both urban and rural areas. Promoting smart infrastructure and sustainable urban planning can increase the region’s attractiveness. Improving green spaces, cultural services, and leisure opportunities further strengthens appeal. Property price levels are a clear strength and should be combined with greater visibility of availability and supply.

→ Improving transport connections and accessibility

Fast and efficient connections, especially between Kuopio and other centres, are vital. Developing public transport to sparsely populated areas also supports commuting and studying without relocation pressure to major centres—this will likely require entirely new types of solutions.

→ Supporting business activity and entrepreneurship

Creating jobs, particularly in growth sectors such as green energy, technology, and health technology, is important. Supporting start-ups and SMEs—for example through attractive location solutions and business services—advances the development of business activity. Support instruments for start-up companies, such as start-up grants and development services, are still needed to encourage entrepreneurship and growth. For micro-entrepreneurs, competence-account type solutions should also be created to support the acquisition of training and skills.

→ Developing services and wellbeing

Improving the quality and accessibility of healthcare and education services is essential for achieving the population target. In addition, family-friendly policies—such as ensuring continuity in childcare and family services—can help attract young families to settle in the region.

1.4.1. Measures to Optimise Labour Markets

In North Savo, several concrete measures can be implemented to improve the functioning of labour markets:

1. Renewal of recruitment culture

- More open and flexible recruitment practices focusing on essential skills. A key factor is recognising applicants' development potential.
- Increased work-based learning and workplace-based training, particularly to meet the needs of SMEs.
- Acceptance and promotion of diversity, including older workers, people with partial work ability, and international labour.

2. Strengthening skills and lifelong learning

- Rapid, modular continuing education and micro-credentials that enable swift responses to changes in labour demand.
- Closer integration of education and working life, with a strong emphasis on direct cooperation between educational institutions and companies.
- Ensuring accessibility of vocational and higher education also in sub-regional towns and rural areas.

3. Supporting labour mobility and attraction

- Regional relocation support, housing solutions, and better alignment of work and housing, for example by utilising remote work.
- International recruitment and integration, especially in sectors where labour availability is critical.
- Service pathways for work-based immigration that are fast, smooth, and regionally coordinated.

4. Coordination and data-driven management

- Regional foresight based on labour market data, compiling information on education needs, vacancies, and skills shortages in cooperation with employment areas.
- Cooperation forums between companies and education providers to design joint solutions for labour availability.
- Sub-regional labour market solutions tailored to local conditions –

for example, addressing seasonal labour needs in primary production and tourism.

5. Specific characteristics and opportunities of North Savo

- Kuopio's attraction and retention capacity can be leveraged for the benefit of the entire region, for example through multi-local living and improved mobility.
- Long-term labour needs in the social and healthcare sector, which will require a significant workforce.
- Remote work and digitalisation offer new opportunities for the decentralisation of work, which can strengthen rural prosperity.
- Labour challenges in agriculture and forestry can be addressed through education policy, immigration, and support measures for family entrepreneurship.

1.4.2. Population Scenarios by Sub-Region

The population target for the region has thus been set at **248,896 residents**, which corresponds to Statistics Finland's population projection for North Savo in 2045. Adopting Statistics Finland's projection as the target is based on the fact that it is more positive than forecasts in previous years.

It should be noted, however, that according to the projection, population growth in the region would be concentrated solely in **Kuopio** unless corrective measures are implemented.

Achieving the population target requires **total net migration of slightly over 1,500 persons per year**. Positive development in total net migration would not be the responsibility of Kuopio alone, as according to the calculations net migration would also turn positive in other sub-regions by the middle of the decade.

There is considerable room for improvement in **inter-municipal net migration** within the region, although the model nevertheless forecasts positive development in the future. It should be noted that during the period **2000–2020**, inter-municipal net migration in the region was negative.

Immigration is a critical factor for both population development and labour availability. In North Savo, immigration has remained moderate. For the period

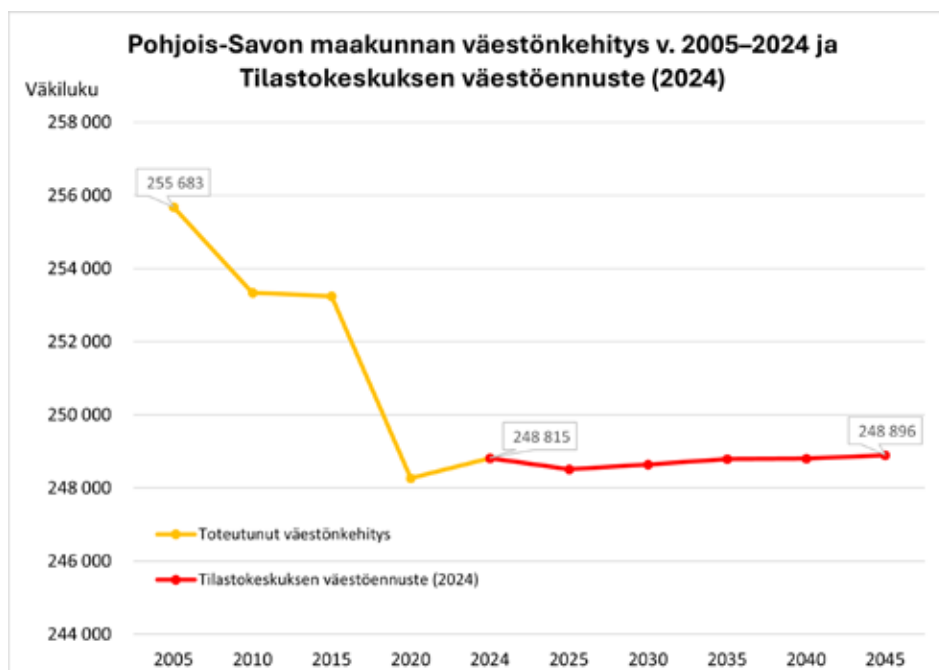


Figure 1 Population development and population development forecast in North Savo

from **2026 to 2045**, the target for total immigration has been set at a modest level of approximately **250 persons per year**. This represents one of the key levers through which population development and labour availability can be influenced by implementing appropriately targeted measures.

No reversal of the declining **birth rate** is expected in the near future. The primary reason is the population's age structure. This phenomenon is global and results from a complex set of factors, including economic uncertainty, prolonged youth, rising costs of parenthood, and diverse social factors that influence people's willingness and ability to start families.

In terms of labour force development, North Savo is expected to see moderate growth from just over **113,000** to slightly more than **118,000** persons. The projected positive development in labour force size would take place in the Kuopio region, reflecting the forecast population trends. In the model, the number of jobs has been set to correspond to the current situation, as this illustrates a significant imbalance between different sub-regions. A total of **98,665 jobs in**

North Savo	2021-2023	2024-2025	2026-2030	2031-2035	2026-2040	2041-2045
Migration difference (people/period)	4 188	3 141	7 354	7 698	7 956	8 434
Internal migration difference (in avg./year/period)	234	409	309	378	429	525
Net immigration (in avg./year/period)	1 162	1 162	1 162	1 162	1 162	1 162
Live births - deaths (in avg./year/period)	-1 421	-1 408	-1 447	-1 509	-1 589	-1 668
Labour force (people)	113 471	113 142	113 198	115 114	117 397	118 319
Employed labour force in area	98 655	98 655	98 655	98 655	98 655	98 655
Net commuting (in avg./year/period)	-1 683	-1 683	-1 683	-1 683	-1 683	-1 683
Unemployment rate (%)	11,6	11,3	11,4	12,8	14,5	15,2
Population 31.12. (people)	248 815	248 516	248 637	248 790	248 802	248 896
0-14-year-olds	33 647	32 806	29 586	28 617	28 705	28 911
15-64-year-olds	146 892	146 544	146 287	146 646	148 549	149 278
Over 65-year-olds	68 276	69 166	72 764	73 527	71 548	70 707

2045 would imply an unemployment rate of approximately 15%. In the Kuopio region, the unemployment rate would also increase, while in other sub-regions unemployment would turn into labour shortages no later than after **2030**.

The current trajectory is not desirable, and greater attention must therefore be paid to the functioning of labour markets.

Kuopion region

Achieving the population target would require total **net migration** of approximately **1,000–1,500 persons per year**. The decline in total net migration toward the end of the review period is explained by the fact that, in the model, **net international migration** has been set to correspond to the current level.

Inter-municipal net migration would remain positive in the future but weaken toward **2045**. This is due to the long-standing trend of residents moving to Kuopio from other parts of the region, a development that is now tapering off. The Kuopio region must therefore focus on strengthening its attractiveness so that it continues to be perceived as an appealing environment for people relocating from elsewhere in Finland.

Up to **2020**, the number of births exceeded the number of deaths. In the projection, the birth rate would decline steadily toward **2045**, which would be reflected in the size of the **0-14 age group**. Compared to other sub-regions, the number of people aged **65 and over** in the Kuopio region would increase by approximately **6,000**, while in the other sub-regions the size of this age group would also turn to growth. This development creates pressure to safeguard the availability and accessibility of services.

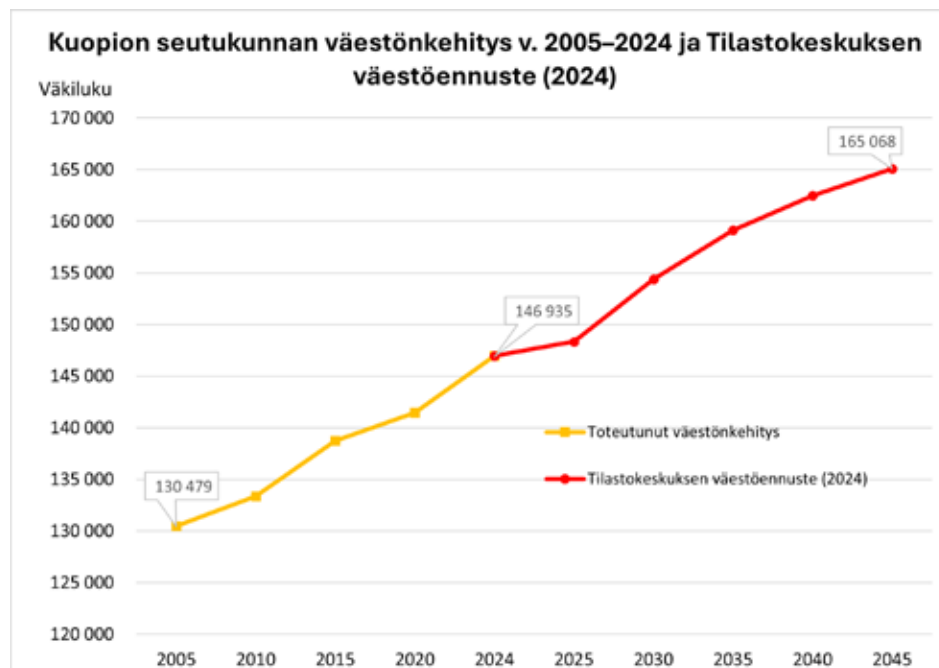


Figure 2 Population development and population development forecast in the Kuopio sub-region

Overall, the Kuopio region would account for the increase in the region's labour force, explained by population growth. However, significant challenges to the functioning of labour markets would arise if the number of jobs cannot be increased. The Kuopio region cannot, however, be solely responsible for future job creation in the region; growth must also take place in other sub-regions.

Kuopio sub-region	2021-2023	2024-2025	2026-2030	2031-2035	2026-2040	2041-2045
Migration difference (people/period)	4 594	3 488	7 834	6 297	5 352	5 005
Internal migration difference (in avg./year/period)	828	1 039	763	555	388	297
Net immigration (in avg./year/period)	704	704	704	704	704	704
Live births - deaths (in avg./year/period)	-248	-232	-257	-313	-395	-486
Labour force (people)	70 577	72 071	75 356	78 861	81 794	83 349
Employed labour force in area	62 536	62 536	62 536	62 536	62 536	62 536
Net commuting (in avg./year/period)	-353	-353	-353	-353	-353	-353
Unemployment rate (%)	10,9	12,7	16,5	20,3	23,1	24,5
Population 31.12. (people)	146 935	146 333	154 382	159 115	162 493	165 068
0-14-year-olds	21 254	20 950	19 748	19 745	20 149	20 450
15-64-year-olds	92 376	93 402	97 462	100 482	103 338	104 905
Over 65-year-olds	33 305	33 981	37 172	38 888	39 006	39 713

Ylä-Savo

In **Ylä-Savo**, the population target has been calculated based on development trends observed since the 2000s. According to this, Ylä-Savo would have approximately **40,000 residents in 2045**. On an annual basis, the population would decline by around **500 persons per year**.

In the projection, however, **total net migration** would turn positive during the **2030s**, and **inter-municipal net migration** somewhat later. As a result, population decline would no longer be as pronounced toward **2045**. **Net international migration** has not been particularly significant in the sub-region, and in the model it is estimated at approximately **40–50 persons per year**.

The birth rate is expected to remain weak in the future as well, which will be reflected in a decline in the number of children aged **0–14**. In Ylä-Savo, the number of people aged **65 and over** is also projected to decrease by approximately **2,000**,

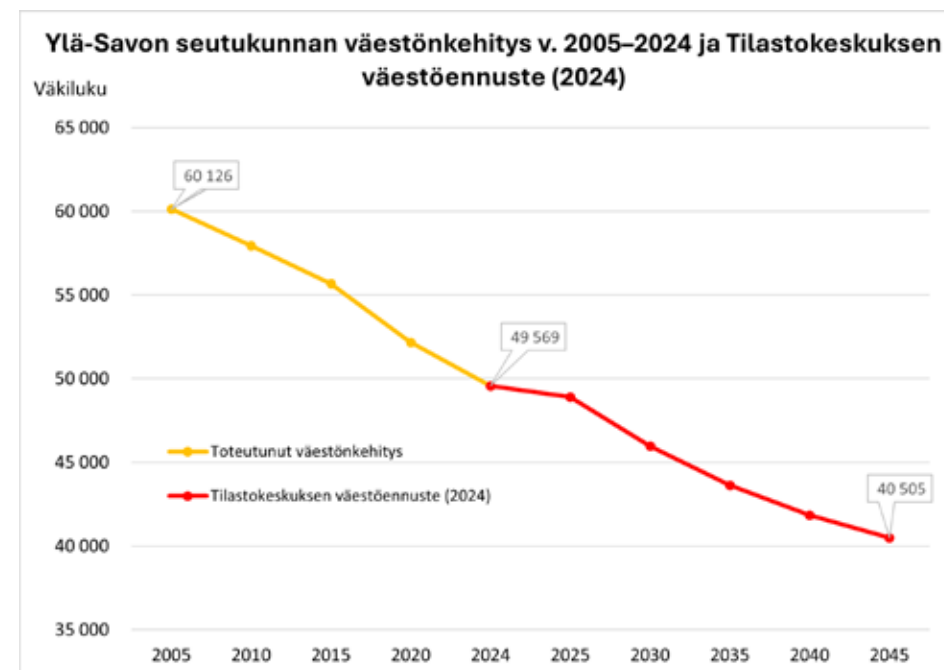


Figure 3 Population development and population development forecast in the Ylä-Savo sub-region

Ylä-Savo sub-region	2021-2023	2024-2025	2026-2030	2031-2035	2026-2040	2041-2045
Migration difference (people/period)	-391	-240	-260	348	909	1 323
Internal migration difference (in avg./year/period)	-331	-321	-253	-131	-19	64
Net immigration (in avg./year/period)	201	201	201	201	201	201
Live births - deaths (in avg./year/period)	-528	-527	-532	-539	-538	-535
Labour force (people)	21 395	20 551	19 067	18 300	17 971	17 602
Employed labour force in area	18 533	18 533	18 533	18 533	18 533	18 533
Net commuting (in avg./year/period)	-199	-199	-199	-199	-199	-199
Unemployment rate (%)	12,4	8,9	1,8	-2,4	-4,2	-6,4
Population 31.12. (people)	49 589	48 906	45 984	43 639	41 856	40 505
0-14-year-olds	6 523	6 264	5 170	4 627	4 457	4 403
15-64-year-olds	26 825	26 310	24 370	23 018	22 491	21 982
Over 65-year-olds	16 221	16 332	16 444	15 994	14 906	14 120

to around **14,000 persons in 2045**. The age structure of sub-regions outside Kuopio has traditionally been older, but this is expected to change in the coming years. This development will create pressure on the organisation of services.

In Ylä-Savo, the labour force is projected to decline to approximately **17,600 persons by 2045**, representing a decrease of about **3,000** from the current situation. Ylä-Savo has been relatively successful in retaining jobs thanks to strong industrial activity, particularly over the past ten years. If the number of jobs remains at the current level and the projected labour force development materialises, **labour shortages** would emerge in Ylä-Savo from **2031 onwards**.

Varkaus sub-region

In the **Varkaus sub-region**, the population would decline to **28,125 residents by 2045**. On an annual basis, this corresponds to a decrease of approximately **200–250 persons per year**.

Population decline is moderated by an increase in **total net migration** from 2030 onwards, reaching approximately **250 persons by 2045**. However, this alone is not sufficient to reverse the overall population trend, as the birth rate continues to decline, falling to around **350–380 births per year** by 2045.

Immigration represents one means of strengthening the population base, but in the model its volume is set at a moderate annual level. In Varkaus, several international large enterprises are in operation, for which **work-based immigration** may be a critical necessity.

As in the sub-regions outside Kuopio, the labour force in the **Varkaus sub-region** would also decline. The decrease would amount to approximately **2,000**



Figure 4 Population development and population development forecast in the Varkaus sub-region

Varkaus sub-region	2021-2023	2024-2025	2026-2030	2031-2035	2026-2040	2041-2045
Migration difference (people/period)	17	-47	150	622	975	1 212
Internal migration difference (in avg./year/period)	-171	-200	-146	-52	19	66
Net immigration (in avg./year/period)	176	176	176	176	176	176
Live births - deaths (in avg./year/period)	-340	-350	-361	-372	-379	-380
Labour force (people)	14 043	13 483	12 440	11 965	11 798	11 631
Employed labour force in area	11 957	11 957	11 957	11 957	11 957	11 957
Net commuting (in avg./year/period)	-228	-228	-228	-228	-228	-228
Unemployment rate (%)	13,2	9,6	2,0	-1,8	-3,3	-4,8
Population 31.12. (people)	33 192	32 620	30 965	29 729	28 811	28 125
0-14-year-olds	3 869	3 698	3 166	2 898	2 789	2 759
15-64-year-olds	17 982	17 487	16 010	15 239	14 979	14 720
Over 65-year-olds	11 341	11 435	11 789	11 592	11 043	10 646

persons by 2045, which is also reflected in the development of the **15–64 age group**.

In recent years, the number of jobs in the Varkaus sub-region has remained relatively stable, and in the projection the target is set at approximately **12,000 jobs per year**. As a result, however, the sub-region would face the risk of a **labour shortage from 2031 onwards**.

Sisä-Savo

In **Sisä-Savo**, the population target for **2045** is set at **10,380 residents**. Population decline is projected to slow slightly from **2030 onwards**. This development is explained, among other factors, by **total net migration** turning positive, reaching approximately **100 persons per year during the period 2036–2045**.

Inter-municipal net migration has long been slightly negative in the sub-region, but the situation is expected to improve moderately towards 2045.

The **net immigration target** has been set at a very modest level, but its role may become more significant in ensuring the availability of labour for **berry production**, which is important for the sub-region.

A slight change is projected in the birth rate, explained by a decrease of approximately **600 persons** in the population aged **65 and over by 2045**. Of concern in Sisä-Savo, as in other sub-regions, is the decline in younger age cohorts. In Sisä-Savo, the number of children aged **0–14** would decrease by slightly more than **30%**.

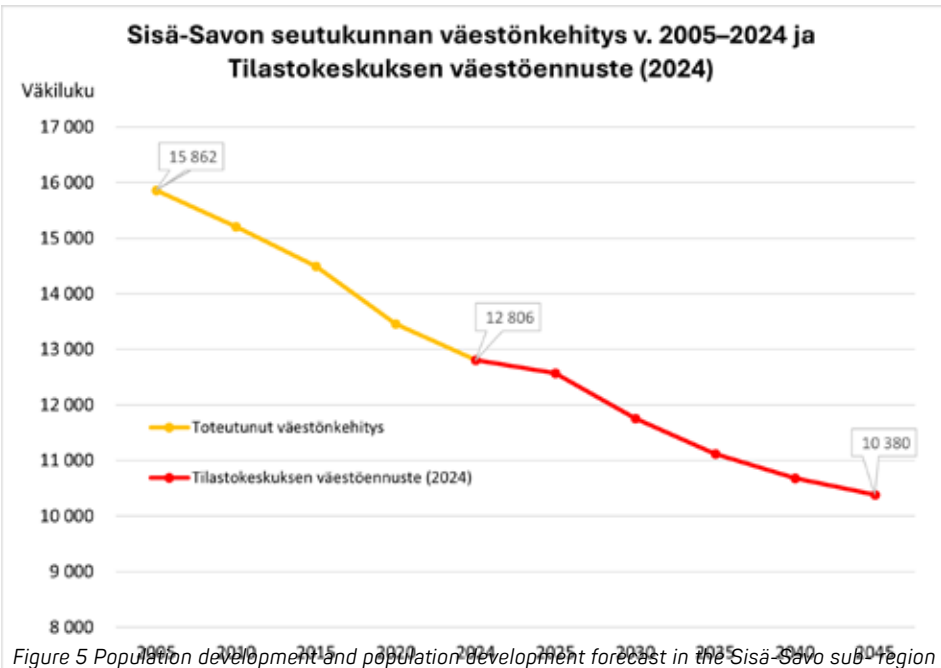


Figure 5 Population development and population development forecast in the Sisä-Savo sub-region

Sisä-Savo sub-region	2021-2023	2024-2025	2026-2030	2031-2035	2026-2040	2041-2045
Migration difference (people/period)	60	-20	94	264	455	569
Internal migration difference (in avg./year/period)	-52	-82	-53	-19	19	42
Net immigration (in avg./year/period)	72	72	72	72	72	72
Live births - deaths (in avg./year/period)	-190	-182	-181	-180	-178	-175
Labour force (people)	5 124	4 864	4 448	4 241	4 147	4 084
Employed labour force in area	3 940	3 940	3 940	3 940	3 940	3 940
Net commuting (in avg./year/period)	-599	-599	-599	-599	-599	-599
Unemployment rate (%)	11,4	6,7	-2,0	-7,0	-9,5	-11,1
Population 31.12. (people)	12 806	12 565	11 752	11 118	10 684	10 380
0-14-year-olds	1 407	1 342	1 067	953	923	913
15-64-year-olds	6 580	6 374	5 822	5 462	5 312	5 230
Over 65-year-olds	4 819	4 849	4 863	4 703	4 449	4 237

The number of people aged **15–64** would also decline in the sub-region, by approximately **600 persons by 2045**, which would be directly reflected in the size of the labour force. In the model, the number of jobs is set to correspond to the current level, at approximately **4,000 jobs**. If the projected labour force development materialises, this would lead to a labour shortage, particularly from **2031 onwards**.

Koillis-Savo

In **Koillis-Savo**, the population target for **2045** is set at **4,818 residents**. As in the other smaller sub-regions of the region, population decline in Koillis-Savo is projected to ease from **2030 onwards**.

This is primarily due to an increase in **total net migration**, particularly from **2031 onwards**. From **2036 onwards**, total net migration would amount to approximately **50 persons per year**. **Inter-municipal net migration** is likewise projected to turn slightly positive from 2031 onwards.

Net international migration has not played a major role in the population base of the sub-region, and this is also expected to be the case in the future. In the projection, the number of jobs is estimated to correspond to the current level, which, due to labour force development, would lead to a **labour shortage**, particularly from **2031 onwards**.

The number of people aged **65 and over** would decline by approximately **20% by 2045**. By contrast, the number of young people in the sub-region would decrease by one third, which is a cause for concern.

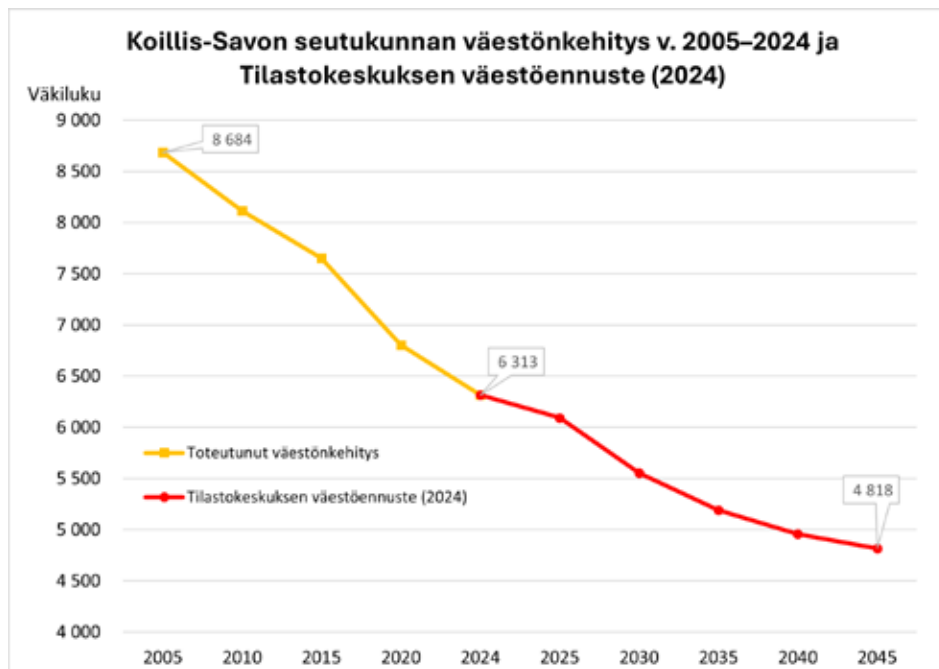


Figure 6 Population development and population development forecast in the Koillis-Savo sub-region

Koillis-Savo sub-region	2021- 2023	2024- 2025	2026- 2030	2031- 2035	2026- 2040	2041- 2045
Migration difference (people/period)	-92	-38	36	167	265	325
Internal migration difference (in avg./year/period)	-40	-29	-3	23	43	55
Net immigration (in avg./year/period)	10	10	10	10	10	10
Live births - deaths (in avg./year/period)	-115	-118	-115	-106	-99	-93
Labour force (people)	2 332	2 196	1 964	1 852	1 838	1 841
Employed labour force in area	1 689	1 689	1 689	1 689	1 689	1 689
Net commuting (in avg./year/period)	-304	-304	-304	-304	-304	-304
Unemployment rate (%)	14,5	9,3	-2,0	-7,6	-8,4	-8,2
Population 31.12. (people)	6 313	6 092	5 554	5 189	4 958	4 818
0-14-year-olds	594	552	435	394	387	386
15-64-year-olds	3 129	2 971	2 623	2 445	2 429	2 441
Over 65-year-olds	2 590	2 569	2 496	2 350	2 142	1 991



2

Regional strategic programme



2.1.

DEVELOPMENT OBJECTIVES IN THE KEY SECTORS

The development needs and objectives of each key sector are examined through the perspectives provided by the cross-impact themes: sustainable prosperity, technological transformation, skilled and thriving people, accessibility and regional structure, comprehensive security, and biodiversity and adaptation to climate change.

2.1.1 Machinery and Energy Technology

In the machinery and energy technology key sector, the objective is to further advance the digitalisation of processes and services (including the increasing use of artificial intelligence), enhance productivity through data and automation, and improve process management. The need for change is closely linked to advanced RDI activities and the energy transition. In particular, the Fourth Industrial Revolution (Industry 4.0) requires targeted development investments and systematic development efforts. Alongside the collection and utilisation of data, it is also necessary to develop data-driven services. A key question is whether companies are able to renew their business models in a way that enables transformation across the entire sector and creates significant growth opportunities. Leading companies, such as Ponsse and Valmet, play a central role in the development of the sector.

This broader development can be supported in North Savo by seeking to establish a significant centre of competence in the data economy and software development, through cooperation between companies and educational and research institutions. This objective can be advanced through large-scale and long-term project portfolios that make effective use of funding sources suitable for different actors. For example, funding linked to artificial intelligence development is available through sectoral networks to cover companies' own financing shares.

New opportunities in machinery and energy technology are also strongly connected to the green transition and the achievement of sustainability objectives. This highlights development goals related to electrification and the energy transition.

The development needs outlined above require strategically targeted RDI activities. One possible way to enhance the effectiveness of RDI is to pay

attention to its regional organisation. In the energy sector, the RDI ecosystem has been organised into the North Savo energy cluster, and further development of its activities remains an important objective in the coming years. In machinery technology, actors in Ylä-Savo have organised themselves into the Kestech competence hub. To strengthen the RDI ecosystem, the objective is to increase RDI cooperation among machinery technology actors. This also raises the question of whether there are conditions or a need to establish a region-wide machinery technology RDI ecosystem or cluster in North Savo.

Sustainable prosperity

Companies in machinery and energy technology in North Savo are strongly engaged in international markets. Realising growth potential requires the expansion of production capacity as well as the streamlining of supply chains and production processes. For example, the reorganisation of production and the development of logistics support companies' competitiveness and strengthen the region's prosperity.

Capturing growth opportunities in the machinery and energy technology sectors requires anticipatory responses to technological transitions. Key drivers include increased automation and robotics, which improve production efficiency and reduce human error. The objective is to develop process optimisation enabled by digitalisation and artificial intelligence, including, for example, predictive maintenance, thereby improving resource efficiency. Product innovations in the technology industries must be promoted, and the value added increased, particularly among subcontracting companies. In addition, the production, processing, distribution, storage, and utilisation of renewable energy must be further developed.

- ✓ **Energy transition and electrification:** Utilisation of low-cost electricity (electric boilers, district heating storage solutions), new solutions for electricity generation and storage (e.g. hydrogen, battery technologies). Solutions are needed that reduce production based on combustion.
- ✓ **Electricity generation and transmission capacity:** North Savo faces challenges in energy infrastructure, and increased distributed

generation is needed. The region must have the necessary conditions in place to enable industrial electrification.

- ✓ **Continuity requirements of process industries:** The utilisation of new technologies (Power-to-X, e-fuels, biogenic carbon dioxide) requires a continuous and stable energy supply.
- ✓ **Shared use and sector integration:** The need to integrate chemical industries, heat, electricity, data, and by-streams from combustion processes – creating opportunities for the emergence of new business activities.
- ✓ **RDI needs:** Research related to integration solutions, electricity storage, and alternative technologies (e.g. electrolyzers, small-scale nuclear power) is essential. RDI needs in machinery and energy technology are also linked to responsible mining, the utilisation of by-streams from the extractive industries, and geothermal energy.

In business development, it is important to encourage the development of regional value chains: skills and manufacturing networks should be kept geographically close, while building reliable networks based on expertise and access to technology at both national and international levels. This enables more flexible responses to market changes and crisis situations. Strengthening security of supply and regional resilience supports comprehensive security.

The utilisation of new technologies and local subcontractors is a key enabler of growth. SMEs' development readiness and customer-oriented operations require support so that they can meet global quality standards and the requirements related to the adoption of innovations. In the software domain, there is potential for a new form of cluster development—for example, a stronger concentration of software expertise could be built around Kuopio. This would have broad relevance for industrial support services, data solutions, and the development of connectivity.

However, a key challenge in cluster cooperation lies in the lack of clarity around collaboration models between actors that are partly in competitive positions. Addressing this challenge is a central development objective, and the added value of cooperation must be clearly demonstrated.

Technological Transformation

In industry, technological transformation manifests more in the development of processes than in the evolution of production machinery. In machinery and energy technology, the transformation is particularly related to increasing automation and the use of robotics, as well as the processing and utilisation of the data generated within these processes. This entails significant development needs, such as data collaboration between companies, the use of artificial intelligence in data processing, and the resulting streamlining of processes. Success in these areas is essential for both cost competitiveness and quality. Automated and AI-enhanced processes require substantial investments in technology and skills.

In the machinery and energy technology sector, a key competitive factor is the efficient utilisation of data. Companies are developing solutions that emphasise safety, user-friendliness, and automation and remote operation. End-to-end supply chain optimisation and value stream modelling are central tools for improving productivity and cost efficiency.

Development needs in energy technology are closely linked to other manufacturing industries, and particularly to the forest industry. Key areas for development include renewable fuels, carbon dioxide capture and storage, and the downstream products enabled by these technologies. A major objective is to identify the conditions for commercially viable production, which highlights the importance of piloting and identifying business opportunities. Hydrogen, small-scale nuclear power, as well as the development of improved battery materials and efficient recycling, are seen as important for the future of energy production. Energy storage solutions play a crucial role in the transformation of the energy system.

- ✓ **Digitalisation and artificial intelligence:** The use of AI in design and production can strengthen regional competitiveness and support the retention of jobs within the region.
- ✓ **Strengthening the regional data economy and software business** serves the needs of North Savo's industry broadly, while also enabling linkages, for example, to the development of space technologies (AI, ICT, multisensor analytics, dual-use products).
- ✓ **New technologies and manufacturing capabilities:** The capacity of

companies to participate in supply chains related to, for example, small modular nuclear reactors and hydrogen production must be strengthened.

- ✓ **Investment conditions:** Agile permitting processes, access to investment financing (including guarantees and public support), and regional capacity to respond to skills needs are required. Joroinen serves as an example of a successful investment environment.
- ✓ **RDI structures in Eastern Finland:** Strengthening regional RDI ecosystems and linking them to broader national and international cooperation is essential.

The utilisation of 3D printing in industrial processes is an important area for development. For example, in the foundry industry, 3D printing enables the rapid and flexible production of sand moulds, improving production efficiency and reducing material waste. In the manufacturing of mobile machinery, the most significant growth areas and development priorities include energy-efficient power sources, operator assistance systems, digitalisation, and service-based business models. These are supported by precision positioning, intelligent control systems, and predictive maintenance. The use of advanced electronics and improved connectivity are also key development areas.

In the uptake of innovations, investment thresholds and scalability challenges have been identified: high capital requirements act as a bottleneck to the adoption of new technologies. Only large companies are able to proceed independently. For SMEs, technology investments are constrained by scalability issues and significant upfront investment needs. This highlights the need to target financing and development measures to support implementation.

Within machinery and energy technology companies, there is a clear need to strengthen competencies particularly in data analytics, software, and electrification. The region's education and research environments support this skills development, which must be continuous in nature over the coming four-year period. It is also important to recognise the links between technological development, human well-being, and environmental impacts: for example, in the foundry industry, efforts to develop inorganic binders and smokeless moulds highlight research needs related both to occupational well-being and emissions.

Skilled and Thriving People

The changes brought about by the technological transformation have a significant impact on all educational institutions; however, shifts in skills needs and the ability to respond to them are particularly pronounced in vocational education and training. Changes in business models highlight the growing importance of entrepreneurial skills. Cooperation between companies and educational institutions is essential from both skills development and labour market perspectives. Attention must be paid to improving awareness of career opportunities and, for example, to facilitating staff exchanges between companies and educational institutions. Technological development also has the potential to promote small-scale entrepreneurship, and when combined, for instance, with craftsmanship, it can support service provision and access to broader customer bases. Attention must be given to the effective shared use of regional RDI infrastructures and to the commercialisation of RDI outputs into business activities.

The availability of a skilled and thriving workforce is a prerequisite for competitiveness and growth. Companies cooperate closely with educational institutions, develop well-being at work, and invest in occupational health and ergonomics. In addition, the recruitment of international talent is increasing, but support for integration and everyday services requires further strengthening at the regional level. A key labour market challenge in attracting skilled workers is the availability of employment opportunities for spouses. Gender segregation in working life poses a challenge to labour availability and mobility; addressing this warrants targeted efforts, for example by promoting location-independent knowledge work and encouraging women to enter technology-related fields. This requires the development of communication, guidance, and education pathways.

From the perspective of machinery and energy technology, particular attention in education must be paid to the overall quality of basic and upper secondary education. In vocational education, it is desirable to strengthen the mastery of general and transferable skills required in process industries, as companies assume that specific job-related tasks will in any case require induction and further training. A strong foundation in transferable skills best supports this approach.

Companies in the machinery and energy technology sector are prepared

to employ foreign labour. This, however, requires robust support structures for the development of Finnish language skills and successful integration. In process industries, a shared working language is a prerequisite for smooth operations and occupational safety. In this regard, there is both a need and a willingness to develop flexible practices related to language use.

Looking ahead, there will be an increasing need for skills in automation and robotics, data analytics, artificial intelligence and the Internet of Things (IoT), as well as technologies supporting sustainable development. At different stages of working careers, particular attention must be paid to knowledge transfer: the utilisation of tacit knowledge and the sharing of experience by senior experts are important for both continuity management and well-being at work.

- ✓ **In the energy sector, education does not yet meet the needs of new energy technologies:** There is a need to renew educational provision away from combustion-based technologies towards electrification and renewable energy sources.
- ✓ **Rapidly customisable education:** Modularity, teachers' placements in working life, close cooperation with companies, and the use of artificial intelligence in education.
- ✓ **International talent:** A need to develop education and employment pathways for international students within the region, including in technology and design-related fields.
- ✓ **Gender segregation:** Educational provision in the energy sector remains strongly gender-segregated – this needs to be acknowledged and actively addressed.

Accessibility and Regional Structure

Perspectives on accessibility and spatial structure are linked to the overall development of the transport system with the aim of improving logistics capacity and managing logistics costs.

Companies in the machinery and energy technology sector emphasise the importance of well-functioning infrastructure and logistics connections. Improved utilisation of rail connections would enhance operating conditions for

industry. The development of international connections, particularly towards Sweden and Norway, is also important for industrial logistics and material flows. In passenger transport, increasing the frequency of rail services and reducing costs are key competitiveness factors. North Savo's strength lies in the smoothness of everyday life, but poor connections reduce the region's attractiveness and therefore constitute a critical area for development. For companies, customer and business travel is a key operating prerequisite – this highlights the need to maintain and develop air services from Kuopio, rail connections to Helsinki-Vantaa, and to increase services, for example through night train connections.

Energy and transport infrastructure: There is a need to strengthen electricity, heat, and transport infrastructure. Opportunities include better utilisation of the rail network and the development of airport environments from the perspective of electric aviation.

From the perspective of companies, 5G and electricity grid infrastructure in the region is currently at an adequate level, enabling the adoption of new technologies in production and supply chains. However, as remotely operated technologies become more widespread, requirements for broadband and 5G network development will increase. These are necessary to fully exploit emerging development opportunities.

From a spatial structure perspective, it is essential to ensure the functioning of business ecosystems and supply chains across the sub-regions of North Savo. With the contribution of leading companies, smaller firms in North Savo can increasingly be integrated into development activities, which is important for their business viability and RDI activity.

Comprehensive Security

The perspective of machinery and energy technology on comprehensive security can be divided into two dimensions: opportunities to be leveraged and needs for preparedness. It is justified to allocate resources to the development of both.

In the current geopolitical context, growing security concerns and the associated increase in public expenditure represent significant business opportunities. This creates a need to apply companies' technological capabilities to development related to the security sector. In terms of preparedness,

prevailing trends in technology industries highlight the importance of ensuring information security and cybersecurity, particularly with regard to remotely operated industrial solutions. Companies call for clearer cooperation with public authorities, especially concerning security of supply obligations and preparedness planning. Common practices facilitate preparedness and the effective allocation of resources.

Ensuring supply chains and the transfer of tacit knowledge have emerged as key issues from a comprehensive security perspective. Companies possess technological expertise that also supports the management of crisis situations, but further development is needed in risk management and preparedness, in cooperation with the public sector and other stakeholders.

The technology industry strengthens comprehensive security through its regional economic impacts, but also by safeguarding the security of energy supply, for example through spare parts and equipment. The energy sector is a major contributor to comprehensive security. From this perspective, the security of energy supply—particularly distributed energy production and energy storage, diversity of production, and raw material self-sufficiency—is of central importance.

Some companies have prepared for electricity distribution disruptions by developing backup power systems, which are also linked to the need for energy storage solutions. Similarly, it is necessary to ensure the continuity of heating and cooling systems. While some companies have prepared for disruptions in telecommunications, there remains a need for clear guidance and preparedness models, particularly with regard to payment systems and business continuity.

- ✓ **Energy security and security of supply:** Reserve capacity and backup power solutions are required to manage prolonged cold periods. The reliability of electricity and district heating networks is particularly critical in sparsely populated areas.
- ✓ **Distributed energy communities and storage:** The self-sufficiency and security of supply of energy communities, households, and farms as part of regional resilience.
- ✓ **Safety of new technologies:** Technologies such as small-scale nuclear power, hydrogen, and e-fuels require targeted communication and safety training.

Biodiversity and Adaptation to Climate Change

In regional development efforts, emphasis is placed on the diffusion of sustainable technologies and the strengthening of cleantech solutions throughout the entire supply network. Companies are investing in environmentally friendly solutions, such as the electrification of machinery and improvements in material efficiency, for example in shotcrete technology. In the foundry industry, the development of inorganic binders and smokeless moulds reduces emissions and improves working conditions—these development efforts promote both environmental responsibility and employee well-being. Energy efficiency and environmental reporting are integral parts of product development and factory operations.

Technologies supporting sustainable development, such as renewable energy production, energy efficiency, and electrification, contribute to both economic and ecological sustainability. These are often closely linked to the emissions reduction targets of the customers of machinery and energy technology companies. For example, hydraulics is highly energy-intensive, and addressing this challenge is a key development objective within mechanical engineering. The green transition and the circular economy open up new business opportunities, such as the large-scale utilisation of industrial side streams and the associated technological solutions.

Indicators

- Employment and turnover in energy technology
- Share of renewable energy in energy production



2.1.2 Forest-, bio- and circular economy

Previously separate key sectors—forest industry and biorefining—have in this regional programme been brought together into a new forest-, bio- and circular economy key sector, which also serves as a smart specialisation choice. The objective is to combine the regional economic impacts of the forest industry with the strong RDI expertise of biorefining into a broader circular economy ecosystem that also covers the utilisation of side streams from the mineral, mining, and construction industries. This requires the further development of the RDI ecosystem based on the existing North Savo bio- and circular economy cluster, as well as close integration with the forest industry and other sectors and actors with potential in the bio- and circular economy.

The forest-, bio- and circular economy key sector in North Savo comprises actors in the forest industry and forestry, bioeconomy companies, operators processing side streams from the mining industry, and other companies utilising circular economy solutions. The bio- and circular economy transcends traditional sectoral boundaries and gives rise to new growth ecosystems.

As this key sector is closely linked to the use of forests, its content takes into account the Regional Forest Programme prepared by the Finnish Forest Centre, which is a forest sector development programme in accordance with the Forest Act (1093/1996). North Savo is the sixth largest region in Finland in terms of forest area, and the significance of the forest-based bioeconomy for the regional economy is therefore above the national average. The share of the wood products industry is structurally exceptionally high, while the share of the pulp and paper industry is approximately half of the national average. Approximately 40% of the region's timber is processed outside the region, which highlights the importance of logistics solutions and network-based cooperation.

Sustainable Prosperity

A key objective for the renewal and continuity of the forest-, bio- and circular economy sectors is to increase value added. There are clear opportunities for this, for example in wood products and wood-based construction. In industry, growth potential is identified in new products that replace non-renewable raw materials

and are well suited to recycling. Product recyclability involves significant RDI needs. In industrial processes, it is essential to direct research and development towards the diverse and full utilisation of side streams. In particular, as the energy transition progresses, the combustion of side streams for energy in the forest industry is likely to decrease, which in the longer term will release substantial volumes of raw materials for alternative uses. These materials must be directed towards applications that enable higher value added.

Growth in the forest industry builds on the existing foundation of packaging materials and wood products. From the perspective of developing wood products and construction, for example multi-storey wooden residential buildings remain rare in North Savo, and such solutions have not yet been implemented in non-residential construction. This situation can be addressed by developing design, procurement, and implementation expertise, piloting, and strengthening cooperation between municipalities and developers. In the bioeconomy, partnerships between companies and research organisations promote bioproof projects and piloting. In the circular economy, growth opportunities exist, for example, in the utilisation of side streams from the mining industry as raw materials for industry or construction, in the recycling of construction materials, and in product design that prioritises recyclability.

Growth opportunities in the forest industry are closely linked to forest management and maintenance. The sustainable growth of forest carbon sinks and timber production requires timely forest management. In the region, boron fertilisation on mineral soils and ash fertilisation on peatlands are promoted to correct nutrient imbalances and prevent growth disturbances. Open forest and nature data, as well as shared operating models, are utilised to improve the targeting and cost-effectiveness of fertilisation. A related side stream is the utilisation and processing of biomass ash from power plants within the region—currently, part of the ash suitable for fertilisation is diverted to secondary uses. In North Savo, the need for young stand management and first thinnings is significant, with many sites requiring urgent intervention. According to VMI 13 (2019–2023) data, within a five-year period there is a need for young stand management on 141,000 hectares and first thinnings on 164,000 hectares in North Savo's forests. These figures indicate a substantial need to develop forest management technologies and practices to ensure timely implementation of management

measures, despite labour shortages in forest management work. The early stages of forestry (soil preparation, seed and seedling handling, planting and sowing, and young forest management) are critical, and shortcomings at this stage result in underproductive stands. In seedling production, development objectives include biostimulants, plant protection solutions, as well as improved species suitability and disease resistance.

The forest-, bio- and circular economy supports new business development and job creation across a wide range of activities, including production, transport, installation, maintenance, and research and development services. The utilisation of industrial side streams should be increased, for example through biogas and circular economy solutions. The development of new products requires extensive research cooperation, in which clusters linked to the forest-, bio- and circular economy play a central coordinating role.

Within the bioeconomy, the profitability and sustainability of agriculture must be improved as part of bioenergy value chains. The circular economy can be developed, for example, through the recycling of growing media and irrigation fertilisers (e.g. composting and UV treatment). New growth and business areas may include composting services, precision fertilisation systems, and variety testing. The multiple use of forests and the natural products sector (berries, mushrooms, and other natural products) offer growing business potential. These are closely linked to the development of the bioeconomy, sustainable forestry, the food system, tourism, and the well-being of the residents of North Savo.

With regard to critical and strategic raw materials identified by the EU, North Savo has significant mineral potential. The obligations imposed on Member States by the Critical Raw Materials Act create a need to assess the conditions for new primary mining production and to promote the utilisation, recycling, and processing of extractive waste from former mining sites. By utilising mining industry side streams in infrastructure construction, it is possible to reduce the environmental impacts of mining waste and decrease the use of virgin natural resources, particularly in relation to aggregates.

Technological Transformation

The technological transformation in the forest-, bio- and circular economy is strongly linked to the utilisation of side streams in order to increase value added. Technologies related to the processing of side streams, and their cost-effective deployment, must be further developed. This includes the need for new technologies that support recyclability. In the forest industry, manufacturing technologies are relatively well established; by contrast, a continuous and competitiveness-critical area of development is process optimisation. Energy technologies and waste heat recovery are likewise key development priorities. Advancing electrification in the forest sector is an important objective, as it can reduce emissions and fuel costs, including in forest industry logistics. This is also linked to the need to ensure the functionality of timber logistics terminals. Attention must also be paid to geospatial tools for water protection, catchment area planning, and the monitoring of water management on peatlands.

In the bio- and circular economy, new technologies have been identified as necessary, for example, to replace bedding and growing peat and to improve the environmental performance of packaging materials. Development needs include digital monitoring methods (such as drones and handheld microscopes) for tracking plant pests, technologies for optimising irrigation and fertilisation in tunnel cultivation, variety testing and IPM methods (integrated biological pest management), as well as planting and soil preparation methods that support precision forestry. The technological transition in the sector creates a clear need for skills development. Network-based RDI cooperation (companies–research–public actors) should be directed towards solutions that generate higher value added from side streams, such as chemical and thermal recycling, lignin processing, and technologies for the purification and concentration of mineral flows.

In decision-making, the objective is to increase the use of open forest and nature data and artificial intelligence for purposes such as decision support, targeting, and monitoring indicators.

Skilled and Thriving People

The education and RDI environment in North Savo is strengthened by forestry-related education at Savon ammattiopisto (vocational college), Savonia University of Applied Sciences' work on climate security, and the education in environmental and biological sciences and engineering at the University of Eastern Finland. The Natural Resources Institute Finland (Luke) research infrastructure in Suonenjoki (including a forest seedling research nursery) provides a nationally significant platform for the development of seedling production and stress tolerance. The organisation Maaseutuammattiin ry supports entry into the sector.

Labour needs are addressed by strengthening automation, electrical, and process industry competences through shared education pathways that serve the entire manufacturing sector, as well as by increasing expertise across forest management, harvesting, and production chains. A unified educational foundation for the process industry would enable effective labour mobility within North Savo's industrial companies, supporting regional labour markets by expanding the pool of skilled workers and increasing flexibility for both employees and employers. Multilingual induction and the development of Finnish language skills are essential prerequisites for the employment of foreign workers.

In the forest industry, recruitment bottlenecks and challenges have particularly concerned automation and electrical engineering competences, where shortages have been identified. Competition for higher-educated professionals is intense. The region's prosperity and development outlook have a significant impact on location decisions and recruitment success. In higher education, the engineering education at the University of Eastern Finland is especially welcome: automation engineers are in demand, and key areas also include machine vision, artificial intelligence, and robotics.

To promote the bio- and circular economy, multidisciplinary learning modules (e.g. in recycling logistics) would be desirable. Additional training needs have been identified in areas related to seedling logistics and handling, the cultivation of new varieties, plant protection and disease control, as well as quality monitoring and standardisation of different seedlings and crop varieties. There are also challenges to be addressed in the induction of seasonal workers, including the need for multilingual and visual guidance materials. From the perspective of

primary production in the forest-, bio- and circular economy, generational change is a critical issue: as the competence base evolves, long-term education and transition strategies are required. The sector's development should also more strongly recognise the potential of the creative economy in product innovation and higher value-added product development.

From a well-being perspective, no specific challenges are identified in the forest-, bio- and circular economy sectors. The workforce is ageing, which underscores the importance of workforce renewal and the maintenance of work ability. In industry, support mechanisms for personnel have been successfully established. In the sawmill industry, a sector-specific occupational health issue is exposure to wood dust. In the forest industry more broadly, the current public debate on forestry is also perceived as burdensome from a well-being perspective; there is a need to improve the quality of this discussion so that environmental impacts and the regional economic effects of the forest industry are assessed in a knowledge-based and balanced manner.

Accessibility and Regional Structure

A specific challenge for the forest sector is how timber can be reliably harvested and transported under changing climate conditions. Products are primarily shipped to ports by rail, which makes transport capacity a critical factor. In timber logistics, there is a need to further develop loading and transshipment sites, rail-connected terminals, and alternatives to road transport. Logistics is a core issue for all major material flows.

The condition of the low-volume road network is a key competitiveness factor for the forest-, bio- and circular economy. Private roads are critical: for example, more than 90% of timber is transported for processing via private roads. According to condition assessments, around one third of private roads are in poor condition, and a significant share of bridges require remedial measures. In North Savo, the decline in road service providers and entrepreneurs weakens maintenance capacity. There is therefore a clear need to strengthen, for example, the competence of road associations and their ability to make use of available funding instruments.

In conditions of labour shortages, the commuting area must be as extensive

as possible. The transport system should be designed to support this objective, rather than allocating development investments solely on the basis of population growth. In other words, population decline and labour demand increase—rather than reduce—the importance of a well-functioning transport system and do not diminish the need to invest in infrastructure quality and public transport.

The development of the forest-, bio- and circular economy concerns all sub-regions of North Savo, as significant natural resources are present throughout the region. Demographic development is the greatest uncertainty affecting the operating conditions of the sector, and this is closely linked to the availability of basic services. From the perspective of the forest industry, balanced regional development is essential. The utilisation of side streams creates opportunities that span multiple sub-regions. For example, in the Central Savo sub-region, the objective is to develop new business opportunities related to green energy and by-products. Maintaining subcontracting networks and thereby ensuring a continuous and strengthening ecosystem of actors is an important development objective for the sub-regions.

Comprehensive Security

The significance of the forest-, bio- and circular economy for North Savo's self-sufficiency is considerable. Domestic production volumes in the forest industry support energy self-sufficiency and critical revenue streams, including under exceptional circumstances. From the perspective of operating conditions, particular attention must be paid to the reliability of electricity networks and logistics systems. Preparedness can be strengthened through joint scenario exercises for logistics and energy chains, as well as through data-driven management (capacity, production readiness, energy consumption). For example, an analysis of the logistics system would be useful not only for preparedness purposes but also as a tool for logistics optimisation to enhance competitiveness. The objective is a flexible system with clear situational awareness—for instance, an understanding of how transport is organised under different scenarios or how transport performance can be substituted.

From a data-driven management perspective, the forest industry generates information related to heat energy production and product output

volumes, including data on industrial capacity, production readiness, and energy consumption. In exceptional circumstances, for example, electricity could be prioritised to keep industrial operations running, while heat could be produced through combustion. From the standpoint of security of supply, information on industrial volumes and logistics capacity is therefore of critical importance.

RDI activities in the bio- and circular economy directly or indirectly promote, for example, environmental security and social security through their contributions to security of supply, self-sufficiency, and resource efficiency. From a comprehensive security perspective, the continuity of seedling production is a critical factor. Climate change accentuates species-related risks to the future of forestry and berry production, which underscores the need for research into the stress tolerance of seedlings and growing conditions.

Biodiversity and Adaptation to Climate Change

In North Savo, the area of protected forests is currently below the national average, but it can be increased through the EU Biodiversity Strategy and the METSO and HELMI programmes. The Priodiversity LIFE (2024–2031) project and the regional LUMO implementation plan guide restoration and nature management measures based on the voluntary participation of landowners.

The regional programme seeks to support the principles of climate-resilient forest management (strengthening growth, managing damage risks, and enhancing structural diversity). In the planning of measures, key priorities include strengthening carbon sinks through timely forest management and improving forest resilience to increasing disturbance risks. As part of the systematic use of available data, it is important to promote the use of the Finnish Forest Centre's open forest and nature data (including Metsään.fi, habitat data, water protection, and usage potential), as well as Tapio's "Rahaa ja työtä metsistä" services.

The management of herb-rich forests will be diversified in particular in the Kuopio herb-rich forest zone. On drained peatlands, key development needs relate to water management, including preventing excessive drying, applying continuous-cover methods where suitable, ash fertilisation to enhance growth and reduce the need for ditch maintenance, as well as catchment-level planning and effective water protection structures in risk areas. Implementation can be

accelerated through training and geospatial tools. Continuous-cover forestry will be expanded in a controlled manner in sites where it is ecologically or economically justified, with practices disseminated through advisory services, peer learning, and contractor training.

From the perspective of the forest-, bio- and circular economy, advocacy at national and EU levels is important to enable the sustainable use of forests and minerals. The volume of norms and regulation affecting the forest-, bio- and circular economy is extensive. The amount of data that must be processed, documented, and stored is significant, which also creates skills development needs. A major challenge for the forest industry relates to the use of timber resources in Finland: how to ensure the availability of raw materials. Climate issues and carbon neutrality targets are taken seriously—CO₂ emissions and the use of fossil fuels are being reduced in production support inputs.

Through the development of the forest-, bio- and circular economy, environmental impacts, or the sectors' positive environmental handprint, can be improved by using raw materials as efficiently as possible. For example, forest management expertise is also crucial from an environmental perspective, and key objectives include enhancing the skills of forest machine operators and timber transport drivers. Across all industrial sectors, means to improve the environmental handprint include, among others, logistics development, route optimisation, electrification, and the use of biofuels.

Indicators

- Employment and value added in the forest-based bioeconomy
- Number of circular economy establishments and turnover



2.1.3 Food System

The food system is an integrated whole encompassing all components – including the environment, people, processes, infrastructure and institutions – and the activities related to the production, processing, distribution, preparation and consumption of food, as well as their nutritional, social, economic and environmental impacts. The development of the food system is of strategic importance to North Savo in terms of business continuity, food security and security of supply.

Development opportunities in the sector are strengthened by the decision to elevate food exports to a national priority in Finland, with the objective of doubling exports by 2031. At present, Finland's food export base is low in international comparison, which has a significant impact on cash flows in both the food industry and agriculture. The weakness of food exports is also linked to Finland's broader balance of trade challenges. In Finland, the development of food exports is organised in a company-driven manner, supported by sectoral cooperation bodies (such as the Finnish Food and Drink Industries' Export Association). The comprehensive development of the food system in North Savo is closely connected to this national framework. The defined domestic market area comprises the entire Baltic Sea region and Norway, which is approximately thirty times larger than Finland alone. At the national level, food exports serve as a pilot sector for the development of export services. Against this backdrop, investments in the food system are strategic at both national and regional levels. Food exports also provide an excellent platform for strengthening macro-regional cooperation in Eastern and Northern Finland and for enhancing the region's international profile.

The development of the food system key sector in North Savo requires a shared understanding among regional development organisations of the components of the food system and the objectives of development work. To achieve such a common understanding and to increase the effectiveness of efforts, the preparation of a coherent food strategy may be a useful approach. From a regional development and export perspective, it is important to identify export-capable companies and to improve the export readiness of their products. Development activities should leverage the expertise and networks of the North Savo Agri-Food cluster and seek to maximise impact through national food export

initiatives. Further development of the food cluster and the implementation of measures identified through this work will support the strengthening of the food system key sector. Enhancing product development capabilities among food industry companies in the region is a particularly important objective.

The food system is fundamentally based on primary production, and its operating conditions must be safeguarded. The continuity of agriculture and work in the sector is challenged by multiple threat perceptions, a one-sided assessment of environmental and climate impacts, and negative public discourse. These factors affect the sector's societal appreciation, the renewal of entrepreneurship and the workforce, as well as access to financing. Without continuity in the sector, there can be no security of supply, nor the ability to influence the environmental footprint and handprint of the primary production that sustains Finland's population. The alternative is the emergence of risky dependency relationships that lie beyond the reach of both Finnish regulation and public opinion. In North Savo, there are compelling reasons to ensure the continuity of agriculture and the diversity of primary production, in both crop production and livestock farming. At the same time, there is a need to foster a respectful public discourse on the significance and practices of agriculture.

Sustainable Prosperity

Key strengths of the North Savo food system include long-term Finnish ownership, which supports regional willingness to invest, locally grounded decision-making, and security of supply. A long industrial tradition combined with an agile, renewal-oriented corporate culture can serve as an example for the sector as a whole of how sustainable prosperity can be built also within large companies. Employee involvement in development processes improves the functionality of solutions and strengthens commitment within work communities.

The objective of growth in the North Savo food sector is to leverage the opportunities of both animal-based and plant-based production and to increase the value added of production. New ways of producing food and food products are actively encouraged. Innovation is fostered by strengthening food technology expertise and by increasing the degree of processing of raw materials. Short and transparent food chains, digital commerce, and the development of logistics are

also key areas of development.

The importance of local food and domestic food production is expected to increase. Strengthening local primary production, processing, and distribution supports regional self-sufficiency and reduces dependence on long supply chains. New nutritional recommendations provide momentum for product development based on domestic fish and plant-based foods. Health-promoting (functional) foods that utilise local raw materials (including forest and garden berries, milk, fish, cultivated mushrooms, and other natural products) continue to require research-based evidence to support product development and market uptake. Functional foods, personalised diets, and the integration of data into products are becoming more widespread. In addition, plant-based protein products and hybrid products represent promising growth categories.

Over the next four years, significant growth opportunities are anticipated in the food industry and new crops. The development of new crops, production models, and production technologies requires cooperation among a wide range of actors. Incentives are also needed to support primary producers in transitioning to the cultivation of new crops and to milk production. Domestic and responsible food products support sustainable prosperity regionally. Within the food industry, companies developing plant-based innovations, producing tasty products that support wellbeing, utilising bio-based and sustainable smart packaging solutions, applying circular economy-based production models, and adopting a strong consumer-oriented approach are expected to strengthen their position.

As a new strategic opening, there is a need for systematic product development aimed at large-scale markets related to the defence forces, NATO member states, and crisis preparedness. Given the current global situation, many countries seek to strengthen both defence readiness and security of supply, including food production and storage. Product development processes that extend shelf life—such as freeze-drying and other processing methods suitable for ambient-stable products—play an important role in enhancing food security.

Improving and further developing the utilisation of technology and production equipment is a central objective. The use of sensor technologies, data analytics, robotics, automation, and artificial intelligence across different stages of production processes is increasing. Active areas of development include food technology, protein innovations, minimisation of food waste, circular economy

solutions (side streams, bio-refining and bioprocessing; plant-based proteins, fermented foods, functional foods, and shelf-life-related innovations), as well as cellular agriculture technologies. In addition, the development of harvesting robots, the versatile use of machine vision and drones in production processes, and the development of related software solutions are of growing importance.

Regional Invest in activities must also be strengthened to attract new food and food technology companies to the region. This would contribute to the formation of a strong production base for the food industry in North Savo. International food exports—particularly of raw materials and food products with long shelf lives—are expected to grow as climate change progresses and food production becomes more challenging globally. In Europe, extreme weather events have increased, and large parts of Southern Europe are affected by severe and recurring droughts. The Finnish food industry and the entire national food chain have the potential to act as a food producer of greater significance than their size would suggest, supporting growth in Finland and across Europe. The continuous expansion of private label production offers an opportunity for internationalisation through established global food brands. New entrepreneurial opportunities should be created, for example through novel food production facilities that utilise the clean, high-quality, and safe raw materials produced by North Savo's primary producers. In promoting food exports, it is essential to strengthen companies' export readiness with due consideration of target markets. Understanding consumer preferences in destination markets and assessing the commercial potential of new products are critical.

Investments in export expertise and additional resources are needed, for example in dairy products, whey protein, milk powder, specialty dairy products, and branded berry products. On global markets, consumers are willing to pay a premium for clean and safe products, particularly in segments such as baby food. Internationalisation and branding—based on clean raw materials and high-quality food production—create new opportunities for Finnish food products. The development of food tourism and food gift products, drawing on regional raw materials and local history, generates new business opportunities for the tourism and hospitality sectors.

The food industry is an integral part of the bio- and circular economy, which the European Union identifies as a key future growth sector. In this respect, the

food system key sector is closely linked to the forest-, bio- and circular economy key sector. At the interface between these priorities, the objective is to enhance the conversion of side streams from primary production and the food industry into fertilisers and biogas. Improving profitability and utilising side streams are key enablers of sustainable prosperity. Further processing and upcycling of side streams and food waste, together with the resulting product innovations, offer new business opportunities for regional companies.

For companies to invest in the region, confidence in the availability of skilled labour, both now and in the future, is essential. The provision and maintenance of appropriate education programmes (including food technology) in North Savo are therefore of critical importance. The training of a skilled workforce and the development of product development capabilities by regional education providers and development organisations are key factors in advancing the food sector in the region.

Significant research in the sector is conducted through collaboration between companies and research organisations. To ensure that development work is effective and impactful, it is essential that research and product development take place at the company interface and are driven by the needs of regional enterprises, through close cooperation among different actors.

Technological Transformation

The food industry is a highly technology-intensive sector, in which competitiveness is increasingly determined by automation, digital control systems, and energy-efficient technologies. At the same time, development must recognise the limits of automation: human labour will continue to play a significant role, particularly in consumer-oriented production. This has direct implications for the anticipation of skills needs and education pathways.

In the development of the food sector, emphasis is placed on leveraging the opportunities offered by new technologies, particularly through applications of artificial intelligence, data analytics, machine vision, and digitalisation. Core competences include system-level understanding and expertise in the control and regulation of production equipment. The development of freeze-drying and other shelf-life-extending technologies (such as high-pressure processing, HPP)

significantly improves export potential and access to international markets.

New cultivation technologies, including cellular agriculture and recirculating aquaculture systems, complement traditional production methods. Increasing the value added of berry products requires improvements in batch quality and consistency. Identified research needs relate to e.g. flavour, colour, and microbiological properties.

Robotics and artificial intelligence can be utilised, among other applications, in logistics solutions for local food systems and in strengthening technological innovation and cooperation to ensure food production and supply chain safety. In the development of technologies for utilising side streams, the objective is to ensure that nutrients, energy, and by-products circulate as efficiently and holistically as possible. The automation of labour-intensive tasks and the reduction of manual, craft-based work across different stages of the food system remain a continuing development trajectory.

Process optimisation, online monitoring, and predictive maintenance improve production efficiency. Expertise related to packaging and transport durability, as well as the associated research needs, has been identified as a priority in many food industry companies. It is also desirable to optimise sub-processes within production (including appropriate outsourcing where necessary), as in many food companies it is neither practical nor cost-effective to carry out all stages of the production process in-house.

AI-assisted solutions related to sales, marketing, accounting, production monitoring, and product dispatch in the food sector are expected to become significantly more widespread in the coming years. Laboratory environments, product testing, piloting activities, and the assurance of sufficient competence through training are fundamental prerequisites for technological development. In addition, packaging and transport durability are often critical factors, particularly from an export perspective.

Skilled and Thriving People

Competition for skilled labour requires North Savo to position itself not only as a region emphasising the quality of working life, but also as an area offering a high-quality living environment. The attractiveness of jobs is built on workplace

culture, inclusiveness, and a sense of meaning at work. Continuous technological development in the food industry creates a need for systematic skills upgrading.

There is an ongoing need in North Savo for basic education in the food industry (a combination of process competence and a vocational qualification in the food sector, complemented by specialisation studies). In organising education, flexibility in qualification structures and a willingness for inter-institutional cooperation are sought. There is a shortage of food technology specialists in Eastern Finland, as the food sector is growing more rapidly in Southern and Western Finland, where most relevant education is provided. Graduates are often recruited directly into local companies in those regions. In addition, there is a need to develop the competences of primary producers to enable the adoption of new crops.

Improving the image and attractiveness of industrial work in the food sector is important so that students recognise education pathways that lead to skills for which there is strong regional demand.

The mobility of seasonal workers should be made more flexible to allow longer employment relationships across the growing season and movement between employers under the same work permit (e.g. planting and harvesting).

Due to increasing automation and digitalisation, food industry process workers are required to possess broader skill sets than before. There is also growing demand for professionals with expertise in quality, environmental, and sustainability issues from a food-sector perspective (e.g. environmentally friendly production methods, circular economy solutions, and responsible procurement).

Automation, robotics, and AI competences are becoming increasingly important across different stages of food system processes. This requires understanding and skills in programming, machine learning, and data analytics. The use and application of AI across all process areas is increasing, and all employees are expected to keep pace with technological developments (procurement, production, sales, marketing, and product development). Manual line work is increasingly shifting towards process control, quality assurance, and maintenance. Traditional sales roles in the food sector are gradually declining as e-commerce expands. The importance of international expertise will also continue to grow.

Documentation requirements and the need for digital data in the food sector

are increasing, requiring new competences in data utilisation and development. Expanding sustainability requirements increase the need for various certifications, thereby raising demand for experts in food safety and quality management systems.

Language skills remain a challenge in the use of foreign labour, as food safety is a core element of production. Many industrial operators in the region still lack fully functioning processes for employing foreign workers. Developing these processes requires investments by companies in induction, training, and changes in organisational attitudes. The integration of foreign workers into the region can be supported through integration training (food, food culture, and food environment development).

The restaurant sector is currently undergoing significant change. Entrepreneurs and employees are increasingly of non-native Finnish background. In the future, training needs related to food safety will be particularly emphasised. More work-related basic language training is needed, especially concerning terminology related to the food sector and employment relationships. In addition, many regional companies require training for foreign workers on Finnish working culture. Berry producers have long-standing experience in employing foreign labour, and their knowledge and practices can be shared with other sectors.

To attract skilled labour, the objective is to brand quality of life and a healthy lifestyle as key assets of North Savo. Combining local food and culture, and strengthening cooperation with tourism and regional events, creates new development opportunities. Culture influences consumer attitudes and provides inspiration for product development (e.g. different food cultures and traditions). Continued promotion of protected local food products is also important.

Remote work opportunities and a diverse economic structure are key attractiveness factors for the region. Ongoing regional development and investments, innovation activity, attractive opportunities for education, entrepreneurship and employment, good basic services (especially for families with children), and strong logistics connections are all critical for regional development.

Work in the food industry and restaurant sector often involves shift work, which can negatively affect employees' health, work ability, and suitability for the sector. Measures and operating models that support work ability must continue

to be actively developed. The demands of expert work, changing legislation, and continuous competence development place a significant burden on specialists—many companies have only one person responsible for these areas. Greater attention must be paid to work responsibility and sustainability, both from the perspective of processes and employees.

Accessibility and Regional Structure

A competitive food system requires efficient logistics and infrastructure that supports security of supply. Existing accessibility functions adequately, but it requires continuous maintenance and development, particularly from the perspective of exports and nationally significant production activities.

High-speed digital connectivity enables the use of artificial intelligence, more automated production processes, and intelligent supply systems. Many devices and machines (including maintenance systems) operate via network connections; connectivity disruptions increase production risks and system vulnerability. Changes in network infrastructure (3G/5G) and the resulting decline in coverage complicate business operations in sparsely populated areas.

Under Finnish climatic conditions, different types of logistics equipment are required compared to much of Europe. If suppliers enter Finland with unsuitable equipment, food safety may be compromised (food loss, complaints). There is a need for targeted communication towards Central Europe regarding Finnish weather and operating conditions, so that transport requirements are properly understood and met.

In North Savo, the functionality of logistics and transport is particularly important, as in practice transport times to Southern Finland are longer—especially for exports, where the additional time is typically around one day. Long distances, a dispersed settlement structure, and road conditions pose challenges for logistics, especially for local and short food supply chains. In addition to the maintenance of main roads 5 and 9, special attention in North Savo must be paid to the development of rail and air transport schedules from a logistics perspective.

By increasing the productivity and diversity of primary production, it is possible to attract new producers across all sub-regions of North Savo. Through cooperation, specialisation, and renewal within the food industry, growth pathways

can be identified for both urban and rural areas.

A key challenge for the region is population ageing and youth outmigration. Kuopio functions as an attractive university city and growth centre, with employment concentrated in certain sectors. Maintaining vitality in North Savo's regional towns is therefore essential. Ensuring youth employment and a sufficient number of jobs is a central objective in sustaining the region's overall attractiveness and long-term prosperity.

Comprehensive Security

The resilience of North Savo's food system is based on enterprises that have operated over the long term and demonstrated the capacity to adapt to change. Domestic food production strengthens security of supply from the consumer perspective. At the core of regional security of supply is ensuring the production and availability of food for the entire population under all circumstances. The profitability of primary production and the adequacy of processing capacity are key prerequisites.

In disruption and emergency situations, food production requires a fully functional infrastructure across the entire production chain. Continuity of energy supply—including backup power solutions and, where possible, redundant feeds—is essential to safeguarding production. Preparedness plans must consider the availability of electricity, water, refrigerants, and fuels, as well as alternative energy sources. The utilisation of side streams from primary production and the food industry for energy production and the development of domestic fertilisers strengthens self-sufficiency.

Company-level preparedness plans and exercises are an integral part of comprehensive security. These cover, inter alia, inventories, alternative sourcing channels, cooperation networks, and the continuity of critical operations. Quality management systems should incorporate risk analyses that address weather extremes, pandemics, geopolitical risks, cyber security threats, and market disruptions. It is also advisable to anticipate acceptable quality adjustments and alternative recipes that may be required in exceptional circumstances.

The obligations of the National Emergency Supply Agency apply primarily to large operators, but preparedness among smaller enterprises must also be

supported. This calls for regional cooperation projects that facilitate knowledge sharing and the development of joint operating models. Network-based cooperation and the effective use of specialised expertise enable efficient crisis management. The Agri-Food cluster serves as a platform for sharing expertise and strengthening cooperation.

Data-driven management supports preparedness by improving the use of research-based knowledge and information exchange among supply chain actors, as well as by enabling the use of predictive analytics in food chain management. Regular information exchange and dialogue enhance readiness to respond to crises.

Physical accessibility is also a component of comprehensive security. The transport of raw materials and products must be secured under all weather and seasonal conditions. In particular, the maintenance of smaller and lower-volume roads is a critical factor in preparedness.

Biodiversity and Adaptation to Climate Change

Industrial actors within the food system are investing in emission reductions, renewable energy, and material efficiency; however, safeguarding biodiversity requires broader consideration also in production planning and supply chain management.

As a result of climate change, the prevalence of pests and plant diseases may increase, which calls for preparedness as well as the development of new operating models and solutions to address emerging challenges. At the same time, climate change may enable the cultivation of new crop varieties and support agricultural diversification. Cultivation practices must be adapted as necessary, with particular attention paid to effective water management.

Climate change is also increasing the frequency of extreme weather events, and preparedness for storms and other disruptions requires the development of local risk analyses. These assessments should also be reviewed in cooperation with regional enterprises, to strengthen adaptive capacity and resilience across the food system.

Indicators

- Number of farm enterprises and cultivated area
- Employment and turnover in the food industry



2.1.4 Health Technology and Pharmaceutical Development

The priority sector encompasses the various domains and processes of health and wellbeing, including wellbeing and health technologies, pharmaceutical research, development and manufacturing, gene and cell therapies, service innovations in health and wellbeing, as well as data-, software- and artificial intelligence-based solutions.

Sustainable Prosperity

To strengthen regional prosperity and competitiveness, an increase in the number of companies in the sector, venture capital investments and private financing is required. It is important to attract large international anchor companies to the region. Regional attractiveness can be enhanced by highlighting already established international actors, such as Finvector, Orion Pharma and Charles River, concrete success stories, high-level expertise and well-functioning infrastructure. A particular strength of the region lies in the agility of public development organisations and companies in advancing matters through close cooperation. To further increase attractiveness and competitiveness, operating models should be further developed and centres of expertise strengthened.

To accelerate company growth and competitiveness, testing and development cooperation with public actors should be streamlined. In health technology and pharmaceutical development, needs-driven innovations and the testing environments required for their development and clinical validation are of key importance. Testing services established within educational and research institutions through public funding should be made more easily accessible to companies. In addition, operating models are needed that enable the testing of products and services in real-life use environments. Intensifying encounters and cooperation between companies can generate new synergies.

To support growth, the educational and research institutions located in Savilahti, including the wellbeing services county, should generate a higher volume of commercially exploitable innovations. This requires training related to innovation commercialisation as well as effective structures for identifying and advancing promising ideas towards the market.

In the field of pharmaceutical development, there is potential for new business creation. Growth potential has been identified in the development of biological medicines and in research services related to new therapeutic modalities.

Accelerating EU-level marketing authorisation processes would support the growth of pharmaceutical manufacturing. Similarly, streamlining the demanding regulatory and approval processes related to health technology would enable faster market entry of innovative products. Healthcare systems require new and effective treatment practices as well as solutions that promote population health and wellbeing in North Savo. A healthier population translates into a more capable workforce and, at the same time, reduced pressure on healthcare services through lower patient volumes.

Climate change is steering the health sector towards digital solutions, remote services and decentralised testing services, opening new business opportunities for companies. At the same time, the extensive use of single-use products in healthcare creates demand for sustainable alternative solutions.

Technological Transformation

The technological transformation in the health and wellbeing sector is rapid, which makes cooperation and partnerships essential for growth. The broad utilisation of artificial intelligence solutions in business operations, development activities and healthcare will significantly transform and enhance efficiency. Digitalisation, digital services and digital products will continue to expand, while the use of automation and robotics will likewise increase, contributing to productivity gains.

As pharmaceutical development is costly and time-consuming, and the commercial lifespan of approved medicines is often limited, accelerating development cycles is critical. This calls for new approaches that leverage modern technologies such as artificial intelligence, machine learning and digitalisation.

The utilisation of health data has progressed more slowly than expected, partly due to national secondary-use legislation that restricts data use. Nevertheless, there remains significant growth potential in technologies that combine data-driven solutions and artificial intelligence.

In promoting health and wellbeing, the development of individual-centred, integrated solutions is essential. This requires the combination of new

technologies, novel care concepts and advanced, holistic therapeutic approaches. An example is the integration of individual risk and treatment profiling with continuous treatment monitoring into a single, coherent solution.

Skilled and Thriving People

The sector requires a highly skilled workforce. There is demand for expertise in artificial intelligence, data security, data analytics, company creation, innovation commercialisation, regulation, quality management, programming, molecular biology and the pharmaceutical development value chain, as well as for combinations of these competencies. The continued development of education in the field of engineering is essential in responding to these skills needs. Closer interaction between companies and educational institutions supports better alignment with labour market competence requirements. Facilitating encounters between companies and students can also improve access to skilled labour. Education must remain agile to keep pace with technological and operational changes, and of high quality so that it effectively meets the needs of the business sector.

International labour plays a key role in securing the availability of skilled professionals. To attract international talent, it is important to communicate the region's living conditions in a comprehensive manner. Key pull factors include employment opportunities for spouses, high-quality childcare and education (including English-language education), diverse leisure and recreational opportunities, healthcare services, and the attractiveness of the natural and cultural environment. The availability of English-language services is essential. Retention of international talent must also be strengthened. Supporting the formation of communities among different nationalities and increasing internship opportunities for international students contribute to this objective.

Regional vitality is strengthened by investing in youth wellbeing and participation. The development of structures and services that support wellbeing is essential not only from an individual perspective, but also in terms of utilising the region's labour potential and ensuring the sustainability of the healthcare system.

Population development:

From the perspective of demographic development, it is important to promote the region's visibility across all areas in a systematic and long-term manner. Regional marketing and brand-building should be strengthened so that North Savo is perceived as an attractive place to live. In addition to attractiveness, retention capacity is required to ensure that the workforce remains in the region.

Accessibility and Regional Structure

Accessibility is a prerequisite for business operations and growth. Adequate flight frequency, along with efficient road and rail connections, is particularly important in this respect. Digital services rely primarily on broadband and communication networks, the reliability and security of which are critical.

Comprehensive Security

To enhance health security, preventive measures and the development of crisis-resilient services are required. Through data-driven management, it is possible to establish a real-time situational picture of the population's health and wellbeing, including in emergency and exceptional circumstances. Preparedness for exceptional situations is generally well managed in large enterprises, whereas in small enterprises it is often perceived primarily as a responsibility of public authorities. It is therefore important to increase awareness of the importance of preparedness among enterprises of all sizes. The sharing of information and data between actors is essential both for preparedness and for the development of new solutions. Agile deployment of developed solutions, in turn, enables faster responses to changing circumstances.

In preparedness for exceptional situations, the development and strengthening of regional value chains, as well as closer cooperation between enterprises, provide a foundation for strong regional prosperity. Bringing value chains closer to Finland from more distant international locations also supports preparedness. Through innovative public procurement, enterprises can be encouraged to develop solutions to identified challenges. By promoting cooperation between enterprises, new business consortia may emerge with the

potential to respond jointly to procurement needs. It is important to steer public procurement in a way that supports the participation opportunities of domestic and regional enterprises.

Biodiversity and Adaptation to Climate Change

In the fields of health technology and pharmaceutical development, climate change is steering activities towards digital and remote solutions that reduce the need for mobility and the environmental footprint of service structures. New business opportunities are emerging through the development of resource-efficient service and production concepts that enhance climate resilience. At the same time, the extensive use of single-use products in the sector increases the need for circular-economy-based and environmentally sustainable alternatives. In the development and deployment of material solutions, it is important to combine eco-design principles in close cooperation with public procurers.

In pharmaceutical research, development and manufacturing, greater attention must be paid to the management of environmental impacts. New solutions are required to reduce the carbon footprint of manufacturing processes and the environmental load of pharmaceuticals. Research that considers the health impacts of climate change and develops technologies to anticipate or mitigate these effects is also a growing field. Integrating environmental considerations into product development, production and regulation supports the sector's sustainable growth.

Environmental criteria should be considered in public innovation funding and procurement practices, and the market entry of responsible solutions should be promoted. Enterprises should be supported in developing green transition business initiatives and internationally competitive solutions that contribute to climate change adaptation.

Indicators

- Turnover in health technology
- Number of jobs and enterprises in the sector



2.1.5 Tourism and the Creative Economy

The content of the Regional Programme and its priority sectors respond to a changing operating environment. In North Savo, the tourism priority sector is being strengthened by integrating the creative economy alongside it. The Regional Programme serves as a strategic framework for the development activities of actors in the tourism and creative economy sectors. Tourism and the creative economy are significant sources of growth, attractiveness and renewal in North Savo. The key development priorities include strengthening entrepreneurship, advancing the digital transition, supporting skills development and well-being, recognising the role of culture in security, and promoting ecologically sustainable operating models.

The tourism sector has experienced several major shocks in recent years that have been beyond its control. The COVID-19 pandemic led to bankruptcies, workforce reductions, and the permanent exit of some skilled professionals from the tourism industry. Following the pandemic, the next major shock was the war between Russia and Ukraine, which resulted in the closure of the eastern border and the near-complete disappearance of Russian tourists. Sudden global crises have created skills bottlenecks and labour shortages in the sector. While these developments have affected all sectors to varying degrees, their impact on both domestic and international tourism flows has been particularly pronounced. There is therefore a clear need to improve preparedness for changes in global conditions. Development efforts should focus on strengthening impact by building on existing foundations and already attractive destinations.

The creative economy constitutes a field of business formed by phenomena, revenue models and value chains. In North Savo, the creative economy is examined in accordance with the classification used by the Ministry of Economic Affairs and Employment (MEAE), comprising three sub-areas:

- ✓ Creative content, where business is based on the commercialisation of intangible assets (IPR) and digital distribution platforms. Activities are internationally oriented and scalable. The sector includes the music and gaming industries, audiovisual production, and the television and media sectors.

- ✓ Creative services, where the core of business lies in cross-sectoral activity and value networks. This area is characterised by B2B operations in which the value created for the client—particularly in enhancing competitiveness—is based on the sale of outcomes derived from either tangible expertise (e.g. architecture, industrial and product design) or intangible expertise (e.g. marketing, creative agencies, design thinking). Intellectual property rights are either transferred to the client or licensed for use (e.g. design work, architecture, visual or pattern design).
- ✓ The events sector, arts and culture provide cultural services and products for different target groups, including performances and experiential events that enable encounters in both physical and digital environments. Value networks in culture (performing and visual arts) comprise both public actors (infrastructure, venues, investments) and private actors (artists, entrepreneurs), who apply a variety of business models within these networks. Events have significant impacts on regional prosperity and attractiveness, as well as on the formation of regional identity and branding. They are also of major importance for tourism and the experience economy.

Tourism and the creative economy form a significant part of North Savo's economic structure and overall attractiveness. These sectors create jobs, strengthen regional identity and distinctiveness, and promote cross-sectoral development initiatives, for example through digital services, events, and the utilisation of cultural heritage. The creative economy is an integral component of the overall development of the tourism sector and has the potential to significantly accelerate growth in other industries and support business renewal. Cultural content and services can constitute primary motivations for travel to the region and are therefore an essential element of the region's tourism offering.

The development and competitiveness of this priority sector require long-term cooperation, sustained investment, and structural support for both tourism and creative professionals. Growth in these sectors also depends on strong regional, national and international visibility and is closely linked to the physical accessibility of North Savo.

Sustainable Prosperity

The vitality of the tourism and creative sectors is built on the region's attractiveness, distinctive content, and responsible operating models. The cultural environment, nature, food, events, and local narratives form the foundation for sustainable, experience-based offerings. Business conditions are strengthened through investment, skills development, and co-creation ecosystems. There is a need for stronger structures that support entrepreneurship in tourism and the creative economy and enable long-term business development also in sparsely populated areas.

Regional prosperity is reinforced when solutions in tourism and the creative economy are linked to the development of other sectors, such as well-being, food system, and technology. In the development of the Tourism and Creative Economy priority sector in North Savo, the key objectives are:

- ✓ **North Savo will be developed into a high-quality and attractive tourism destination for international and domestic visitors through cooperation, investment, and the development of event and experience services.** The long-term tourism development vision for North Savo is to become a knowledge- and skills-based tourism region that increases tourism revenue, is easily accessible, and operates in accordance with the principles of sustainable development.
- ✓ Tourism content is produced and developed through broad cooperation across North Savo and at the inter-regional level as part of Lakeland cooperation (Eastern Finland and the Saimaa region), in collaboration with Visit Finland.
- ✓ Joint products combining culture and tourism are supported, drawing on local cultural heritage, events and distinctiveness. Tourism products are marketed to customers through nature-based, activity and experience-oriented content, based on which companies in the region develop competitive, environmentally sustainable and attractive tourism offerings.
- ✓ Growth is pursued by supporting the expansion of international tourism, product development, national and international cooperation, and by investing in travel chains and the growth of international air connectivity. Building inter-regional and international networks is essential for the

development of the entire priority sector.

- ✓ The target markets for tourism are primarily Europe, with a particular focus on the Baltic countries and the Nordic region. The sector's capacity to respond to changes driven by the global economy and geopolitics will be strengthened.
- ✓ The university hospital, together with attractive tourism destinations, creates excellent preconditions for the development of health tourism.
- ✓ The business activity of the creative industries will be strengthened, with development priorities including entrepreneurship, revenue models, RDI cooperation, and digital services.
- ✓ The utilisation of creative expertise across other sectors will be promoted (e.g. design and service experiences).

Technological Transformation

Digital solutions are profoundly transforming the operating environments of both tourism and the creative industries. Development efforts require support for the adoption of new technologies, the creation of new business models, and the commercialisation of digital content. The interoperability of platform-based business models, immersive technologies (such as AR and VR), and creative content opens new opportunities to improve service accessibility and enhance customer experiences.

The technological transition calls for multidisciplinary expertise and the ability to combine technology with cultural, experiential, and community-based value creation. Strengthening RDI activities, fostering a culture of experimentation, and enhancing networking among actors create the preconditions for the development of internationally competitive products and services.

Key objectives from the perspective of the technological transition:

- ✓ The tourism sector leverages developments in information technologies and artificial intelligence to develop new service offerings and to increase labour productivity.
- ✓ Digitalisation is utilised in the production, accessibility and marketing of culture and tourism, enhancing reach, efficiency and customer engagement.

- ✓ New digital platforms and distribution models for creative content are developed to support scalability and market access.
- ✓ Business models based on intellectual property rights and intangible value creation are supported, strengthening the commercialisation of creative assets.
- ✓ Opportunities offered by the New European Bauhaus initiative are utilised to integrate technology, aesthetics and sustainability in the development of tourism and creative industry solutions.

Skilled and Thriving People

The role of tourism and the creative economy as sources of identity, community cohesion and mental well-being is central from the perspectives of North Savo's reputation as well as its attractiveness and retention capacity.

Growth in the tourism and creative sectors requires multidisciplinary competence, strong adaptive capacity and cultural literacy. The education system must support entrepreneurship in the creative and tourism sectors, digital skills, and cultural and linguistic awareness. Flexible learning pathways are needed to enable skills upgrading at different stages of working life and to support the attraction and integration of international talent into the region.

Well-being is both a prerequisite for work in the tourism and creative sectors and a key outcome of their activities. Issues related to social security, work ability, resilience and operating conditions of those working in the sectors must be recognised as part of a broader well-being policy framework. Tourism and the creative economy also contribute to population-level well-being by promoting accessible culture, participation and community cohesion.

- ✓ Strengthen education and training in the tourism and cultural sectors, enhance links with working life, and support the employment of young professionals.
- ✓ Support leisure activities and basic arts education as a foundation for creativity and skills development
- ✓ Develop cultural well-being by integrating cultural rights into health and social care services, advancing cultural well-being models, and making use of digital platforms.

- ✓ Ensure the accessibility of cultural services in all municipalities.

Accessibility and Regional Structure

Regional accessibility and a well-functioning spatial structure are essential for the development of tourism and the creative economy. Regarding internal accessibility within the region, it is crucial to improve public transport as well as solutions for active and sustainable mobility between regional centres and their catchment areas. This supports both the mobility of visitors and the network-based working practices of creative economy actors without reliance on private cars.

Developing the creative economy across different parts of the region requires functional connections and local infrastructure: work and performance spaces, fast digital connectivity, and temporary accommodation enable decentralised and mobile forms of work. From a tourism perspective, the smooth functioning of travel chains, the accessibility of destinations and route networks, and ensuring accessibility and responsibility throughout the visitor experience are important.

Comprehensive Security

Culture and the creative sectors build societal resilience, strengthen social cohesion, and support the processing of crises. The safety of tourism and events requires systematic planning, risk management, and close cooperation between actors. In an increasingly technologized operating environment, the security of digital platforms and content production, as well as the protection of intellectual property rights, are key considerations.

From a security-of-supply perspective, the creative sectors can contribute to recovery during and after crises, for example through community-based arts, events, and instruments of information and communication. A comprehensive security approach should be strengthened as an integral part of the planning of tourism, the creative economy, and cultural services more broadly.

- ✓ The tourism sector supports the development of comprehensive security, including through food security, and by contributing to the development of transport modes and travel chains.

- ✓ Cultural security of supply is integrated into regional preparedness: safeguarding cultural heritage and recognising the role of art and the creative sectors in strengthening crisis resilience.
- ✓ Community-based cultural activities that enhance resilience and a sense of safety are supported (e.g. libraries, local heritage work, and local events).
- ✓ Culture is utilised in addressing demographic challenges, including by promoting participation, integration, and dialogue between different cultures.

Biodiversity and Adaptation to Climate Change

Nature is a central element of North Savo's attractiveness and the core content of its tourism offering. Safeguarding biodiversity and adapting to climate change require the continuous development of sustainable tourism practices, including the management of visitor pressure, environmentally friendly mobility solutions, optimisation of waste management, and responsible communication.

Actors in the creative economy can contribute to the ecological transition by making human–nature relationships visible, creating meaningful experiences, and providing communities with tools to imagine and build a sustainable future. Art and cultural expression play a key role in raising climate awareness and strengthening ecologically sustainable values.

The development of tourism and the creative economy in North Savo requires cross-sectoral cooperation, structural support, solutions that improve accessibility, and strong cultural self-confidence. The region's distinctiveness, cultural diversity, and natural environment provide a solid foundation for sustainable growth that strengthens both the regional economy and overall wellbeing.

- ✓ Promote responsible tourism and cultural production based on ecological sustainability and local distinctiveness.
- ✓ Develop and package nature- and cultural heritage-based tourism assets in a sustainable manner.
- ✓ Improve the energy efficiency of culturally and historically significant buildings, including the deployment of smart solutions and renewable energy generation.

- ✓ Strengthen the ecological sustainability of events and cultural services, with a focus on materials, energy use and circular economy solutions.

Indicators

- Number of overnight stays and the share of international visitors
- Employment and turnover in tourism-related industries
- Employment and turnover in the creative industries
- Cultural TEAvisari score



2.1.6 Smart Water System

Sustainable Prosperity

The renewal of the smart water systems priority sector is driven by the opportunities created by the green transition and changes in the operating environment. Tightening environmental and safety requirements, together with technological development, open new possibilities for the optimisation, management, modelling, operation, maintenance and construction of networks, water quality monitoring, industrial water management, water treatment, as well as improvements in energy and resource efficiency.

Smart water systems are closely linked not only to industrial processes but also to mining activities. The region has strong expertise in water cycles and their development, building on long-standing experience from the pulp and paper industry in water treatment, including the handling and evaporation of reject streams. North Savo is home to several significant companies operating in the sector, providing water systems RDI actors with opportunities to jointly pursue e.g. funding opportunities offered by Business Finland.

In the development of water expertise related to the mining sector, areas of particular interest include zero-waste mining, the utilisation of tailings, and water recycling. Expertise in water recycling has significant global demand, including in municipal water services. This is also closely linked to the development of wastewater reuse in municipalities.

In construction, trenchless methods and the use of digitalisation enable cost savings and reduce environmental impacts. From a circular economy perspective, key development areas include the reuse of materials and the reduction of emissions from construction activities.

To support sustainable growth, new types of innovations and pilot activities are needed. In addition, the reform of the Water Services Act will introduce changes and requires closer regional cooperation than before.

Technological Transformation

Digitalisation and new technologies are reshaping the water sector. Key areas of development include the use of artificial intelligence and data in water treatment, continuous water quality monitoring, remote monitoring of networks, and improving energy efficiency. These solutions enable increasingly accurate and real-time information on the condition and performance of water networks. Smart pipes improve the detection of leaks and anomalies, while advances in robotics and trenchless technologies enable more cost-effective construction, maintenance and system management. Access to pilot environments is a critical prerequisite for testing and deploying new solutions.

Water services systems face a significant investment backlog. The adoption of new technologies is also slowed by limited access to financing, the tight financial situation of municipalities, and the fragmented structure of the sector. Strengthening cost competitiveness requires, for example, data-driven management, the utilisation of synergies, and structural efficiency improvements.

Skilled and Thriving People

The retirement of water utility personnel necessitates systematic knowledge transfer and the strengthening of the sector's attractiveness. Many roles in the water sector do not have a direct educational pathway; instead, competence is also accumulated through on-the-job learning. Automation may reduce traditional administrative and operational tasks, but network construction and maintenance cannot be replaced digitally. Specialist expertise in the water sector therefore remains essential.

Alongside core water services skills, technology- and data-based capabilities are becoming increasingly important. Digitalisation, data utilisation, automation, artificial intelligence, control engineering, and tightening safety, environmental and water quality requirements all demand the ability to integrate technical expertise with sector-specific water services knowledge. Key areas for development also include water quality management, network management and modelling, and data-driven management.

The utilisation of international labour in customer-facing roles is constrained

by Finnish language requirements. In expert roles, working in English is possible in some cases, but broader recruitment would require a regional solution that also considers employment opportunities for family members without local language skills.

Accessibility and Regional Structure

A functional digital infrastructure, in particular the availability of high-speed broadband and 5G connections, is a key prerequisite for the deployment and development of new digital solutions. The importance of network capacity and reliability increases as data volumes and performance requirements continue to grow. Reliable connectivity enables remote operation and monitoring of systems and ensures real-time monitoring of water quality.

Regarding physical accessibility, the functionality of passenger transport and freight connections is essential for business development, management and logistics. The extensive operational scope of the water sector and the reach of networks into sparsely populated areas highlight the importance of maintaining the secondary road network.

Comprehensive Security

Water services are a critical component of comprehensive security and security of supply. Both physical security and cybersecurity are of central importance in the sector. The production and distribution of water underpin the operational capacity of numerous industries and essential services.

Dependencies on resources and the vulnerability of supply chains require foresight and systematic preparedness planning. Transport capacity and the functioning of logistics are decisive factors: if fuels do not move, energy cannot be produced and water services cannot operate. In disruption situations, the availability of spare parts and the reliability of telecommunications connections are likewise critical.

The utilisation of data and knowledge-based management are an integral part of preparedness in the water sector. There remains scope to further strengthen interaction and cooperation between actors in preparedness planning, although for some operators such structures are already well established.

Biodiversity and Adaptation to Climate Change

The impacts of climate change, such as storms and increasing variability in precipitation, as well as environmental risk management, must be addressed through proactive preparedness. Overall, smart water systems have significant potential both in climate change mitigation and adaptation, for example through reducing the environmental handprint of industrial processes and strengthening preparedness in water services.

Indicators

- Number of jobs in the sector
- Ecological status of surface waters: number of water bodies with ecological status classified as moderate or worse



2.2

CROSS-CUTTING THEMES APPLIED TO ALL PRIORITY SECTORS



Among the cross-cutting themes, sustainable prosperity and technological transition are best examined separately for each priority sector. For this reason, only a concise summary of these themes is presented in this section. The theme skilled and thriving people contains more content that transcends sector-specific analysis, relating primarily to population targets and overall wellbeing. By contrast, the themes accessibility and spatial structure, comprehensive security, as well as biodiversity and adaptation to climate change emphasise content that is common to all priority sectors.

Sustainable Prosperity

From the perspective of sustainable prosperity, renewal under conditions of sustainability and productivity is essential for all priority sectors. Sustainable prosperity must be strengthened by leveraging the opportunities offered by renewable energy and green technologies. The application of technology and artificial intelligence should be expanded across sectors.

New business opportunities are emerging most prominently around digitalisation, artificial intelligence and the circular economy. Research, development and innovation activities must be activated across the entire region. There is a need to develop new innovations that support self-sufficiency and security of supply, which at the same time constitute the core of regional development work that reinforces comprehensive security.

In rural areas, sustainable prosperity can be strengthened by developing both traditional and emerging livelihoods and by harnessing the opportunities created by technology and the green transition. Traditional rural industries remain a key source of prosperity, while growth potential is also provided by tourism, local food systems, energy production and nature-based entrepreneurship.

Technological Transformation

Keeping pace with the technological transition requires strong linkages between businesses and research activities, as well as close cooperation between companies and educational institutions in pilot environments to enable the uptake of new innovations.

The application of technology and artificial intelligence can provide solutions for compensating for a shrinking labour force and for restructuring the economy. Strengthening investment environments and supporting companies in the energy transition and in the deployment of AI-based solutions are essential to safeguarding sustainable renewal.

In North Savo, it is necessary to strengthen the region's position in the RDI-intensive knowledge economy. To achieve this, the long-term and strategically prioritised development of a data technology competence hub around Kuopio should be promoted. Overall, the technological transition should place particular emphasis on the development of the data economy, artificial intelligence and software-based business.

Skilled and Thriving People

→ **Renewal of skills and agility of education**

The future of North Savo is founded on skills that evolve in step with technological, ecological and social change. The region's strength lies in its broad education and RDI base, but its impact depends on the ability to respond rapidly to changing skills needs. In vocational education and training, the emphasis is on transferable skills and the capacity for continuous learning, as companies increasingly invest in task-specific induction and lifelong learning.

The technological transition is evident across all sectors. The development of mechanical and energy technology, the forest-, bio- and circular economy, the food system, and water system expertise requires broad-based competence in automation, robotics, data analytics and artificial intelligence. At the same time, it is essential to safeguard the quality of core skills and process-related know-how. Training needs related to new energy technologies, the circular economy and bio-based innovations are growing, and education provision must be modular and flexibly updatable. Cooperation between higher education institutions, teachers' placements in working life, and the use of AI in teaching strengthen alignment with business needs.

Skills renewal is also a matter of attractiveness. Lifelong learning, multidisciplinary education pathways and cultural literacy enhance the capacity

to respond to labour market change. Growth in the creative industries and tourism highlights the importance of holistic learning, in which entrepreneurship, digital skills, and language and cultural awareness support international competitiveness.

→ **Wellbeing at work and the availability of skilled labour**

The availability of a skilled and healthy workforce is a key prerequisite for growth and competitiveness in North Savo. Wellbeing at work is built on competence, participation, and a sense of meaning and purpose in work. Companies are actively developing solutions that support occupational health, ergonomics and work ability, yet labour shortages affect almost all sectors—particularly health and social services, industry and service sectors.

The attractiveness of education and employers' recruitment capacity largely shape regional labour market dynamics. Workplace culture, flexible career pathways and opportunities for learning at different stages of working life are decisive factors. Gender segregation in working life, which remains pronounced especially in technology and energy sectors, limits labour mobility and availability. Promoting gender equality, location-independent knowledge work and the attractiveness of these sectors for women requires active and targeted measures.

Through cooperation between the wellbeing services county and municipalities, wellbeing at work is also closely linked to the sustainability of service structures. Structural reforms in the health and social care sector, staff shortages and the pressures brought about by digitalisation call for strengthened leadership, resilience and skills development. Supporting work ability and investing in preventive wellbeing measures are also economically essential means of curbing cost growth, while safeguarding the long-term functioning of services.

→ **International talent and attractiveness**

The importance of international labour and students is increasing across the region. North Savo must position itself as a living environment where international talent can settle and thrive. Successful recruitment requires the strengthening of both pull and retention factors: employment opportunities for spouses, English-language education alongside Finnish language training, smooth everyday

services, and opportunities for social integration are decisive in whether talent remains in the region.

Language skills are a key factor, particularly in process industries and in tasks related to food safety. Flexible practices, multilingual induction and integration support enhance the functionality and safety of workplaces. The effective utilisation of international labour requires long-term cooperation between education providers, businesses and municipalities.

Attracting top talent and developing structures for international recruitment require systematic attractiveness-building efforts. Strengthening the region's brand and visibility—both nationally and internationally—is essential for North Savo to succeed in the competition for talent. International networks, interaction platforms linking education institutions and businesses, and an increased availability of traineeships create continuity and social capital that support the region's sustainable prosperity.

→ Equality, inclusion and cultural well-being

Inclusion, community cohesion and cultural well-being are integral to the region's competitiveness and identity. The significance of tourism and the creative economy extends beyond economic growth: they strengthen mental well-being, identity and social cohesion. The education system and cultural services must support participation in leisure activities, basic arts education and young people's employment pathways into the creative sectors.

The development of cultural well-being entails both the accessibility of services and the realisation of cultural rights as part of social and health services. Digital platforms, diverse artistic activities and the utilisation of local food culture enhance North Savo's attractiveness and sense of community. Equality and diversity in working life support not only the functioning of labour markets but also the overall well-being of residents.

→ Well-being structures, health promotion and comprehensive security

The promotion of well-being and health is a strategic strength of North Savo. A strong cooperation framework has been established between municipalities and

the wellbeing services county, reflected in active health promotion (HYTE) work, an inclusive operating culture and a strong emphasis on community cohesion. Key priorities include healthy lifestyles, strengthening mental health, supporting physical activity and recovery, and preventing addictions.

Among population health challenges, overweight and lifestyle-related diseases are the most significant. Addressing them requires the promotion of nutrition and physical activity in cooperation with municipalities, the retail sector and the wellbeing services county. Technological solutions can support well-being and the accessibility of services, but social innovations and active citizen participation are equally needed.

From the perspective of comprehensive security, Eastern Finland plays a significant role in national preparedness. Education, participation and adaptation to climate change strengthen regional resilience. At the same time, imbalances in funding models must be recognised: the current financing of wellbeing services counties does not sufficiently support health promotion or regional development. Strategic steering and bold prioritisation are necessary to ensure that resources are allocated in an effective and sustainable manner.

The future success of North Savo is built on skilled, healthy and socially engaged people. Continuous skills renewal, well-being at work, international attractiveness and the strengthening of equality form a mutually reinforcing whole. The link between well-being and regional prosperity lies at the core of competitiveness: skills create work, work generates well-being, and well-being sustains the capacity to renew.

Accessibility and Regional Structure

Matters related to accessibility are described most comprehensively in the North Savo Transport System Plan, which remains up to date. In North Savo – as in Eastern Finland more broadly – there are extensive development needs in transport infrastructure and transport services. Overall, road and rail conditions have deteriorated as the maintenance backlog in infrastructure continues to grow. From the perspective of North Savo's external accessibility, there are significant needs for improvement and development on the main corridors, including national roads 5 and 9, the Savonia railway line, and the transversal rail connections. In

terms of internal accessibility within the region, substantial improvement needs exist on low-traffic connecting roads and moderately trafficked regional roads. In addition to poor pavement condition, the weakening structural condition of roads is an increasing problem. Across all transport corridors, there is also a considerable maintenance backlog in bridges.

The poor condition of infrastructure causes significant problems for traffic flow and safety and undermines the cost efficiency of logistics. These negative impacts affect both everyday mobility for residents and freight transport for businesses. The situation will not improve without a clear increase in national funding for basic transport infrastructure maintenance and a dedicated programme to address the accumulated maintenance backlog.

Regarding both external and internal accessibility, there are shortcomings in passenger transport service frequency across all modes of transport. From the perspective of external accessibility, there is a need for more frequent and better-timed air, rail and coach services. Outside the Kuopio–Siilinjärvi core area, bus services in North Savo have declined significantly and, in some areas, ceased altogether. Insufficient passenger transport services constitute a major bottleneck for labour mobility, work-based training and education.

Taken together, **the deteriorating condition of North Savo's infrastructure and the shortcomings in both external and internal accessibility represent a major constraint on effective regional development.** The mobility, transport and connectivity needs of residents and businesses, as well as accessibility requirements, continue to increase even in a context of stagnant or declining population development. In addition, the development of North Savo's transport system must consider multi-local living, location-independent work and the needs of tourism.

In rail transport, the development of the entire Savonia railway line is required, not only the section between Kuopio and Kouvola. Measures are needed both to increase capacity and to shorten travel times. Improvements and electrification of the Siilinjärvi–Viinijärvi–Joensuu and Pieksämäki–Varkaus–Joensuu transversal rail lines are necessary, particularly for freight transport serving industry; in the latter case, electrification is also essential for the development of passenger rail services via Varkaus. Across all rail lines, there are numerous level crossings in need of removal, as they pose traffic safety risks and impose speed restrictions.

There are substantial improvement needs on national roads 5 and 9, which traverse North Savo. On national road 5, the improvement of the Leppävirta–Kuopio section has begun and, according to current estimates, is expected to be fully opened to traffic in 2030. In Lapinlahti, the road plan for the Nerkoo section (Valkeinen–Taipale) is undergoing approval procedures, but no funding has yet been allocated for its implementation. Once the general plan for the Siilinjärvi–Alapitkä (Lapinlahti) section has been approved, preparation of a detailed road plan must be initiated without delay. Additional improvement needs on national road 5 exist, among others, between Varkaus and Leppävirta, and between Lapinlahti and Iisalmi.

On national road 9, the Rissala grade-separated junction in Siilinjärvi and the emergency runway between Rissala and Jännevirta are scheduled for completion in 2025. Road planning is currently underway only for the Vartiala–Riistavesi section in Kuopio. This planning area includes the critically deteriorated Kivisillansalmi bridge, whose potential weight restrictions pose a severe risk to industrial transport due to the extremely long detour routes required. Initiating planning for the similarly critical Tulisalmi bridge east of Tuusniemi is an urgent priority. Significant improvement needs on national road 9 also exist, inter alia, between Vuorela and Toivala in Siilinjärvi, between Tuusjärvi and Hietämäki in Tuusniemi, and along the entire stretch of national road 9 west of national road 5 to the regional border of Central Finland.

Within North Savo, national roads 5 and 9, the Savonia railway line, and the Iisalmi–Ylivieska and Siilinjärvi–Joensuu rail lines are part of the European TEN-T network. Efforts should therefore be made to secure EU funding for the planning and implementation of development measures on these corridors.

Against this background, it is essential to ensure the availability of public transport services, to advance key infrastructure projects, and to take into account the regional needs of industry. In parallel with the development of the transport network, improving accessibility also requires investment in digital infrastructure, such as broadband connections, to meet the needs of businesses and residents. Identifying the specific strengths of different areas supports balanced development within the region. The development of broadband connections and 5G networks would enable the growth of multi-local living and particularly support service provision and development opportunities in rural areas.

From the perspective of spatial structure, a key issue is safeguarding the growth conditions of the Kuopio region while simultaneously creating favourable conditions for population and labour force development in the other sub-regions of North Savo. In rural municipalities, important actors include LEADER groups and the North Savo village networks. Village-level activities can significantly promote regional prosperity and highlight the opportunities North Savo offers for living and quality of life. This, in turn, can contribute to the expansion of multi-local work and entrepreneurship. The role of local heritage associations is also significant in prosperity-building and in preserving regional identity, which together create the foundations for a balanced spatial structure across North Savo.

Comprehensive Security

In the context of the Regional Programme, comprehensive security refers to systematic and forward-looking action that supports regional resilience and the continuity of functions under all circumstances. At the same time, activities that strengthen comprehensive security in businesses, public administration, research institutions and civil society organisations generate new operational needs and business opportunities, thereby reinforcing regional prosperity. Comprehensive security is a cross-cutting theme of the Regional Programme because it is not a condition produced by any single actor, but rather one that requires multi-sectoral, network-based and future-oriented cooperation.

North Savo is, in many respects, a leading region in Finland in the development of public authorities' comprehensive security functions. The Emergency Services Academy trains the majority of Finland's rescue services professionals and provides education related to municipal preparedness and civil protection. The Karelian Air Command is a strategically important training and operational unit of the Finnish Defence Forces. The University of Eastern Finland provides nationally significant research and education in medicine, nutrition and toxicology, with broad relevance for wellbeing services counties as well as regional and national authorities responsible for food and health security. It is also noteworthy that the majority of Finland's emergency and authority vehicles are manufactured and equipped by two companies located in North Savo.

The comprehensive security competence centre to be established in Kuopio

will generate expertise to safeguard functions vital to civil society and to strengthen citizens' psychological resilience in all circumstances. The centre will enhance cooperation, leadership and communications among comprehensive security actors, as well as the functionality and security of supply of critical infrastructure in a broad sense. Nationally significant civil protection expertise will be developed within the centre, building on the enhancement of crisis preparedness related to Kuopio's nationally important dual-use civil defence shelter, Luola. Luola will also serve as a prominent showcase of Finnish comprehensive security expertise for international visitors.

Strengthening the role of North Savo's priority sectors as a cross-sectoral cooperation network for comprehensive security is a key objective of the Regional Programme. This objective is supported by the emergence of the North Savo comprehensive security cluster. The priority sectors, organised as EU-level industrial clusters, represent ambitious, business-driven development work also in a European context, particularly in the fields of health, food, water and energy security. Strengthening the machinery and metal industry cluster into a region-wide and inter-regional entity is essential for influencing the advancement of the industrial modernisation that is necessary in Eastern Finland, nationally and at EU level. This renewal is also crucial from the perspective of strengthening the European defence industry and, more broadly, the strategic autonomy of the continent.

The development of the North Savo comprehensive security cluster aims to enhance the prosperity of Eastern Finland as a whole and, in doing so, to contribute to safeguarding the resilience of the EU's eastern border region. While the initiative is led by the Regional Council of North Savo, it is not intended to remain confined to a single region. The objective is to create an ecosystem covering Eastern Finland that supports business growth through new comprehensive security innovations and strengthens research, development and innovation activities in the field. This also constitutes an important component of Finland's broader EU influence efforts, aimed at advancing preparedness and crisis resilience across the Union.

Biodiversity and Adaptation to Climate Change

Biodiversity must be considered in all development measures, at a minimum as a consideration of the environmental impacts of the available options. In its own decision-making, the Regional Council of North Savo cannot and does not wish to impose any additional bureaucratic procedures in this regard. Rather, this is a question of a mindset—one that has concrete and practical consequences in real-world choices.

In a similar way, the consideration of climate impacts needs to become a routine part of decision-making. Climate change should therefore be approached from two complementary perspectives: climate change mitigation and adaptation to climate change.

Climate Change Mitigation

North Savo aims to achieve carbon neutrality by 2035. The region's shared climate objectives are set out in the North Savo Climate Roadmap, which was approved in May 2021 and updated in 2023. Greenhouse gas emissions in North Savo have shown a slight downward trend in recent years.

According to data from the Finnish Environment Institute (SYKE), greenhouse gas emissions excluding industrial process emissions, domestic aviation and the land use sector amounted to 1,866 kt CO₂-equivalent in 2023. Total emissions declined by 47%, and per capita emissions by 45%, between 2007 and 2023. The largest sources of greenhouse gas emissions are agriculture (31%), road transport (24%) and heating (16%).

Emissions from the energy sector are expected to continue decreasing as the use of fossil fuels declines and energy efficiency improves. The most significant challenges relate to reducing emissions from the land use sector, agriculture and road transport. In the land use sector, substantial additional measures are needed to strengthen carbon sinks in order to make the regional target of carbon neutrality by 2035 achievable.

Adaptation to Climate Change

Climate change adaptation addresses the impacts and consequences of climate change. Through proactive adaptation measures, it is possible to reduce the negative effects of climate change on people, nature and societal functions. In North Savo, a regional climate change adaptation plan will be prepared during 2025. The plan will outline the key measures for adaptation to and preparedness for climate change. The preparation of the plan is coordinated through the Carbon-Neutral North Savo – Responsibly and Effectively (HIPOVA) project led by the North Savo ELY Centre.

In North Savo, several climate change-related phenomena have been identified as posing the most significant weather- and climate-related risks to the region. These include changes in precipitation patterns, changing winter conditions, storms, rising temperatures, and the decline of biodiversity. Risk cards have been prepared for municipalities in the region, identifying key risks and the necessary response measures at the municipal level. In addition, a regional climate change adaptation model has been developed in North Savo. The accompanying figure illustrates the model's key components and the ongoing work being undertaken in the region to support adaptation to climate change.

Indicators

- Regional RDI expenditure (Research, Development and Innovation)
- Business investments
- Gross value added (GVA)
- Number of exporting enterprises
- Greenhouse gas emissions per capita
- Employment rate
- Share of population aged 15 and over with a completed qualification
- Morbidity index
- Share of the population able to reach the regional centre within one hour (by private car / public transport) (accessibility)



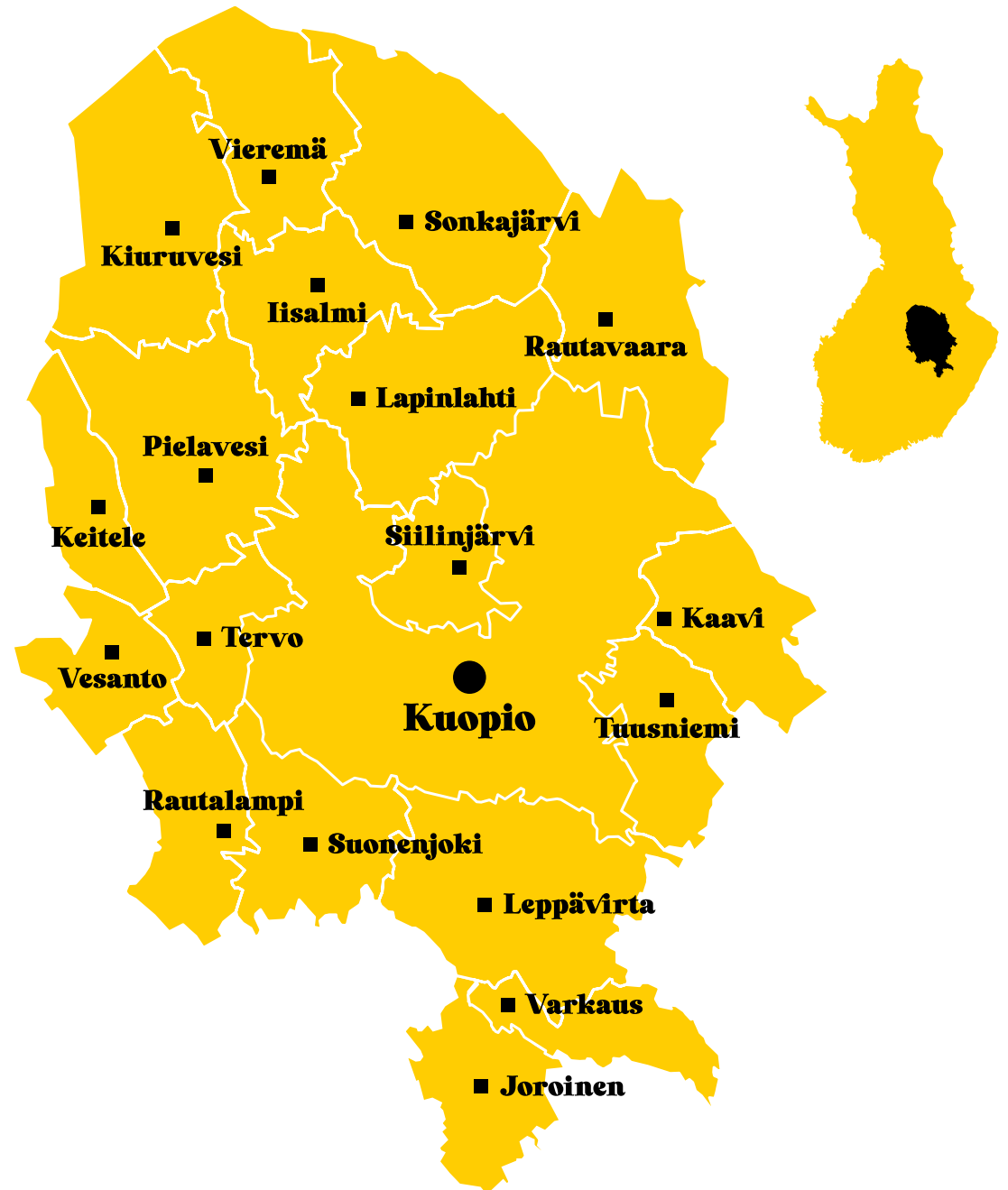
Figure: Regional operational model of North Savo for climate change adaptation and climate risk management.



Figure: The most significant phenomena caused by climate change in North Savo.



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North Savo Regional Council, Sepänkatu 1, FI-70100 Kuopio, Finland
kirjaamo@pohjois-savo.fi
www.pohjois-savo.fi