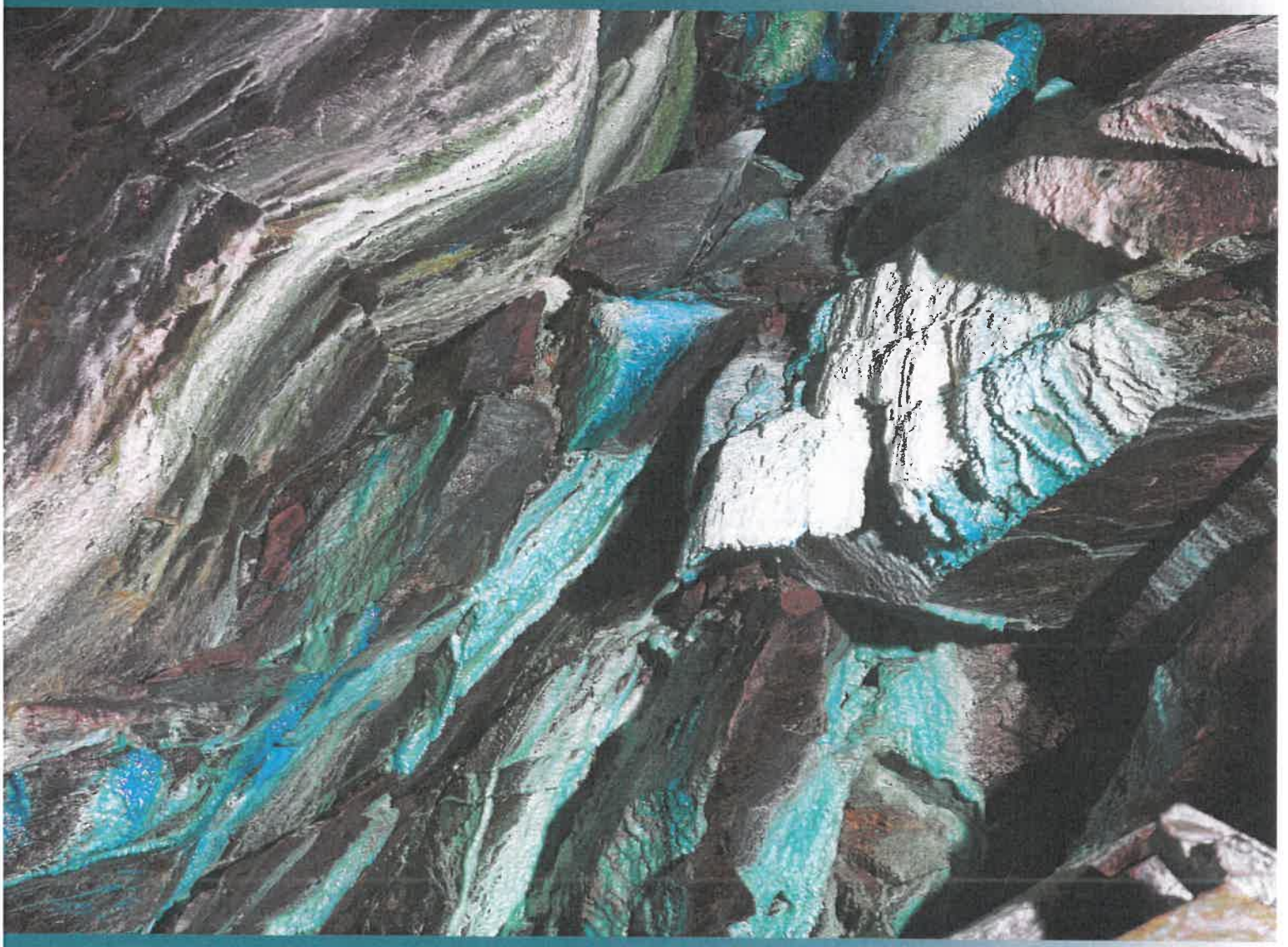
OECD Regional Development Papers

Enhancing regional mining ecosystems in Central Ostrobothnia, Finland



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Cover image: Dmitry_Chulov / Getty Images Plus

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Executive summary

Central Ostrobothnia is Finland's second smallest region by area (5 000 square kilometres, km²) and population (68 000 inhabitants). It has a strong industrial base, particularly in the chemical and industrial sectors. The region hosts Northern Europe's largest inorganic chemical industrial park, with 80 companies employing around 2 400 people, equivalent to 8.5% of the regional workforce. The mining sector is expected to grow with several exploration projects, especially in lithium. The industrial base is supported by educational and research institutions and a local labour market centred around the town of Kokkola.

Central Ostrobothnia is a key player in the European Union (EU) mining and chemical value chains. It is home to Finland's only lithium mine (Keliber), one of the EU's largest integrated lithium projects, which is expected to start producing battery-grade lithium hydroxide in 2026. The project's relatively low-carbon footprint is supported by short distances between mining and processing sites and the availability of renewable energy. The region also hosts the European Union's second-largest zinc smelter and an active cobalt facility, positioning it as a contributor to the EU battery and clean technology sectors.

The region's industrial ecosystem has the potential to support greater EU self-sufficiency in critical raw materials, particularly in relation to batteries and clean energy. However, it faces several bottlenecks. These include gaps in institutional co-ordination, the need for improved infrastructure planning, a shortage of skilled workers and limited engagement between small and medium-sized enterprises (SMEs) and the innovation ecosystem. Stronger links between industry, local government and research actors are needed to align investments with regional development objectives.

This paper identifies 14 recommendations across 4 pillars to strengthen Central Ostrobothnia's mining ecosystem and its contribution to regional development and the EU mineral supply chain:

1. **Governance and community engagement for more sustainable mining**: update the regional mining strategy with long-term goals and a multi-stakeholder governance mechanism; promote neutral communication and transparency on mining impacts and benefits; and align private environmental, social and governance actions with regional development needs.
2. **Innovation and circular economy**: improve links between research institutions and mining companies; support innovation based on regional needs; develop a standard framework for environmental and social reporting; and facilitate SME access to circular economy projects and EU innovation funding.
3. **Employment and skills**: expand targeted training for emerging sectors including mining, batteries and renewable energy; support educational pathways from vocational to higher education; and promote inclusion of the local inactive workforce and international workers.
4. **Infrastructure**: anticipate transport, energy and housing needs related to upcoming projects through co-ordinated planning and national-regional collaboration.

1 Relevance for EU self-sufficiency in mineral raw materials

Unhindered and reliable access to critical raw materials and strategic raw minerals is vital for OECD countries and the European Union to achieve self-reliance in digital and renewable energy technologies and meet climate goals. Given the geographical concentration of minerals, regions and municipalities are crucial to facilitate, plan and implement mineral-related projects with greater economic, social and environmental outcomes.

Central Ostrobothnia is set to play a pivotal role in Europe's sustainable energy landscape with the forthcoming establishment of one of the largest integrated lithium projects in the European Union. With this project, the region will stand as one of the main EU suppliers of battery-grade lithium hydroxide, benefitting from an integrated project with a relatively low-carbon footprint given the short distance between the main and the refinery (70 km) and the high supply of renewable energy in the region. The region also hosts a higher education institution with research in mineral processing. The mining sector in Central Ostrobothnia accounts for roughly 4% of the regional workforce, with significant potential for growth due to ongoing exploration projects in lithium, cobalt and other critical minerals.

Figure 1.1. Central Ostrobothnia, Finland

Source: verkostojarjestot (2024[1]), *Keski-Pohjanmaan järjestöyhteistyö*, https://www.verkostojarjestot.fi/keski-pohjanmaa/.

Central Ostrobothnia's position in the EU mining value chain

- Finland's only lithium mine (Keliber) (Sibanye-Stillwater, 2025[2])
- the European Union's largest lithium mine to start production (EIB, 2024[3])
- the largest inorganic chemical industrial park in Northern Europe (Kokkola, 2024[4])
- the European Union's second-largest zinc smelter (Boliden, 2024[5]).

The national mineral outlook

For the national mineral outlook, please refer to the official Finnish National Mineral Outlook that can be found in the repository of the project.

Regional mines and exploration projects

Central Ostrobothnia is an upcoming EU mining region, with lithium mining set to commence in 2026. South-African company Sibanye-Stillwater operates Keliber Mine, aiming to produce 15 000 tonnes of battery-grade lithium hydroxide monohydrate annually for at least 16 years. Boliden from Sweden runs Kokkola Zinc Smelter, the largest industrial employer in Kokkola. Belgian company Umicore operates Kokkola Cobalt Smelter, sourcing cobalt from the Democratic Republic of Congo. Additionally, Arvo Metals Oy is exploring for lithium in the region, having secured about 1 600 km² in the key lithium district. Also, Kälviä Titanium Project (Tetra Ekberg Oy) is developing former discovery of the titanium-vanadium deposit Koivusaarenneva, which was test mined at the turn of the millennium.

Table 1.1. Key active projects

Company	Headquarters	Mine/plant	Minerals	Municipality	Employees	Relevant information
Sibanye-Stillwater	South Africa (20% owned by Finnish Minerals Group)	Keliber Oy holds the lithium deposits at Länttä, Outovesi, Rapasaari and Syväjärvi, which are currently in the mining project phase, pending the commencement of mining operations.	Lithium	Kaustinen, Kokkola and Kruunupy	Employing 500 people in the construction phase and about 300 on permanent contracts. Seven hundred estimated indirect jobs.	Keliber aims to be one of the European Union's first integrated high-purity lithium operations, producing lithium hydroxide chemicals. It estimates annual production of about 15 000 tonnes of battery-grade lithium hydroxide monohydrate for at least 16 years.

Table 1.2. Key exploration projects

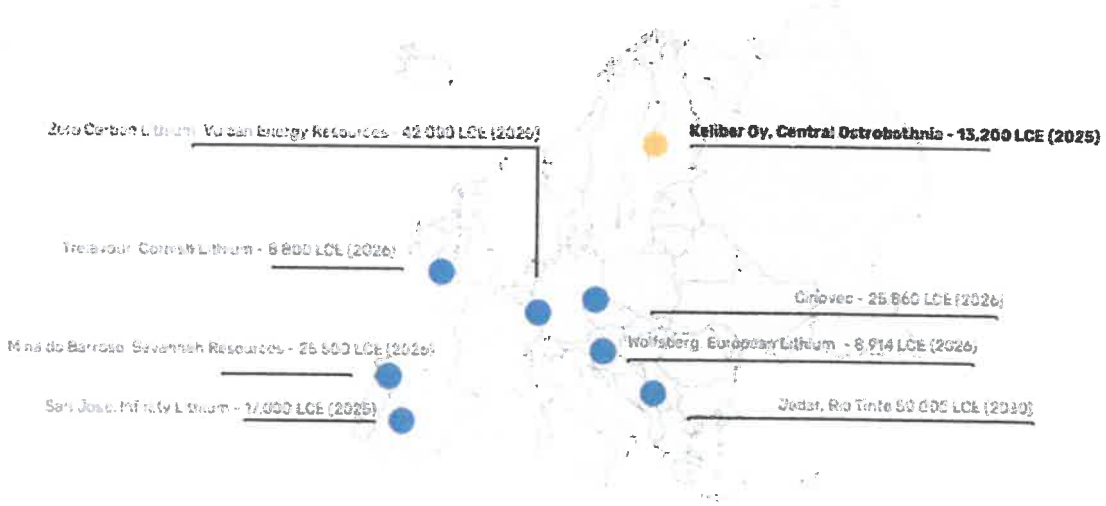
Company	Headquarters	Mine/plant	Minerals	Status	Relevant information
Arvo Metals Oy	Finland	Currently exploring for lithium deposits.	Lithium	Exploration project	Have secured approximately 1 600 km² in the key lithium district and are currently exploring.
Tetra Ekberg Oy	Finland	Application for exploration permit for titanium and vanadium.	Titanium, vanadium	Exploration project	Tetra Ekberg Oy is continuing exploration and development of the titanium-vanadium deposit at Koivusaarenneva.

Box 1.1. The Sibanye-Stillwater Keliber lithium project

The Finnish region of Central Ostrobothnia's goal is to become the European Union's leading producer of battery chemicals (lithium, cobalt, etc) in the next 5 years, supplying an estimated 15 000 tonnes per year of battery-grade lithium hydroxide monohydrate. The Keliber project is owned by Keliber Oy, a Finnish mining company. The majority shareholder in Keliber is Sibanye-Stillwater, a global precious metals mining company, which acquired a controlling interest in 2021. The project focuses on developing a lithium mine and a lithium hydroxide refinery in Central Ostrobothnia. This lithium is critical for producing batteries used in electric vehicles and energy storage systems, aligning with EU green transition goals.

The Keliber lithium project in Central Ostrobothnia is expected to have significant impacts on both the local economy and the broader European Union. Locally, the project is set to create substantial employment opportunities. During the construction phase, up to 500 professionals will be employed and, once production starts, around 300 direct jobs will be created along with numerous subcontracting positions. This influx of employment will boost local economic activity, increase tax revenues and foster co-operation with local educational institutions to meet the demand for skilled labour.

Figure 1.2. Key lithium projects in Europe



On a broader scale, the Keliber project is crucial for the European Union's strategic goal of enhancing its supply chain for battery materials. By producing battery-grade lithium hydroxide domestically, the project reduces EU dependence on external sources for this critical mineral, essential for electric vehicles and renewable energy storage. This aligns with EU green transition goals and supports the broader push towards electrification and sustainability within the region.

Economic, social and environmental outlook of Central Ostrobothnia

Administrative structure and location of mining activity

Central Ostrobothnia is composed of eight municipalities, with Kokkola serving as the regional capital. Kokkola functions as a central local labour market for the region, with the remaining municipalities forming more self-contained labour markets. Mining activity is concentrated in Kaustinen and Kokkola, which also show relatively better demographic performance compared to the rest of the region. Additional exploration projects are ongoing in municipalities such as Kannus and Toholampi.

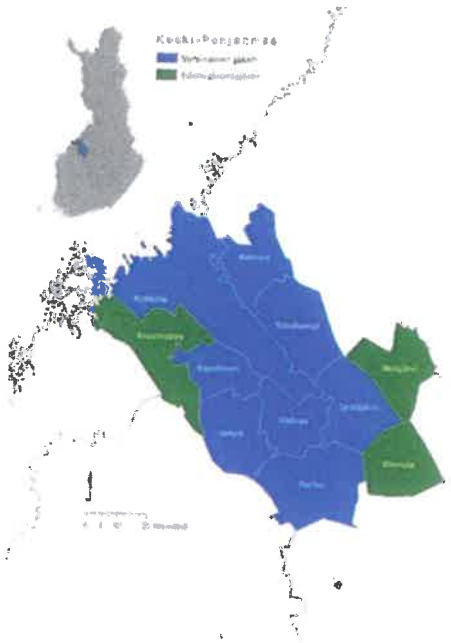
Between 2010 and 2021, population trends varied across municipalities. Kokkola was the only municipality to experience population growth, supported by its industrial and mining activities. Municipalities with mining projects tend to have a higher share of working-age population compared to the regional average. In contrast, rural municipalities without active industrial or mining projects, such as Halsua and Lestijärvi, have experienced sharper population declines and lower shares of working-age residents.

Table 1.3. Central Ostrobothnia population dynamics by municipality

Municipality	Population growth (%) (2010-21)	Population (2021)	WA population (%)	Intermunicipal migration gain/loss, persons (2020)	Mining-related project
Halsua	-16	1 083	50	-7	No
Kaustinen	-2	4 196	56.9	-7	Yes
Lestijärvi	-16	719	50.1	-3	No
Perho	-9	2 676	50.2	-33	No
Toholampi	-16	2 938	52.7	-14	No
Veteli	-12	3 056	52.4	-28	No
Kannus	-6	5 390	56.3	-39	No
Kokkola	4	47 909	58.5	-84	Yes
Central Ostrobothnia	*-0.8*	*67 805*	*57.2*	*-191*	
Finland	**4**	**5 563 970**	**66**	**5 000**	

Source: Statistics Finland (2024[6]), *Municipalities*, https://stat.fi/en/luokitukset/kunta/kunta_1_20250101.

Figure 1.3. Municipalities in Central Ostrobothnia



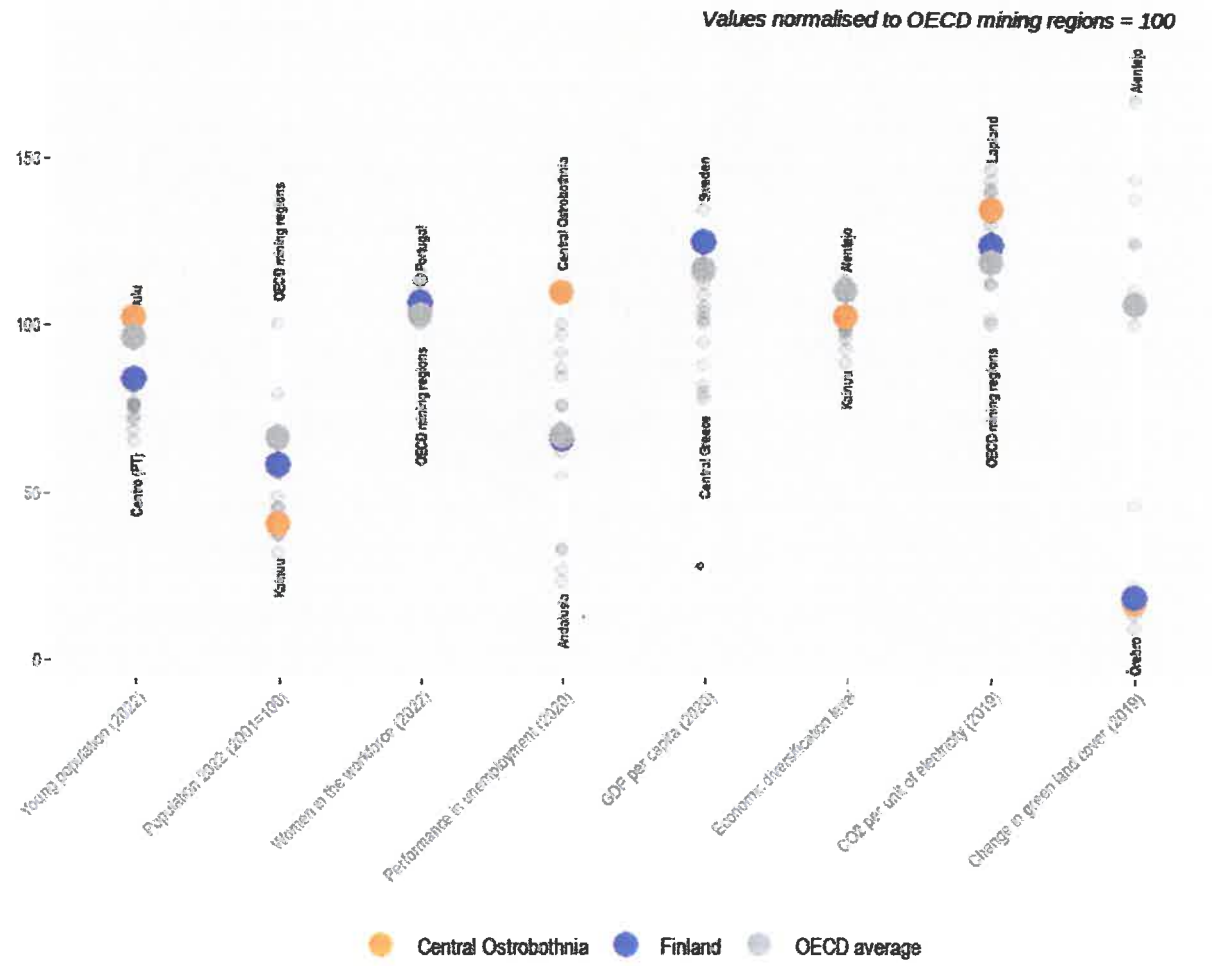
Source: keski-pohjanmaa (2024[7]), *Mission Statement and Tasks of the Regional Council of Central Ostrobothnia*, https://www.keski-pohjanmaa.fi/en/jasenkunnat.html.

Regional well-being performance relative to OECD mining regions

The following section analysis uses TL3 regional benchmarks to enable a consistent comparison of Central Ostrobothnia with other regions of similar territorial scale across OECD countries[1] (OECD, 2023[8]), (OECD, 2020[9]). The indicators below illustrate the region's relative position across key economic, social and environmental dimensions.

Central Ostrobothnia performs above the OECD mining regions benchmark in several economic and social indicators. The region stands out in terms of GDP per capita, unemployment performance, the share of young people, and the participation of women in the workforce. Economic diversification is also slightly higher than the benchmark. However, the region scores well below the benchmark in population change since 2001, reflecting long-term demographic challenges. In environmental terms, Central Ostrobothnia in a similar trend than Finland, records low values in green land cover growth, suggesting room for improvement in the environmental dimension.

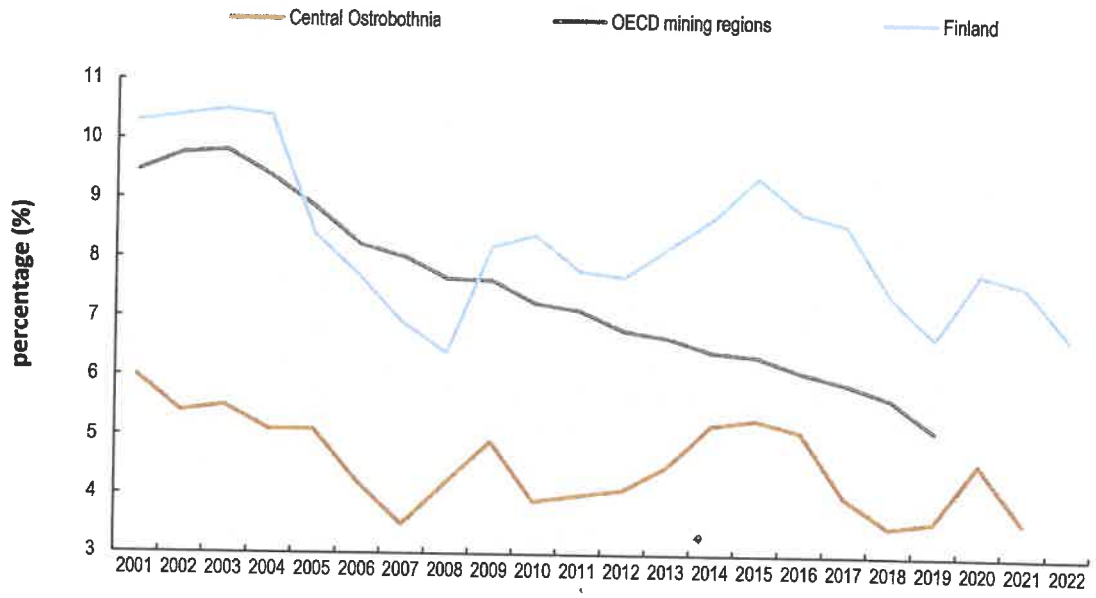
Figure 1.4. Overall performance of Central Ostrobothnia relative to OECD mining regions



Note: Values are normalised to the OECD mining regions benchmark (set to 100). A higher value indicates better performance. See the endnote for explanations of the variables and the corresponding time frames. OECD average is calculated as the average of national values.
Source: OECD (2024[10]), *Regions, Cities and Local Statistics*, https://www.oecd.org/en/topics/regions-cities-and-local-statistics.html.

Unemployment in Central Ostrobothnia has declined gradually since the aftermath of the global financial crisis. In 2022, the unemployment rate fell to 4.8%, lower than both the national and OECD mining region averages. This trend reflects the region's strong industrial base and active labour market, although continued demographic shifts may affect labour supply in the medium term.

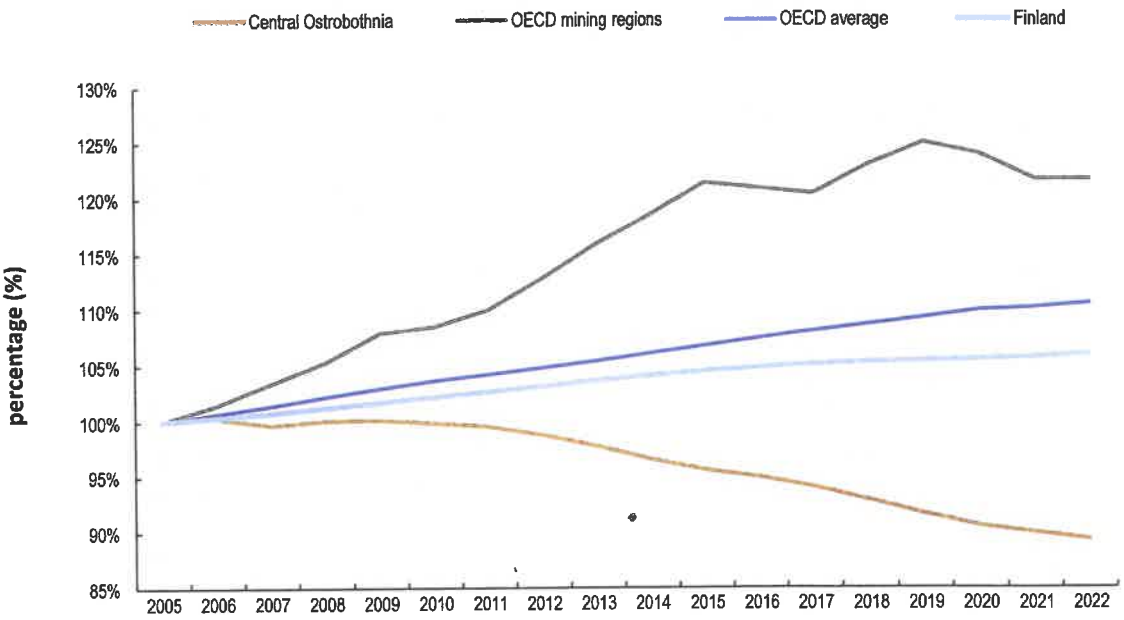
Figure 1.5. Unemployment rate in Central Ostrobothnia, OECD Mining Regions averages and Finland



Note: Unemployment rate of population between 16-64 years old. Data for OECD average on unemployment is restricted due to data availability. OECD mining regions is calculated as explained in the endnotes of the policy paper.
Source: OECD (2024[10]), *Regions, Cities and Local Statistics*, https://www.oecd.org/en/topics/regions-cities-and-local-statistics.html.

Population growth in the region has declined considerably over the last two decades, in line with broader demographic trends affecting several regions. While some municipalities have maintained relative stability, others continue to face significant outmigration and ageing. Nonetheless, certain municipalities in Central Ostrobothnia continue to experience outmigration, and the working-age population is shrinking.

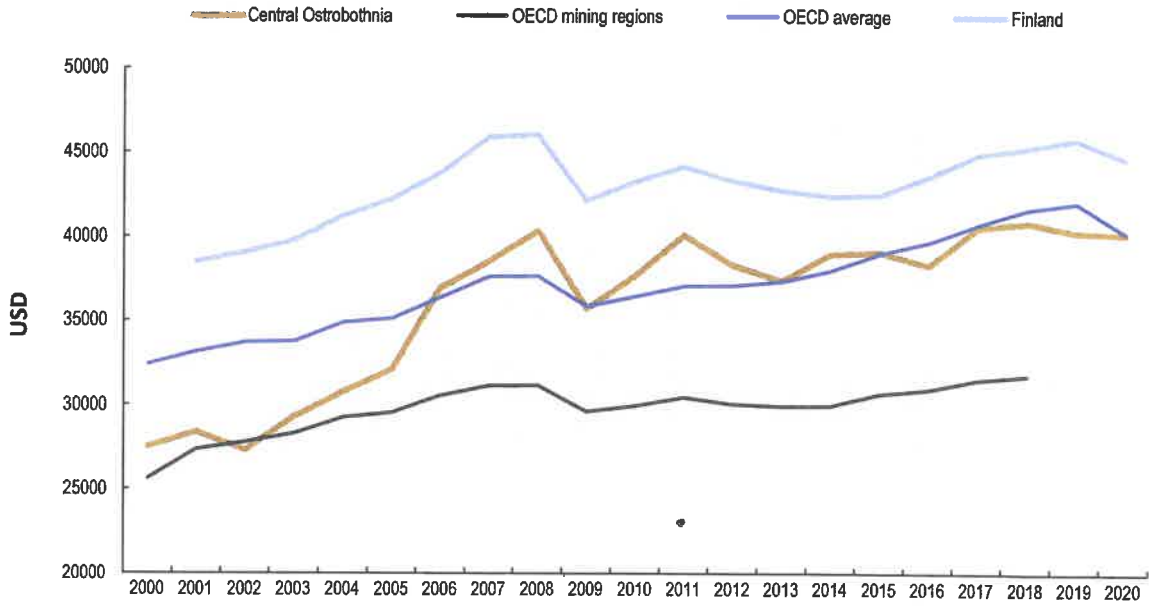
Figure 1.6. Population growth, Central Ostrobothnia, OECD Mining Regions averages and Finland, 2001-22



Note: Population in 2001=100. OECD average is calculated as the average of national values. OECD mining regions is calculated as explained in the endnotes of the policy paper.
Source: OECD (2024[10]), *Regions, Cities and Local Statistics*, https://www.oecd.org/en/topics/regions-cities-and-local-statistics.html.

GDP per capita in Central Ostrobothnia has grown steadily over the past two decades and is now close to the OECD mining average, though it remains below the Finnish national level. The upward trajectory suggests positive productivity trends, likely driven by the region's advanced industrial and chemical sectors, though further investment in innovation and skills could help close the national gap.

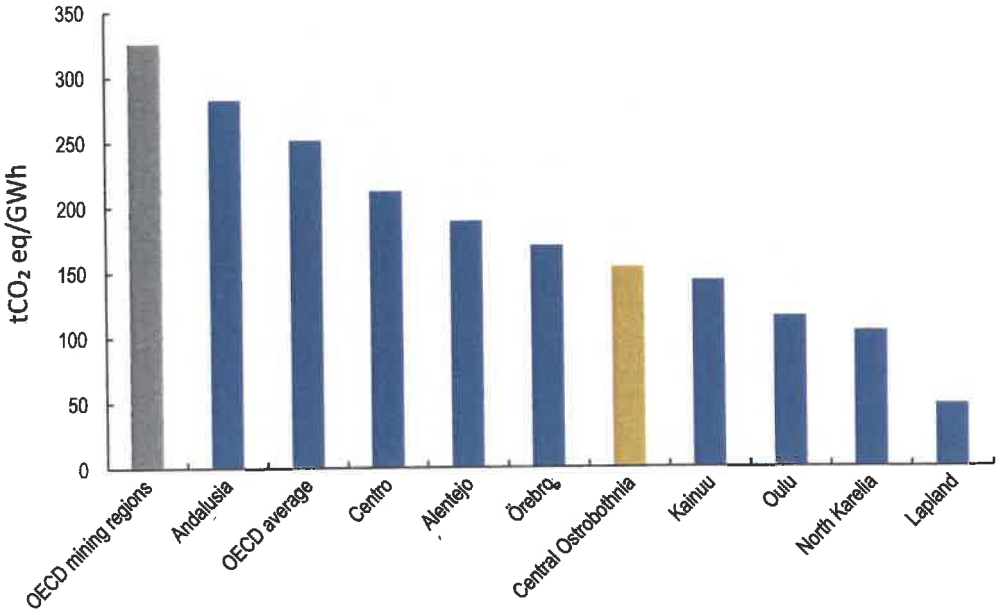
Figure 1.7. GDP per capita, Central Ostrobothnia, OECD Mining Regions averages and Finland, 2000-20



Note: USD PPP, constant price 2015. OECD average is calculated as the average of national values. OECD mining regions is calculated as explained in the endnotes of the policy paper.
Source: OECD (2024[10]), *Regions, Cities and Local Statistics*, https://www.oecd.org/en/topics/regions-cities-and-local-statistics.html.

GHG emissions per unit of electricity generated are below the OECD mining regions average, highlighting a relatively efficient and less carbon-intensive energy mix. However, emissions remain higher than in other Finnish regions, reflecting the region's industrial activities and energy demand. Enhancing energy efficiency and expanding low-carbon solutions in mining and industrial operations will be key to further progress.

Figure 1.8. GHG emissions in Central Ostrobothnia, OECD Mining Regions averages and Finland, 2019



Note: Measured in tonnes of carbon dioxide equivalent per gigawatt hour (tCO_2 eq/GWh). OECD average is calculated as the average of national values. OECD mining regions is calculated as explained in the endnotes of the policy paper.
Source: OECD (2024[10]), *Regions, Cities and Local Statistics*, https://www.oecd.org/en/topics/regions-cities-and-local-statistics.html.

Regional policy context for mining

The Regional Council of Central Ostrobothnia is responsible for the region's planning and development, managing regional development strategies and programmes, planning development measures and implementing financing programmes. The main policies relevant for mining are listed in Table 1.4.

Table 1.4. Analysis of Central Ostrobothnia regional policy

Policy instrument	Description	Mining scope	Takeaways
Central Ostrobothnia Regional Programme 2022-2025	A long-term regional development plan that guides development funding, regional planning and spatial planning.	The region is focusing on sustainable mining practices, with the development of the European Union's first high-quality lithium mine. The goals include expanding mining activities, enhancing renewable energy usage and integrating circular economy principles.	The main strategic documents emphasise the importance of sustainable practices and innovation in mining to drive regional economic growth. However, there is a need for better infrastructure planning and co-ordination between regional and national authorities.
Sustainable Smart Specialisation Strategy for 2022-2025	A model for regional governance aimed at enhancing smart growth and balancing sustainable development.	The strategy focuses on developing clean technologies, including hydrogen, wind and solar energy, alongside mining. It includes creating a mining cluster, increasing exports and launching new mining projects while supporting existing operations.	The strategy highlights the need for skilled labour and targeted education programmes to meet the demands of emerging industries. There is also a focus on community engagement and participative planning processes to ensure local support for mining projects.

Regional Strategy for Extractive Industries 2019-2025	Implements mining-related objectives from the Central Ostrobothnia Regional Programme, focusing on improving the linkages between mining and regional development.	The strategy aims to sustainably grow the extractive cluster in Central Ostrobothnia by linking research, development and innovation. It also focuses on developing new mining-related products and addressing workforce availability.	The strategy underscores the importance of collaboration with educational institutions for R&D in clean technologies and sustainable practices. There is a need for better risk prevention strategies and streamlined permitting processes to support mining activities.

2 Enabling factors for an improved regional mining ecosystem

The right regional conditions are important, both to facilitate the implementation of responsible mineral-related projects and increase raw material supply and to ensure greater benefits for the long-term development of communities. The geographic concentration of mineral deposits and know-how as well as the proximity to communities makes regional and municipal governments key players in the European Union's pursuit of greater mineral self-sufficiency. Regions can strengthen policy and governance frameworks to improve social licence to operate and community participation in projects' benefits, support regional innovation ecosystems to advance circular mining practices and local value-added, enhance supply of skills and road and energy infrastructure. This section analyses opportunities, challenges and good practices across different enabling factors in view of enhancing regional mining ecosystems.

Main strengths and bottlenecks of the mining ecosystem

Key opportunities

- **Mineral endowment**: The mining ecosystem has important potential with its large lithium reserves.
- **Institutional support for sustainability**: The region ensures adequate institutional backing for the projected EUR14 billion investments by 2027 in hydrogen, wind and solar technologies, establishing policies that foster successful green investments and sustainable practices.
- **Municipalities with sound governance approach** improve the alignment of mining projects with local development goals (e.g. Kaustinen).
- **Educational and research institutions for mining**: Centria University of Applied Sciences, the Kokkola University Consortium Chydenius, the Federation of Education in Central Ostrobothnia and the Geological Survey of Finland promote education and research in clean technologies, with vocational training to integrate local and international workers in mineral and industrial activities.

Key challenges

- **Cumulative environmental pressures** come from various land-use activities including mining, renewable energy projects and forestry.
- **Workforce challenges** include potential shortage of 6 000 qualified professionals, coupled with an ageing population, low unemployment rate and lack of affordable housing.
- **Infrastructure needs**: Transport infrastructure requires futureproofing planning to support efficient industrial and mining operations and reduce impact on municipal roads.
- **Institutional co-ordination issues**: The Centre for Economic Development, Transport and the Environment in Central Ostrobothnia is crucial for regional development and managing economic, transport and environmental policies. Effective co-ordination among these sectors is vital to

harness the region's economic assets and support its sustainability initiatives, ensuring that government policies are implemented efficiently and synergistically.

Governance engagement for more sustainable mining (Thematic focus)

Key opportunities

- **Strong governance frameworks** to guide mining development and align it with regional growth and environmental sustainability, including the Central Ostrobothnia Regional Programme and Smart Specialisation Strategy for 2022-2025.
- **Public-private collaboration**: There is significant potential to enhance governance and community engagement through collaborative efforts between public institutions and private mining companies. Initiatives like the Kokkola Industrial Park business incubator foster innovation and sustainable practices through co-operation between multiple stakeholders, including educational institutions and local businesses.
- **Community acceptance**: Community engagement in Central Ostrobothnia involves public consultations, participative planning and continuous dialogue with local stakeholders. This approach ensures that mining projects align with community interests and environmental standards, fostering trust and co-operation between the industry and local residents.
- **Cultural heritage and newcomers' adaptation**: Beyond the economic opportunities that the region provides, traditions and cultural heritage (e.g. folk music festival) act as a catalyst for attracting population and enhancing the well-being of local communities. As the needs for labour will continue to grow (expected need of about 6 000 employees by 2030), the regional government with the town of Kokkola and the rest of municipalities have established programmes to help adapt newcomers to the region.

Key challenges

- Futureproofing of upcoming investments and economic development in the area is needed to improve:
  - **Environmental monitoring:** Balancing mining activities with environmental protection, especially for biodiversity and water, presents a critical challenge. Particularly in terms of environmental monitoring and management capabilities.
  - **Post-mining closure**: There are no clear strategies for the post-mining phase, which needs to involve collaborative planning among regional stakeholders to determine future options of mining repurposing and land use. This process is guided by legislation and requires technical expertise to ensure effective environmental rehabilitation.
  - **Anticipatory Infrastructure planning**: there is a need to further analysis to ensuring current infrastructure can support the anticipated surge of multiple economic activity reliant on land and road transport, including mining and renewables. This includes evaluation of shared infrastructure and greater capacity of existing ports.
- **Contextual anti-mining movement**: While protests against mining are not significant in the region, they do exist across the country. Efforts to maintain communication and transparency – including guidelines or action framework – regarding mining activities are important to uphold trust and social permission for mining operations.

Good practices

- **Community engagement**: The municipality of Kaustinen has organised workshops with local communities in the town hall to engage and inform about local development plans – including mining projects – and ensures that these initiatives align with local interests.
- **Private sector-led air quality monitoring system**: Kokkola Industrial Park and the town of Kokkola have jointly collaborated on a programme to track air pollution in the region and inform citizens.
- **Mapping of local labour needs in Kaustinen subregion**: Five municipalities collaborate on a shared platform for job matching and enhancing SME capabilities. This model facilitates mapping labour needs, enabling joint planning, capacity building and investment attraction.

Innovation and circularity

Key opportunities

- **The regional government has an opportunity to host and facilitate regular** networking sessions between entrepreneurs and researchers with mining projects to promote circularity and industrial innovation. For this, the region can leverage:
  - The town of Kokkola has a hub to organise regular matchmaking meetings between companies, entrepreneurs and workers.
  - LEY funds for research and innovation to advance research in mining and related technologies.
  - The universities and research institutions in the region, such as Centria University of Applied Sciences, Kokkola University Consortium Chydenius, the Federation of Education in Central Ostrobothnia and the Geological Survey of Finland, to actively engage them in mining-related R&D. These institutions focus on areas like geological scientific research, mineral processing, digital solutions for circular economy practices and the development of sustainable products and processes. Centria has been instrumental in 133 R&D projects, primarily in the chemical industry and funded by the European Union.
- **Integration of circular economy practices** from the Kokkola Industrial Park into mining-related processes is pivotal. Kokkola Industrial Park has incorporated circular economy technologies, including the initiatives of the Kokkola lithium and hydrogen project, by utilising renewable energy sources and integrating local businesses into the circular economy supply chain. This framework can further advance the battery value chain, attracting companies interested in battery recycling. Kokkola University Consortium Chydenius and Centria University of Applied Sciences are actively researching battery recycling and biobased battery materials, complemented by the University of Oulu's eight patents, one of which focuses on lithium recycling. Strengthening this innovative ecosystem necessitates forging long-term partnerships with local companies, entrepreneurs and universities.
- **New innovations emerging** from mining activities include the reuse of tailings and the utilisation of sidestreams from other industries as a minimal input in the production processes of various sectors.
- **Renewable energy integration**, biogas, wind and solar energy projects in the region support sustainable mining practices, promoting energy efficiency and creating new job opportunities, exemplified by the successful transformation of the biogas industry in Kannus and Kaustinen.

Key challenges

- **High financial risk for technological adoption in mining**, which deters local companies from engaging in technological innovation due to the substantial capital required for lengthy and uncertain projects.
- **Skill shortages**, particularly of skilled workers with expertise in environmental management and digital technologies.
- **The slow, lengthy and complex permitting processes** can delay the implementation of essential environmental investments, such as improvements in water treatment systems, thereby hindering the progress of sustainable mining initiatives.
- **Challenges in long-term research funding** and in the move towards business ideas: Securing funding for long-term research projects, particularly those aimed at valorising tailings and other mining byproducts, is challenging due to the uncertainties associated with the technologies and the balance between costs and potential benefits.
    - There are information gaps and limited support to assist SMEs in accessing EU funding for innovation. This inhibits innovation start-ups and the scaling up of existing SMEs in the mining sector. EU funding for innovation is also often limited in its support for the commercialisation of innovation technologies in the mining sector, making it difficult for innovation breakthroughs in universities to be utilised by SMEs within mining regions.

Good practices

- **Public-private partnerships**: Strong partnerships between educational institutions, research centres and mining companies facilitate the development of innovative solutions. For example, collaborations with the Geological Survey of Finland and local universities (Centria University of Applied Sciences, Kokkola University Consortium Chydenius and the Federation of Education in Central Ostrobothnia) support research on sustainable mining practices and the recovery of valuable materials from mining waste.
- **Circular economy projects**: Projects like the BATCircle network involve multiple stakeholders, including universities and mining companies, developing battery production capabilities and other circular economy solutions. These initiatives foster innovation and promote sustainable practices across the region.

Skills and workforce

Key opportunities

- **A collaborative educational ecosystem**: Ongoing partnerships among educational institutions meet the region's vocational education demand, which constitutes 60% of new job openings. Institutions like the Federation of Education in Central Ostrobothnia collaborate closely with mining companies to co-develop curricula and enhance training provisions. Notably, the federation is one of the few vocational education institutes in Finland offering training in English. Furthermore, universities of applied sciences such as Centria, with 20% of its students from abroad and a high retention rate in Finland (70%), contribute significantly to the region's educational landscape.
- **Strong skills infrastructure**: Central Ostrobothnia boasts a well-established skills infrastructure with multiple pathways into the mining sector. Vocational education emphasises skill upgrading and practical training through apprenticeships with mining companies, offering students hands-on experience with specialised machinery and tools.

- **High employment and wage opportunities**: Mining in Central Ostrobothnia provides attractive employment opportunities with high wages, comprehensive job benefits and promising career advancement prospects. The sector significantly contributes to the regional economy, employing a substantial portion of the labour force in mining-related activities.

Key challenges

- **Skill shortages:** Significant skill shortages exist in the mining sector, affecting both operators and high-skilled workers, particularly in areas such as the circular economy, digitalisation, automation and environmental management. These shortages are compounded by factors such as housing limitations, an ageing population, negative net migration and a high employment rate, which restricts the available labour force. Currently, only 2% of the unemployed population is readily available for work.
- **Attracting young talent and women**: The mining sector struggles to attract young people and women. At the main vocational school, only 10-20% of students are women and most students are over 25 years old. This demographic imbalance poses a challenge for diversifying and expanding the workforce.
- **Bureaucratic education pathways**: Although mechanisms exist for vocational students to transition to university programmes, the process is often bureaucratic and the information scattered. Streamlining this process could enhance opportunities for skill development and career progression.
- **Integration of foreign workers**: Language barriers pose a significant challenge for the integration of international students and workers in the mining sector. Addressing these barriers is crucial for retaining skilled foreign labour in the region.

Current policy efforts

- **Training support and co-ordination**: The Centre for Economic Development, Transport and the Environment acts as an intermediary to support training programmes that target and recruit workers for the mining sector. This support is part of the region's Smart Specialisation Strategy for 2022-2025, which aims to ensure the availability of skilled labour.
- **The Process Academy initiative**: The Process Academy, a pilot project running from 2020 to 2022, involved collaboration between local education institutions and mining companies. Supported by the European Social Fund, it aimed to map existing and future skills and training needs, develop a co-operation model between companies and educational institutions, and use a common platform for planning and implementing training programmes. The initiative received positive feedback despite challenges posed by the Coronavirus disease 2019 (COVID-19) pandemic.

Good practices

- **The KokkolaWorks campaign**: This joint campaign by the town of Kokkola, Kokkola Industrial Park and 15 companies aims to develop local services and workforce. It is an excellent example of how regional initiatives can support local economic development and workforce integration.
- **Circular and responsible mining**: Research led by Centria University of Applied Sciences on soil remediation projects involving tailings from lithium mines demonstrates proactive strategies to reduce environmental impacts and restore mining areas. Investments in renewable resources to power refinery plants, such as biogas, highlight a commitment to ecofriendly industrial practices.

- The Kasvun, Osaamisen ja Elinvoiman (KOE) uses skills foresight to advance workforce planning in Central Ostrobothnia (Centria, 2025[11]). This project is coordinated by Centria University of Applied Sciences, Kokkola University Consortium Chydenius and the Federation of Education in Central Ostrobothnia. The project focuses on identifying future skill needs and aligning education and training with the evolving demands of industries like digitalisation, green transition and bioeconomy. It is funded by the region of Central Ostrobothnia through national "Funding for sustainable growth and vitality in regions" (AKKE).

3 Recommendations

Table 3.1. Framework for action

Policy priorities	Key recommendations	Responsible actor(s)
	Governance and community engagement for more sustainable mining	
The regional strategy for extractive industries could benefit from a strong governance mechanism for implementation and monitoring.	• Update the regional mining strategy with a long-term timeline and intermediate concrete outputs. Establish a governance structure comprising regional stakeholders (companies, universities, community) to define concrete projects and goals based on local needs and monitor implementation beyond political cycles.	• Regional government in collaboration with major universities
Monitoring, communication and transparency around mining projects need improvement to ensure community support.	• Raise public awareness of geosciences, mining and mineral exploration by providing neutral information and involving citizens in local discussions concerning mining and its importance in daily life and regional development. • Establish mechanisms of measurement of the benefits of mining and mineral-related activities for the community in the economic and social dimensions.	• Regional and municipal governments, in collaboration with academia and the Geological Survey of Finland
Streamlining environmental, social and governance practices for new projects in the region, especially in the mining sector, is crucial for upholding trust and collaboration among all stakeholders.	• Improve the links of private companies' environmental, social and governance actions with regional needs. The regional and municipal government could establish formal co-operation with Keliber and other industrial companies to help align their environmental, social and governance actions with local needs and map such activities to promote them in the mineral strategy.	• Regional government • Mining companies
The vibrant portfolio of investments is bringing new challenges for the social development of the region.	• Establish guidelines for current mining and industrial companies in the region, with special focus on those mining exploration companies or other projects. These guidelines should include the need to engage municipalities and communities early and continuously, ensuring transparency and incorporating local input throughout development.	• Regional government • Private companies
	Innovation and circularity	
The region has strong research institutions but connection with mining-related companies or	• Facilitate better links between research institutions and mining-related companies by: ○ Promoting a knowledge exchange through (formal or informal) meetings led by the town of Kokkola to help researchers and companies find a channel for co-operation. This is especially relevant in a future scenario of	• Regional government • Centre for Economical Development, Transport and the

Policy priorities	Key recommendations	Responsible actor(s)
the mining strategy is ad hoc rather than framed within a long-term innovation plan.	new companies arriving to the region. o Supporting innovation projects on mining that involve companies and research centres, based on pre-identified regional needs. Promote a business development approach in innovation projects, e.g. the chemical-battery value chain.	Environment
Creating a standardised template for public reporting on environmental and social aspects is key.	• Develop a standardised public reporting template for environmental and social aspects, encouraging community engagement and drawing on successful examples like the Kokkola lithium mine framework.	• Regional government • Centre for Economical Development, Transport and the Environment
Investment and skills required for SMEs to benefit from circular economy technologies are lacking.	• Improve engagement between large mining companies, SMEs and business incubators such as Kokkola Industrial Park to support the involvement of local businesses in the development and application of circular economy technologies. This includes supporting join applications to EU and national innovation programmes.	• Regional government
Support for SMEs to access EU funding for innovation is limited with information gaps.	• Facilitate accessibility to EU and national funds for SMEs engaging in innovation in the mining sector to increase their competitiveness with larger firms. To encourage this, the regional government can disseminate information about national and EU funds to SMEs and promote calls for projects.	• Regional government
	Employment and skills	
Skill shortages persist in all occupations within mining, posing challenges for sector growth.	• Promote inter-regional co-operation between educational institutions by leveraging the specialisations of each university, encouraging student exchanges to minimise duplication of specialised equipment and resources.	• Regional government,
Targeted education and training programmes are essential to align with the requirements of emerging sectors like mining/chemical industry, as well as hydrogen, wind and solar energy production.	• Implement targeted education and training programmes to meet the needs of emerging industries, including mining, chemical, hydrogen, wind and solar energy sectors.	• Regional government • Educational institutions
The region could benefit from increasing the engagement of the silent workforce with an inclusive strategy for workforce involvement and re-education within the framework of the green transition.	• Develop strategies to engage the silent workforce, increasing their participation from 6% to 2% of the current unemployed population, supporting an inclusive approach to workforce development during the green transition.	• Regional government • Local businesses
	Infrastructure	
The region can enhance its mining infrastructure to meet the future needs of companies.	• Advocate with national government the need for to keep up the investment in infrastructure as the mining ecosystem develops in the region.	• National government • Regional government • Mining companies
Transport infrastructure needs to be futureproofed to efficiently support growing	• Include a foresight action in the regional strategy to anticipate needs in transport, energy and housing infrastructure in the face of upcoming projects in the region. This includes updating and expanding to the whole region the Kaustinen	• Regional government, • National government

Policy priorities	Key recommendations	Responsible actor(s)
industrial and mining operations, as well as increasing demographic and intensive-use demands.	analysis on labour demands.	

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Notes

[1] TL3 is the lowest comparable administrative level in OECD regional statistics, capturing meaningful socio-economic dynamics at the subnational level. In addition, a dedicated benchmark of the 50 most relevant and representative OECD mining regions is used to reflect the specific challenges and opportunities of regions with strong mining specialisation. All variables have been normalised with the OECD Mining Regions Benchmark set at 100.

A higher number implies better performance.

Description of variables:

- Population 2022: Reflects the growth in population from 2001 to 2022.
- Young population: Represents the share of youth (0-15 years old) in the total population as of 2022.
- Women in the workforce: Indicates the gender balance in the working-age segment (15-64); a higher value means a higher proportion of women as of 2022
- Performance in unemployment: Refers to the unemployment rate, calculated as the number of unemployed persons over 15 years old as a percentage of the total population as of 2020.
- GDP per capita: Measured in purchasing power parity (PPP), current as of 2015. Latest available data from 2020.
- Economic diversification: Calculated using the Herfindahl index, defined as the sum of the squared sectorial shares of the top ten principal sectors in a region to measure its diversification. Data from 2020.
- CO2 per unit of electricity generated: Normalised as the number of tonnes of carbon dioxide equivalent per gigawatt hour (tCO2 eq/GWh). Data from 2020.
- Change in green land cover: Represents the change in tree cover surface from 2004 to 2019

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