

Securing a sustainable material supply in the Nordics

– bridging the gap between supply and demand of aggregates

Short version

For more information regarding the report.

Please contact: hakim.belarbi@ncc.se or info@ncc.se

Project group: Marie Norén, Søren Evald Jensen, Thomas Berggren, Pertti Peltomaa, Maria Werner, Tonje Grönlund and Hakim Belarbi from NCC. Haben Tekie and Christopher Marton from Ramboll.

Foreword

The Nordic countries are facing a massive societal transition driven mainly by the shift to a climate-neutral economy with net-zero greenhouse gas emissions by 2050.

To achieve this, the Nordic countries are making large and historic investments in fossil free industries and infrastructure to support economic growth, sustainability, and regional connectivity. Significant funding is being allocated to modernizing and expanding road and railway networks, developing residential areas, and enhancing digital and energy infrastructure.

Raw materials for the construction sector are a prerequisite for this societal development. In this context, aggregates in particular play a crucial role. Virtually every construction project relies on some form of aggregates, which is used to build roads, railways, wind parks, airports, residential buildings, offices, industrial facilities, and hospitals.

This makes aggregates one of the most important building materials we have, and the largest geological resource extracted and used in society.

This report shows that the major societal development projects that the Nordic countries are undertaking will increase the aggregate consumption in the Nordics substantially between 2026 and 2045, from approximately 460 million tonnes (Mton) in 2026 to around 625 Mton 2045, representing a 37 percent increase in annual consumption.

At the same time, even though most of the Nordic countries have great access to natural resources and aggregates, scarcity of aggregates is becoming a fact. The overall trend in the Nordics shows a decrease in the number of quarries producing aggregates, caused primarily by unpredictable and ineffective permit processes, conflicts of land use and a lack of local, regional and national material planning.

This has made it harder, not only to sustain a local and regional production but has also raised the climate footprint of aggregates with longer transportations from fewer quarries to more distant areas. But even more fundamentally it has created a gap between supply and demand that threatens to endanger the green industrial transformation in the Nordic countries.

The future gap between supply and demand of aggregates is particularly pressing given the scale of this challenge and that the transition is taking place in the light of a rapidly changing world in which we live.

Disruptions in global logistics chains caused by the coronavirus pandemic, the war in Europe and the ongoing global trade war has made it evident that we in the Nordic Region need to find common, long-term and robust solutions to ensure a sustainable material supply.

The solution lies not only in facilitating and expanding our aggregate production but also in addressing key strategies that will ensure a sustainable and long-term supply. There are three primary areas that are vital to meet the increasing demand.

- 1. Facilitating the extraction of new aggregate materials.**
- 2. Increasing the recycling and reuse of existing materials.**
- 3. Optimizing material-use to reduce demand and minimize waste.**

I am certain that if the Nordic countries undertake the right measures, we can bridge the gap between current supply and future demand, securing a sustainable and robust material supply and at the same time reaching our climate goals, despite the geopolitical challenges we face.

Grete Aspelund, Head of NCC Industry

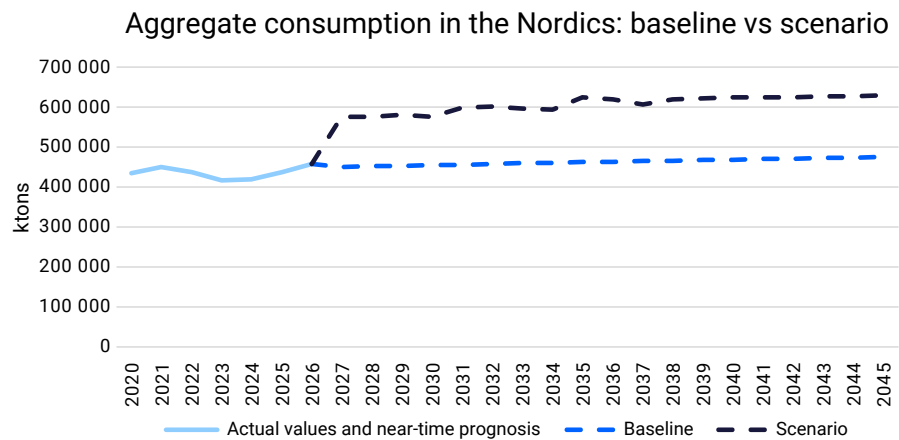


Executive summary

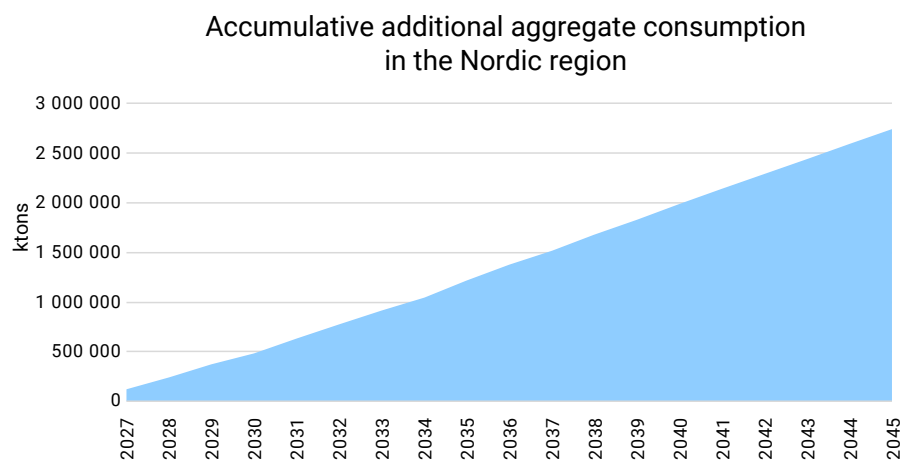
The Nordic countries have set ambitious climate targets, aiming for carbon neutrality by 2045–2050. At the same time, the region is making large-scale public investments in fossil-free industries and critical infrastructure. Major funding is being directed toward modernizing and expanding transport systems, developing residential areas, and strengthening energy and digital infrastructure. These three sectors are particularly important because, together, they account for the majority of aggregate use in the built environment. Meeting the region's ambitious development and climate goals will require a reliable, sustainable, and large-scale supply of aggregates — at levels far beyond current norms. The findings in this report are based on identified societal needs in the Nordic countries and presents total aggregate consumption from 2020 to 2045 across infrastructure, buildings, and energy systems using two scenarios: a Baseline Scenario and a Societal Transition Scenario (STS).

In 2024, the Nordic region consumed **over 420 million tons** of construction aggregates, with Sweden leading at more than **160 million tons**, followed by Norway, Denmark, and Finland. These volumes reflect the scale of current development – but demand is set to rise significantly. Under a Societal Transition Scenario, aligned with Nordic political goals, annual consumption is projected to grow from **around 460 million tons** in 2026 to approximately **625 million tons by 2045** – an increase of **37 percent**. Cumulatively, this would require **2,750 million tons more aggregates** than the baseline by 2045.



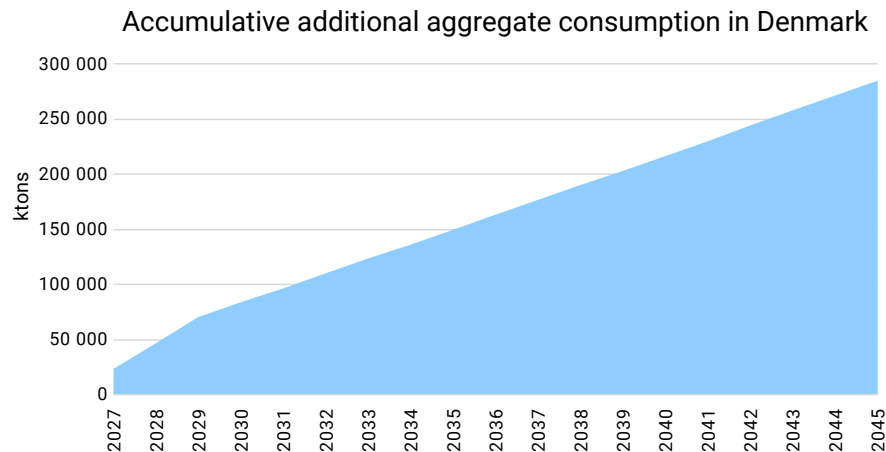


Aggregate consumption in the Nordics – comparison of baseline and societal transition scenario.



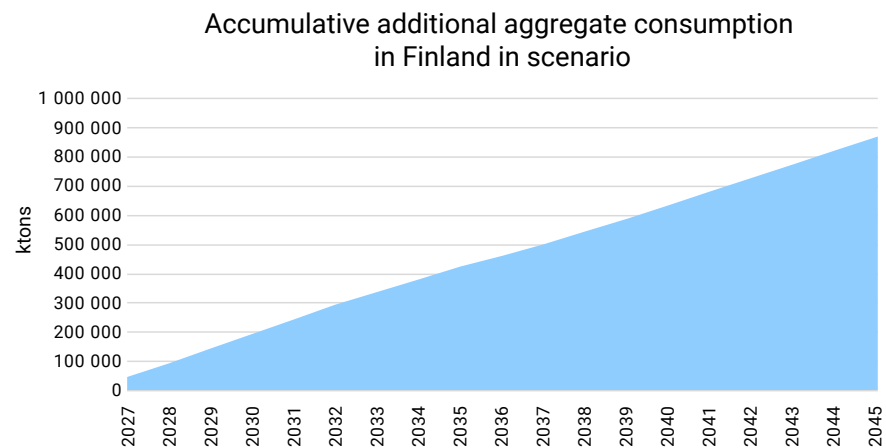
Accumulative additional aggregate need in the Nordic region between 2027–2045 in scenario compared to baseline.

In **Denmark**, annual aggregate demand is expected to increase by 15–25 million tons compared to the baseline. By 2045, the country is projected to require 300 million tons more than under the baseline – **an increase of approximately 20 percent**.



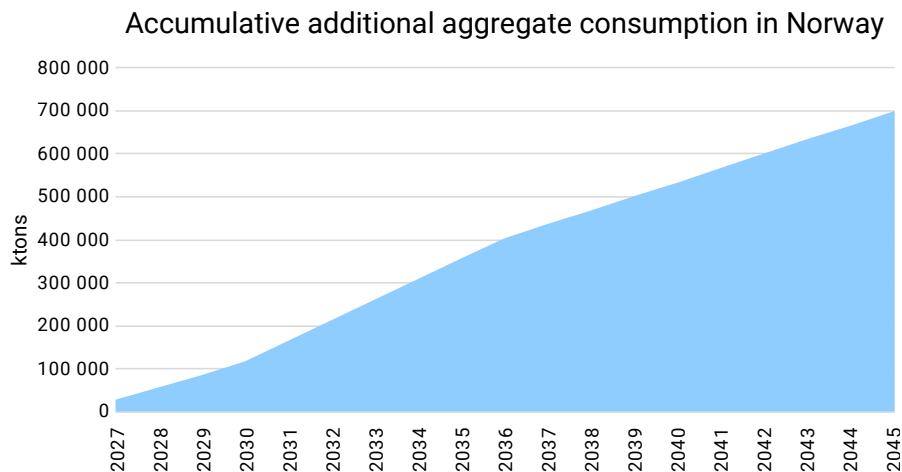
Accumulative additional aggregate consumption in Denmark between 2027–2045 in scenario compared to baseline.

In **Finland**, demand is projected to rise 40–50 million tons compared to the baseline. This translates to a cumulative increase of around 870 million tons – **approximately 60 percent more** than in the baseline scenario.



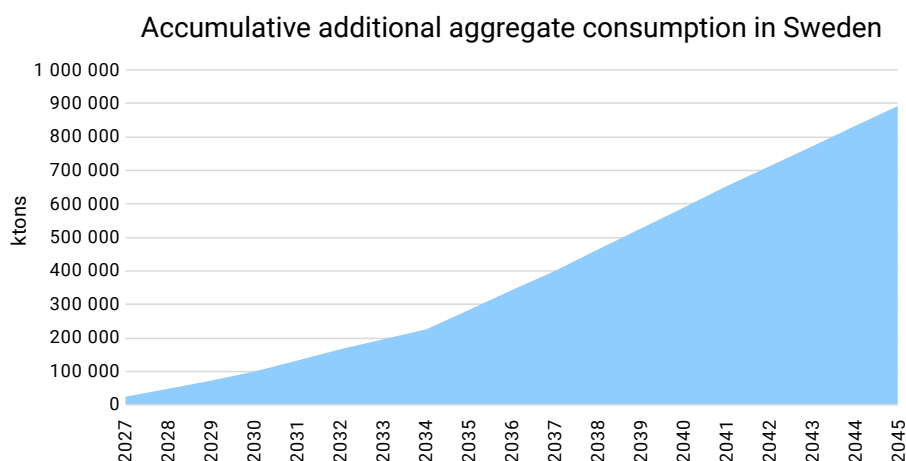
Accumulative additional aggregate need in Finland between 2027–2045 in scenario compared to baseline.

In **Norway**, annual demand is expected to grow by 30–50 million tons, by 2045, the country is projected to require 700 million tons more than under the baseline – **an increase of approximately 30 percent.**



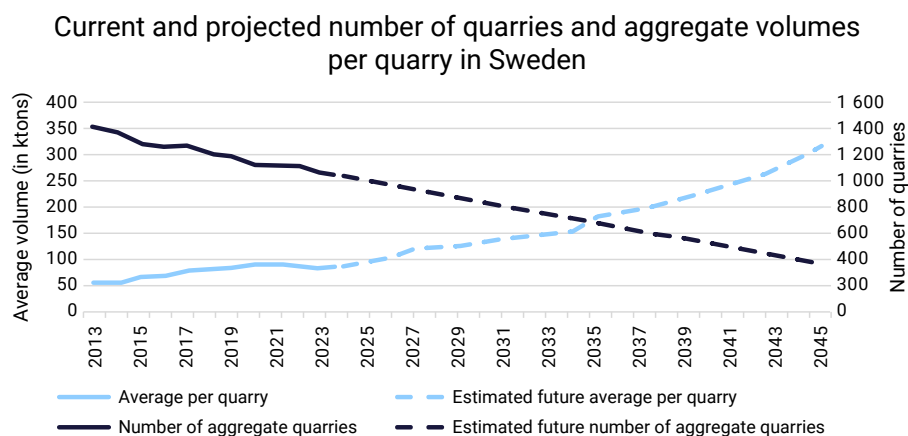
Accumulative additional aggregate need in Norway between 2027–2045 in societal transition scenario compared to baseline.

In **Sweden**, annual demand is projected to increase by 25–60 million tons by 2045, the country is projected to require 900 million tons more than under the baseline – **an increase of approximately 25 percent.**



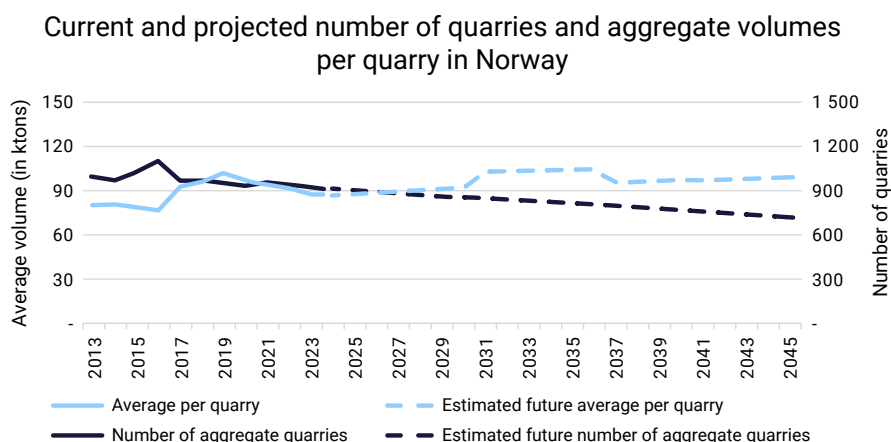
Accumulative additional aggregate need in Sweden between 2027–2045 in scenario compared to baseline.

At the same time, the report shows that both the number and productivity of quarries have shifted significantly over the past decade. In **Sweden**, the number of operating quarries has declined from 1,750 in 2011 to 1,064 in 2023.



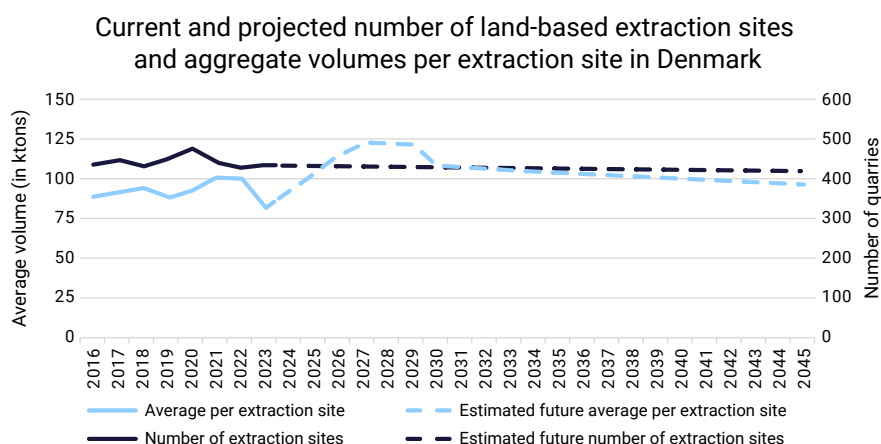
Number of quarries and average volume per quarry in Sweden, historical and future projected values to cover increased aggregate demand under the societal transition scenario.

Norway follows a similar trend, with active quarries decreasing from approximately 1,000 in 2013 to around 925 in 2023. In Finland, the decline is even more pronounced, dropping from roughly 1,900 to 1,500 over the same period.



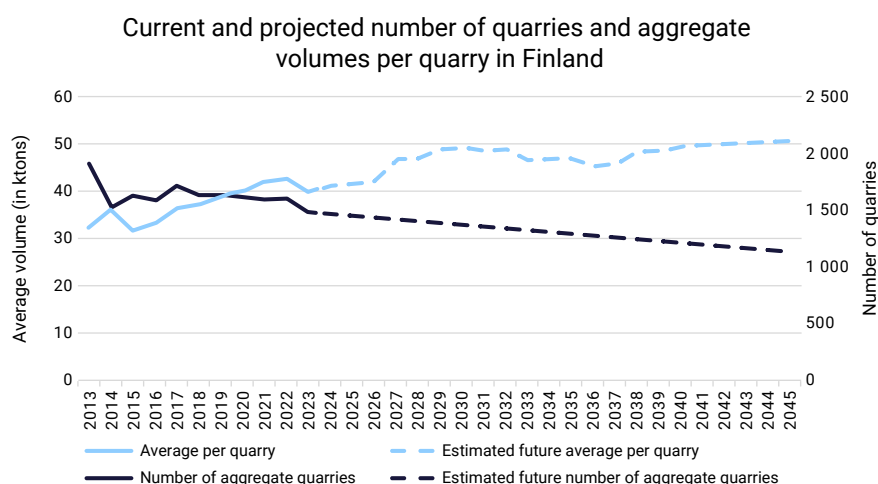
Number of quarries and average volume per quarry in Norway, historical and future projected values to cover increased aggregate demand under the societal transition scenario.

Denmark stands out as an exception. While data is measured differently—based on extraction permits rather than direct counts of raw material pits—the trend is notably more stable. Between 2016 and 2023, both the number of permits and the overall volume of extracted aggregates remained largely unchanged, with only a slight dip in 2023.



Number of land-based extraction sites and average volume per site in Denmark, historical and future projected values to cover increased aggregate demand under the societal transition scenario.

Taken together, the total number of active quarries across Sweden, Norway, and Finland amounted to roughly **3,473 in 2023**, down from approximately **4,289 a decade earlier** – a reduction of about **20 percent**.



Number of quarries and average volume per quarry in Finland, historical and future projected values to cover increased aggregate demand under the societal transition scenario.

These projections reveal a growing gap between current supply and future aggregate needs. Bridging this gap is essential to meet future construction and climate goals. Without action, the region risks material shortages, delivery delays, and rising environmental impacts.

The urgency is heightened by broader geopolitical and economic risks. Global events such as the war in Ukraine, price volatility, and rising geopolitical tensions have exposed the vulnerability of international supply

chains – especially for construction-critical materials. In this context, aggregate supply becomes a strategic issue, central to both economic and societal resilience. Addressing this challenge requires a coordinated strategy. No single solution is sufficient. Instead, a combined approach is needed, built on three strategic pillars: enabling new extraction, expanding the use of recycled materials, and improving material efficiency.

All three pillars now demand targeted policy attention if the Nordic region is to meet future demand. Quarry production remains dominant but increasingly concentrated, with fewer sites producing more. Recycling remains limited, hindered by regulatory uncertainty, infrastructure gaps, and weak market signals. Material efficiency, while offering large savings through early design decisions, is still underused.

Closing this gap will not be a matter of geological availability alone. The real obstacles lie in how aggregate supply is governed, coordinated, and planned. The current systems are not equipped to scale the three strategic pillars at the pace or scale required. Declining quarry numbers reflect deeper systemic issues: permitting processes have become increasingly complex and fragmented, with long lead times, costly documentation, and multi-agency coordination challenges.

Regional planning is also underdeveloped. Aggregate supply is often overlooked in broader spatial and infrastructure strategies. As local reserves deplete, materials must be hauled over longer distances –driving up emissions, costs, and pressure on transport infrastructure.

Meanwhile, the uptake of recycled aggregates remains low, despite growing supply capacity and better technical standards. The core barrier is demand side: outdated procurement practices, rigid material requirements, and a lack of incentives. Procurement based on functional performance, as seen in Norway, offers a promising path forward, but broader adoption is still needed.

Material efficiency – particularly through early-stage collaboration – is another underused opportunity. In many projects, decisions that shape material use are made late in the process, missing key chances to optimize design, standardize elements, or enable reuse. Sequential planning processes, where key actors enter at different stages, make it harder to align around shared targets for efficiency and sustainability. A broader policy shift is needed – one that supports all three strategic pillars in parallel and creates the right conditions for systemic change.

This report sets out nine policy recommendations to close the supply gap. These actions aim to strike a balance between expanding access to materials and minimizing environmental impact – while laying the foundation for a more circular, resilient, and climate-aligned aggregate system.

7. Policy recommendations

1. Establish national strategies for aggregate supply preparedness

Nordic governments should develop national strategies to ensure long-term access to material used for building and maintenance in both crises' situations and under normal circumstances. The supply of aggregates is vital to the Nordic countries' ability to handle preparedness and the growth of the Nordic countries and should therefore be considered an essential building material.

2. Strengthen Regional Spatial Planning for Resource Extraction

Sweden, Norway and Finland should implement mandatory regional plans that reflect local resource conditions, demand trends, and landuse constraints. Regional plans could also integrate material flows into land-use planning and recycling efforts, improving overall system efficiency and sustainability. Denmark should implement a national plan that coordinates and help reduce regional imbalances, anticipate future needs, and prevent supply bottlenecks that could hinder future development.

3. Broader scope of permit assessments

Environmental EU Directives must take on a broader perspective. An investigation should be made into how to create a broader perspective that enables good trade-offs between conflicting land interests, societal benefits, climate effects and environmental objectives in order maximize the benefit to society.

4. Strengthening Digital Transparency and Access to Data

Develop centralized digital portals where all documents, decisions, and public consultations related to quarry permitting can be easily accessed by stakeholders.

5. Encourage Cross-Nordic Harmonization

Promote knowledge sharing and harmonized procedures for quarry permitting through Nordic Council collaboration to reduce administrative barriers for cross-border companies.

6. Improved guidance on waste versus product

Nordic countries should develop clear national criteria to distinguish between clean, reusable materials and contaminated materials that align with the EU Waste Framework Directive, which allows for "end-of-waste" criteria. Many excavated materials from infrastructure projects are automatically classified as waste, even when they are clean, reusable, and comparable in quality to virgin materials. This leads to valuable materials being unnecessarily sent to landfills leading to more emissions, costs, and environmental degradation.

7. Use partnering and functional requirements in procurement to optimize material usage

To accelerate the circular economy, Nordic governments should promote partnering and functional requirements in public procurement that prioritize performance and carbon outcomes—rather than prescribing specific materials, technologies or construction technical requirements. This approach gives contractors the flexibility and possibility of being innovative to propose lower-emission solutions, thereby boosting materials with a lower climate impact such as recycled aggregates. + standards and eurocodes.

8. Promote quarries that produce aggregates with a low climate impact

Use climate budgets and verifiable Environmental Product Declarations (EPD) to promote projects and aggregates with a lower climate footprint. Through climate budgets, goals are set for the construction project's climate impact and can be used not only to map emissions but also to reduce them. Clearer procurement criteria—such as bonus points, lifecycle-based performance standards, or EPDs can strengthen market signals and drive investment in recycling capacity.

9. Accelerate decarbonization of the Nordic quarrying sector

Nordic governments should support the decarbonization of the quarrying sector by enabling electrification, promoting fossil-free transport and promoting efforts to implement climate investments, such as switching to fossil-free work machines and vehicles. A major transition will require financial support from the Nordic countries. External transport emissions can also be reduced through alternative fuels and by co-locating quarries and terminals near high-demand areas. Smarter spatial planning and strategic siting of extraction activities are essential to lowering emissions, reducing traffic pressure, and improving system efficiency.

