

NORDIC CAPITALS RAILWAY

– a more united North,
a stronger Europe

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Background

The City of Turku, the Regional Council of Southwest Finland, the Confederation of Finnish Construction Industries RT, Ramboll, and the Turku Chamber of Commerce, together with Miltton Group, have commissioned Miltton to prepare a report on the Nordic Capitals Railway – the Helsinki–Stockholm–Oslo rail project. The aim of the report is to position the Helsinki–Stockholm–Oslo railway project as one of the options for advancing the EU’s goal of a high-speed rail network connecting European capitals. This report seeks to inspire public debate on major connectivity initiatives in Northern Europe. Throughout history, periods of significant geopolitical change have always been opportunities to advance great visions.

The Helsinki–Turku–Stockholm railway project emerged as a credible option when the Confederation of Finnish Industries (EK) highlighted it in its report “Vision for Finland: Future International Transport Connections” in spring 2025. That report focused primarily on freight logistics and security of supply. This report broadens the perspective by framing the transport project as a strategic growth initiative for Northern Europe, connecting the Nordic capitals and national economies while strengthening European integration.

Europe has previously turned ambitious infrastructure aspirations into reality, and this report raises the question: is it Northern Europe’s turn next?

The report is based on interviews with the commissioning parties, a scenario workshop and independent analysis by Miltton’s experts.

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Summary: Nordic Capitals Railway – a more united North, a stronger Europe

Introduction: geopolitical change and Finland's new position

Russia's war on Ukraine has fundamentally changed Finland's geopolitical and logistic position. Previously, Finland benefited from its location between East and West, serving as a hub for passenger and freight flows between Europe and Asia. However, Russia's attack and sanctions against Russia have disrupted these connections, including flight routes to and from Asia and rail links. As a result, Finland's logistic position has weakened, and the country has become more isolated. Nearly all (97%) of Finland's imports and exports now pass through the Baltic Sea, making the country vulnerable and highlighting the need for alternative routes toward the west.

The roles of Finland and Sweden in European security have grown following their NATO membership. East–west connections are particularly critical for military mobility and security of supply. This geopolitical shift has opened a historic opportunity to advance major infrastructure projects connecting Northern Europe within the EU agenda. In this context, the vision of the Nordic Capitals Railway initiative has emerged, linking Helsinki, Stockholm and Oslo.

Vision: the Northern Europe railway as a strategic growth project

The report commissioned by Milton broadens the previous discussion, which has focused mainly on logistics and security of supply. It presents the Nordic Capitals Railway, the Helsinki–Stockholm–Oslo rail link, as a strategic growth initiative aimed at connecting the Nordic capitals and their economies, deepening European integration, and creating a new, dynamic economic area. The project would advance the European Commission's goal of building a high-speed rail network connecting Europe's capitals, a goal advocated, among others, by Mario Draghi in his competitiveness report. Cross-border major initiatives of this kind are seen as central to the EU's competitiveness, the functioning of the internal market and the achievement of climate objectives.

The initiative would connect the metropolitan areas of Helsinki, Stockholm and Oslo, home to a combined population of 7 million and a combined GDP exceeding EUR 455 billion. Improved accessibility would create broader and more efficient labour markets, leading to higher productivity and economic growth through so-called agglomeration benefits. Companies would find it easier to access skilled labour and partners,

and innovation would intensify as universities, research institutes and businesses interact more closely. For example, up to 70% of the Öresund Bridge's benefits are estimated to result mainly from labour market effects.

Militarily, the project would create a strategically important east–west connection, improving NATO forces' mobility and the overall security of supply in Northern Europe. It would provide an alternative route to the Baltic Sea, which is considered vulnerable. The project's dual-use nature, serving both civilian and military needs, is its key strength.

Lessons from Europe's previous major projects

Öresund Bridge, the Channel Tunnel and Rail Baltica. What these projects have in common is a strong political vision and commitment from national leadership that has transcended traditional cost–benefit analyses. They have served as instruments for deepening European integration, bringing nations together and promoting economic integration.

Financing models have varied considerably in major infrastructure projects. The Öresund Bridge was financed through user fees without any public funds. Rail Baltica was almost en-

tirely funded by the EU and national budgets. The Channel Tunnel was built with fully private capital. For Nordic Capitals Railway, the most likely option would be a hybrid model combining government and EU funding, private investment where applicable, and user fees.

Challenges and conclusion

Nordic Capitals Railway is a massive project with estimated costs amounting to tens of billions of euros. Its greatest risks include the lack of political consensus among the countries involved, rising costs, prolonged travel times, and significant environmental and landscape impacts, particularly in the sensitive archipelago area.

The report's key policy recommendation is that Finland, Sweden, Norway and the European Commission should initiate a joint study of the project's strategic benefits, feasibility, and financing options. Large infrastructure projects require decades to implement, so strategic preparation must begin now. Advancing the project requires vision and long-term commitment that transcends electoral cycles and party lines, as its benefits will build up over the long term. This is not merely a transport project, but an investment in a more united North and a stronger Europe.

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01

POLITICAL MOMENTUM

In times of major geopolitical changes, great things can be achieved

Current state: Finland's connections to the world have depended on Russia

After Russia's attack on Ukraine, Finland responded swiftly to the geopolitical shift and joined NATO, the Western military alliance. Finland decisively aligned itself with the West in terms of foreign and security policy.

However, Finland has not yet responded to the major shift in geopolitical logistics, despite being pushed further from global markets as a result of the war. Before the war on Ukraine, Finland served as a hub for passenger and freight flows between Europe and Asia, leveraging its geographic position between East and West. That relative advantage in geopolitical logistics has now been lost. The country is once again genuinely peripheral.

Finland's western connections were, paradoxically, also dependent on Russia: 1) Russia's overflight rights provided the shortest air route between Europe and Asia via Helsinki; 2) rail links from Finland to Asia passed

through Russia; and 3) container shipping from Asia to Europe transited the Baltic via Russia.

Russia's ban on overflights cut off the shortest air route between Europe and Asia via Helsinki. Before the war, citizens from densely populated Asian countries flew to Helsinki, where passenger flows were distributed onto flights to various European destinations. Thanks to Finland's geographic location and Finnair's successful Asia strategy, the country enjoyed excellent global flight connections relative to its small population.

One could fly from Finland to Europe in the morning and be back home by evening, and still reach Asia's growing markets the following day. Finland's role as a hub for air traffic between Europe and Asia ended with the Russian overflight ban.

The rail link from Finland to Asia through Russia was also closed because of the war. A third, less well-known point is that Finnish

export industries had been able to narrow their logistic disadvantage by integrating into the logistics flows between Russia and Asia.

About 50 per cent of Russia's middle class lives in St. Petersburg and Moscow. Consumer goods for the middle class were shipped from Asian production sites and major ports via container vessels through the Baltic Sea to St. Petersburg. Meanwhile, Russia's exports to global markets consisted mainly of oil and fertiliser shipments controlled by oligarchs, which are not transported in containers. This allowed containers to move from St. Petersburg at almost no cost for the needs of Finland's export industries. Today, shipping companies must collect the containers empty from more distant and more expensive locations in Europe.

As an export-driven open economy with transport-intensive industries, Finland is more dependent than many countries on cost-efficient logistics. Finland's logistics costs exceed EUR 50

The rule of thumb used to be that just under 90% of Finland's exports and imports moved by sea, but the share has risen to 97% because of Russia's war.

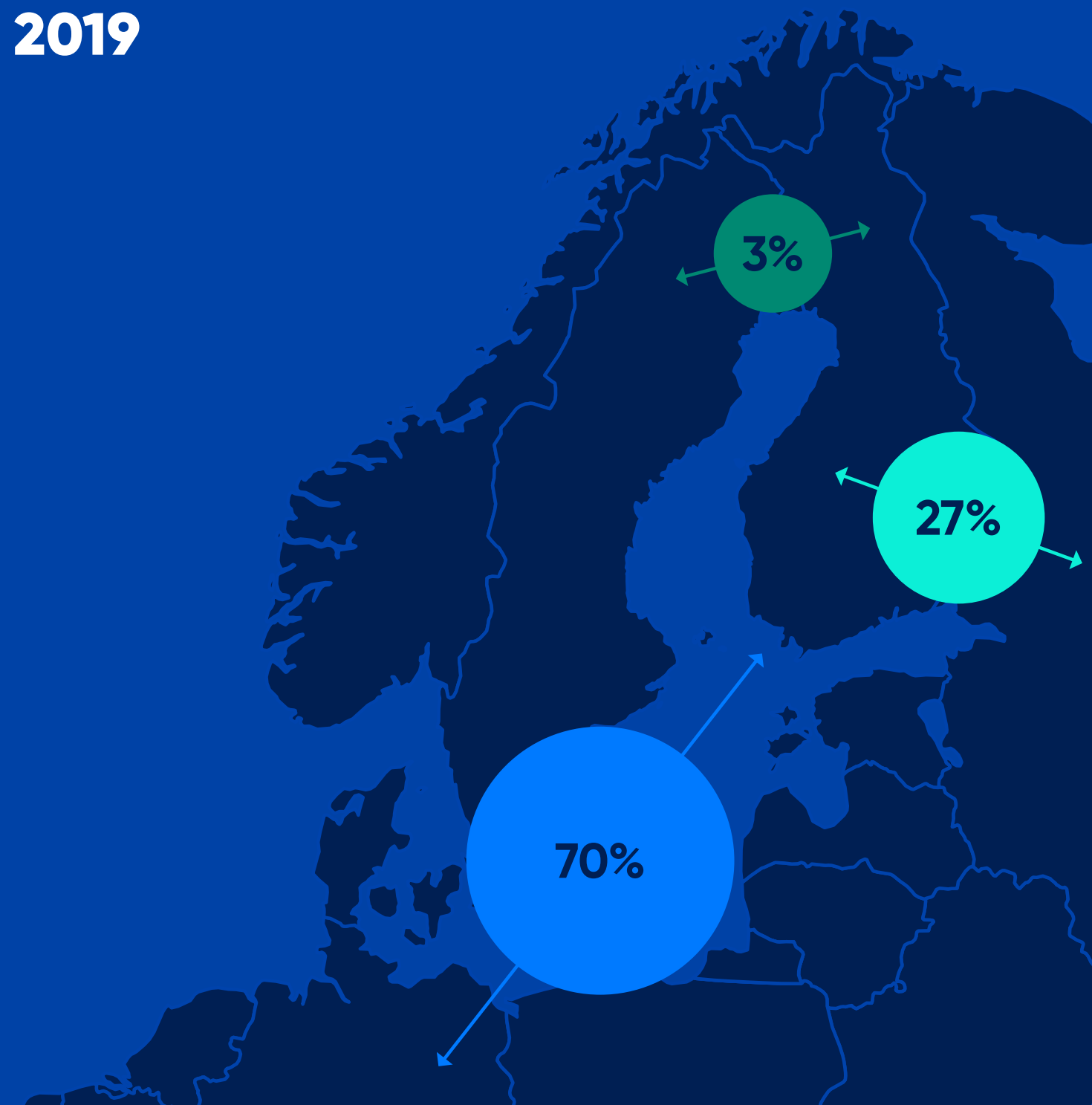
billion, among the highest in the EU relative to GDP. In 2022, logistics costs accounted for 12.5 per cent of GDP, compared to 10.7 per cent in 2019.

The previous rule of thumb was that just under 90 per cent of Finland's exports and imports moved by sea, but the share has risen to 97 per cent because of the war. Finland's fate, prosperity and security of supply now depend on the Baltic Sea. Alternative routes are needed in times of crisis.

Changes in Finland's transport routes in 2019 and 2024

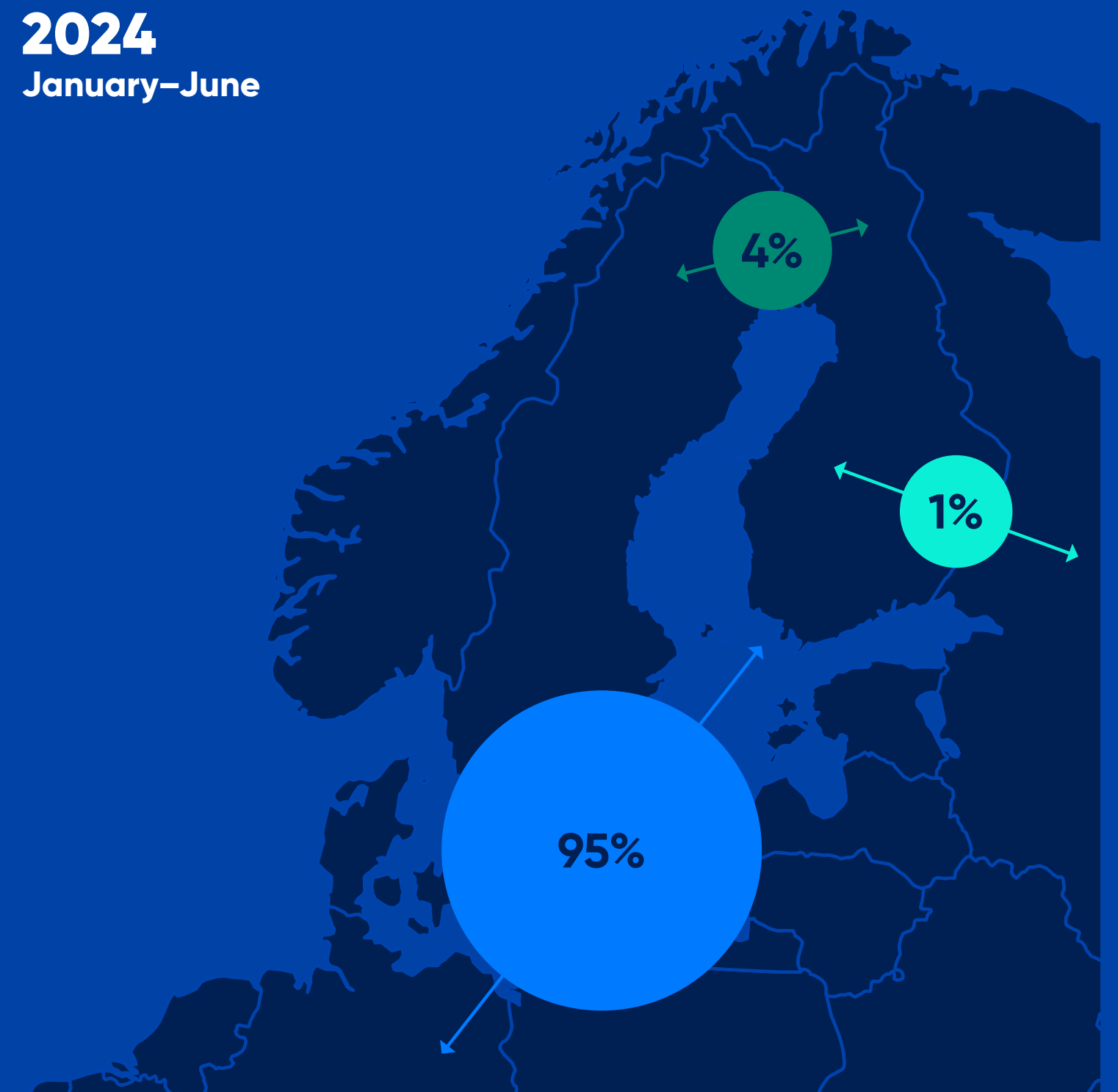
Previously, about one quarter of Finland's import and export tonnage was related to trade with Russia. Since the start of the war on Ukraine, new and replacing transport flows have relied almost entirely on maritime shipping.

2019



2024

January–June



- All trade with Russia
- Maritime transport to other countries
- Road, rail and air connections and equivalents to other countries

Dual-use transport projects may be recognised under the 5 per cent NATO commitment to defence spending.

NATO's northern frontier becomes more pronounced

Great geopolitical shifts create a window for big decisions. Finland and the Nordic countries now have a once-in-a-century political momentum to put the Northern European major connectivity project on the EU agenda. Political support for the EU's external borders with Russia is strong.

As NATO members, Finland and Sweden are now more fully assuming responsibility for Europe's security and for ensuring military mobility and supply resilience for both the EU and NATO. Finland faces the task of defending the longest external border of any EU and NATO member state – a 1,300-kilometre frontier with Russia. Finland is a strategically significant country for Northern European security and serves as a frontline state. While Norway is not an EU member, it is a NATO member that contributes to the stability of Northern Europe. Within the EU, there is strong interest in deepening Norway's relationship with the Union. Similarly, during the security crisis, the EU has forged a new connection with the United Kingdom, which had withdrawn from the Union after Brexit. In spring 2025, the EU and the UK agreed on a new strategic partnership.

Fixed and alternative routes play a crucial role in the movement of troops and equip-

ment. East–west connections from the Atlantic through Scandinavia to Finland are becoming increasingly critical.

At the NATO summit in The Hague in summer 2025, NATO countries committed to raising defence spending to at least 5 per cent of GDP, of which 3.5 per cent covers traditional defence expenditure. The remaining 1.5 per cent consists of defence-enhancing investments, including critical infrastructure and logistics projects.

Finland, Sweden, and Norway have the opportunity to have the Helsinki–Stockholm–Oslo railway project partially recognised under the 1.5 per cent NATO commitment, which amounts to roughly EUR 25 billion per year.

The integration of European people and economies is key

Amid major geopolitical upheaval and Russia's war of aggression, there is a unique political momentum for projects that strengthen Finland's western connections and provide alternative transport routes. In the long term, integrating the economies and peoples of the Nordic countries into Europe is a strategically more significant objective than short-term security considerations.

The Helsinki–Turku–Stockholm railway project emerged as a credible option when

the Confederation of Finnish Industries (EK) presented it in its report “Vision for Finland: Future International Transport Connections” in spring 2025. The report focused primarily on freight logistics and security of supply.

Milton's report broadens the perspective by framing the Nordic Capitals Railway as a strategic growth initiative that connects the Nordic capitals and their economies while deepening European integration and the single market. The stronger growth impact ultimately stems from linking the region's densely populated capitals into a single economic area, rather than from the direct logistics benefits.

The report expands the concept of the Nordic Capitals Railway into a west–east Northern European rail project. The project should be elevated as one of the major connectivity initiatives to be assessed alongside the Tallinn Tunnel and the Vaasa–Umeå bridge, to strengthen Finland's international connections.

The EU wants a high-speed rail network connecting European capitals

Europe has realised major infrastructure projects that have connected its people and economies. Deepening EU integration has been the driving force behind these projects. Examples include the Channel Tunnel between the United Kingdom and France, the Öresund Bridge linking

Finland, Sweden, and Norway have a unique opportunity to put the Northern European rail link connecting their capitals on the EU agenda.

southern Scandinavia, the Fehmarnbelt Tunnel connecting Denmark and Germany, Rail Baltica linking the Baltics to Central Europe, and the world's longest rail tunnel through the Alps in Switzerland.

Connectivity investments continue to be seen as vital for strengthening the EU's competitiveness and economy. In his 2024 competitiveness report to the European Commission, Mario Draghi proposed the construction of a high-speed rail network connecting Europe's capitals as part of the EU's EUR 800 billion investment package.

According to Draghi, a high-speed rail network connecting EU capitals is a strategic investment to advance economic integration,

reduce emissions and improve logistics. Large infrastructure projects help the EU achieve its ambitious climate goals and enhance the functioning of the single market.

The ideas from Draghi's competitiveness report were incorporated into Ursula von der Leyen's Commission work programme. The high-speed rail network linking EU capitals is the Commission's sole transport-sector policy priority. The EU aims to promote cross-border major projects with wide-ranging European impact.

Finland, Sweden and Norway have a unique opportunity to bring the Northern European rail link connecting capitals onto the EU agenda. Launching a joint study by the Commission

and the northern member states would be the first step in the long marathon ahead for the project.

The study should assess the strategic benefits of the Nordic Capitals Railway for Europe. Is the project feasible, and are the benefits significant enough compared to the investment cost? What is the estimated budget, and what would be the most effective implementation and financing model? Could another project deliver greater benefits for Northern Europe? What lessons can be learned from previous European major projects? This report provides strategic considerations and a sufficiently broad perspective for shaping future feasibility studies.

Following the study, Finland, Sweden, Norway and the EU would be better equipped to draw conclusions on which projects should be advanced and on what timeline. The key is to identify which initiative would deliver the broadest societal benefits for Europe.



02

CURRENT SITUATION

More strategic goals for infrastructure policy – where do the benefits of investment arise?

Major infrastructure projects must be on the agenda of heads of state.

The Rail Nordica project, approved by the Finnish government, is intended to introduce the European track gauge in Finland, starting with the Tornio–Haparanda section. At a later stage, the European track gauge is planned to extend all the way to Oulu. The timetable for extending the European track gauge more widely across Finland remains open.

Rail Nordica has been driven by the need to enhance military mobility in the aftermath of Russia's war on Ukraine, and by the view that Russia poses a long-term threat to the West.

The project will streamline logistics and support the transportation needs of northern industries, particularly in mining and green transition projects. In line with industrial policy thinking, as steel plants up north develop green steel, the products should also be transported using low-emission modes.

From the perspective of Finland as a whole, the Rail Nordica is unlikely to become a com-

mercially viable transport route, as the journey via the north is significantly longer. The project also does not connect densely populated urban areas, meaning it would have little effect on overall economic productivity or labour market efficiency. Its impact on the national economy would remain limited and largely local.

As the security situation has tightened, the Nordic transport ministers have drawn up a cross-border transport strategy. Understandably, in a politically tense security situation, the immediate and medium-term needs for military mobility have come to the fore.

In the long term, the joint Nordic cross-border transport strategy should place greater emphasis on how civil societies, national economies, and densely populated metropolitan areas are interconnected – or, in other words, on how a more dynamic economic region can be created in Northern Europe. Dual-use infrastructure in major projects is essential, as it is rarely justified

to build separate infrastructure solely for military purposes.

It is therefore justified that the preparation of strategic major connectivity projects should involve a broader national leadership participation, rather than leaving the decisions solely to transport ministers and the military.

Major connectivity projects require a more strategic perspective

The Vaasa–Umeå bridge connection has been examined by the Finnish Transport Infrastructure Agency in accordance with the Government Programme. Naturally, the agency's studies emphasise transport-related aspects, but without additional assessments the overall picture remains limited.

Rather than focusing on transport-related aspects, particularly in the initial phase, it is necessary to examine how various major connectivity projects serve Europe's strategic interests

over the next century. In 2021, the governments of Estonia and Finland signed a memorandum of understanding on the construction of the Tallinn tunnel. The document is in practice a political statement of intent. The European Commission has approved the Helsinki–Tallinn connection as a subject for future study in 2024.

It is not an ideal situation that individual projects are now being examined one at a time. A more appropriate approach would be to prepare a joint report comparing different alternatives for all major connectivity projects, which would provide political decision-makers with better tools for policymaking.

The Finnish perspective is too narrow. Finland, Sweden, Norway and the European Commission should jointly examine which major connectivity project would generate the broadest pan-European benefits and strengthen Northern Europe's position within Europe.

First, a strategic perspective and an assessment of the broader societal benefits and political objectives are needed. At a later stage, transport assessments and a traditional project evaluation, including benefit–cost ratios, should be prepared.

The preparation and strategic consideration of cross-border projects should be elevated to the level of Nordic prime ministers. In Sweden, transport policy has traditionally been more on

the agenda of party leaders, whereas in Finland, transport issues have typically been handled by transport-oriented policymakers. As a result, transport investments have often been directed towards individual road projects in electoral districts, rather than using the resources of a small nation for investments that improve international connectivity and competitiveness.

The benchmark projects presented in this report show that large-scale visions for the future of nations and inter-country integration have been the main drivers behind the progress of megaprojects. Traffic volumes or benefit–cost ratio calculations have played a much smaller role when advancing strategically significant transport projects.

Assessment of the European Commission's rail transport policy

The European Commission has encouraged Finland to adopt the European track gauge. The aim has been to detach Finland from Russia's sphere of influence and integrate the country's railway system with European standards. The main flows of Finland's rail network connect to ports in southern Finland, and no real link to the European rail network is established. Finland's rail network remains largely domestic, although Rail Nordica improves interoperability in the north.

The Commission's eagerness to extend the European track gauge widely across Finland reflects more a desire to orient Finland towards the West than to offer a genuine solution to logistics challenges. Instead of fiddling around, the EU should focus on finding solutions that deliver genuine pan-European benefits, such as those offered by the Nordic Capitals Railway. On the Helsinki–Stockholm–Oslo corridor, adopting the European track gauge would indeed be justified.

As a major connectivity project, the Nordic Capitals Railway would connect the Nordic capitals and provide a direct link to continental Europe. Rail Nordica does connect Finland to the European rail network in the north, but due to its long detour, it is commercially viable for only a very limited number of operators.

The key idea in Draghi's competitiveness report – an EU-wide high-speed rail network connecting the capitals – was incorporated into the work programme of Ursula von der Leyen's Commission. The high-speed rail network between the capitals is the only transport-sector policy priority in the Commission's work programme. The EU aims to promote cross-border megaprojects that deliver broad and tangible Europe-wide impacts.

Implementing the high-speed rail network plan will require substantial investments, with costs estimated at around EUR 500 billion

EU's political objectives for rail transport

Double the volume of rail freight traffic by 2050 (European Green Deal)

Double high-speed rail traffic by 2030 and triple it by 2050 (European Green Deal)

Connect all EU capitals and major cities with high-speed rail links by 2050 (work programme of the von der Leyen Commission)

In summer 2025, the Commission proposed doubling the CEF funding for transport

by 2050. The Commission encourages both the public and private sectors to participate in financing, for example through public–private partnerships (PPPs). In 2025, the Commission intends to publish its policy vision for advancing the high-speed rail network.

The European Commission’s proposal for the 2028–2034 financial framework raises CEF transport funding to EUR 51.5 billion, double the amount of the current period. The share for military mobility is just under EUR 18 billion, which is ten times the current level and, given the present global situation, improves Finland’s prospects for funding. Going forward, CEF funding will be allocated only to projects that clearly deliver European added value: cross-border connections and links to third countries. Infrastructure projects will increasingly need to be “dual use,” serving both civilian and defence purposes.

Nordic countries and the EU should launch a joint study on major connectivity projects

Launching a joint study by the Commission and the northern member states would be the first and urgently needed step in the long marathon of a project.

Going forward, a study should be prepared jointly by the European Commission and the

governments of Finland, Sweden and Norway. The study should establish a shared vision between national leaders and the Commission on the strategic and long-term societal benefits of the Nordic Capitals Railway for Europe and the Nordics. At the same time, it would be advisable to assess the project’s feasibility, prepare a cost estimate, develop implementation and financing models, and draw lessons from previous megaprojects.

Finland has lacked major regional initiatives within the EU

Since the Northern Dimension, Finland has lacked initiatives that would strengthen the country’s strategic and regional position in Europe. By contrast, Southern European countries are known for their highly active regional advocacy. In the current von der Leyen Commission there is even a dedicated Commissioner for the Mediterranean, safeguarding the interests of that region.

Throughout its membership, Finland has focused on strengthening free movement and the single market within EU policy, which has been justified for an export-driven open economy. Finland has not pursued an aggressive national interest policy in the Union but has primarily sought to reinforce the Union itself. In EU advocacy, it is important to identify projects that

benefit all of Europe and advance pan-European objectives. Pursuing narrow national goals is unlikely to be the Nordic path in the Union in the future either.

Still, there is demand for stronger visionary thinking aimed at projects that enhance Northern Europe’s strategic position within the Union. This need is particularly acute amid the major geopolitical and security shifts, as the European Commission advances its high-speed rail agenda. Could it now be Northern Europe’s turn in the continuum of the EU’s major connectivity projects?

The question is well-founded, as the EU’s high-speed rail network has grown by nearly 50 per cent over the past decade. In 2023, there were altogether 8,500 kilometres of tracks in Europe for trains exceeding 250 km/h. Spain has received almost half of all EU high-speed rail funding between 2000 and 2017, and its network has expanded by 66 per cent, now reaching a length of 3,100 kilometres.

Political continuity as a guarantee for the progress of major projects

Traditionally, in the multiannual financial framework negotiations, Finland has taken the position that the share of projects funded through the EU’s Connecting Europe Facility (CEF), which supports the development of the

Cross-border transport projects make the benefits of a more integrated Europe tangible to citizens. That is why they have played an important role in the story of a common Europe.

Union’s energy, transport and digital networks, should be reduced.

In the CEF calls, Finland has most often put forward domestic projects offering only limited European benefits. Given Finland’s peripheral position, this has been understandable. By contrast, Sweden has pursued EU funding for transport projects more ambitiously, both in terms of the number of projects and the total amounts requested.

According to Hinrich Brümmer, Project

Manager at Ramboll Germany, it is crucial to link major projects to broader EU strategic and political objectives, such as the EU TEN-T network, NATO’s logistical needs, and the integration of regions into Central European infrastructure. Without these connections, projects appear isolated or unjustified.

According to Brümmer, large infrastructure projects succeed or fail depending on political support. Major projects require commitment across party lines and cross-border cooperation. Fragmented political will or populist opposition can easily halt the progress of internationally significant infrastructure projects.

In Finland, transport projects have traditionally been viewed as solutions to domestic traffic challenges rather than as engines driving EU integration. Cross-border transport projects make the benefits of a more integrated Europe tangible to citizens. That is why they have been important to the narrative of a common Europe.

The benefits of rail projects accumulate over time

Profitability calculations for transport projects mainly emphasise passenger time savings, but they do not sufficiently account for broader societal benefits.

Cost–benefit analyses for transport projects are calculated over a thirty-year horizon.

However, the benefits of rail projects that connect large geographical areas accumulate over centuries. Railway links, once built, are rarely dismantled; instead, they continue to generate societal benefits.

Many large-scale infrastructure projects initially lacked support due to low benefit–cost ratios. However, these projects may prove successful when broader societal benefits are assessed over time.

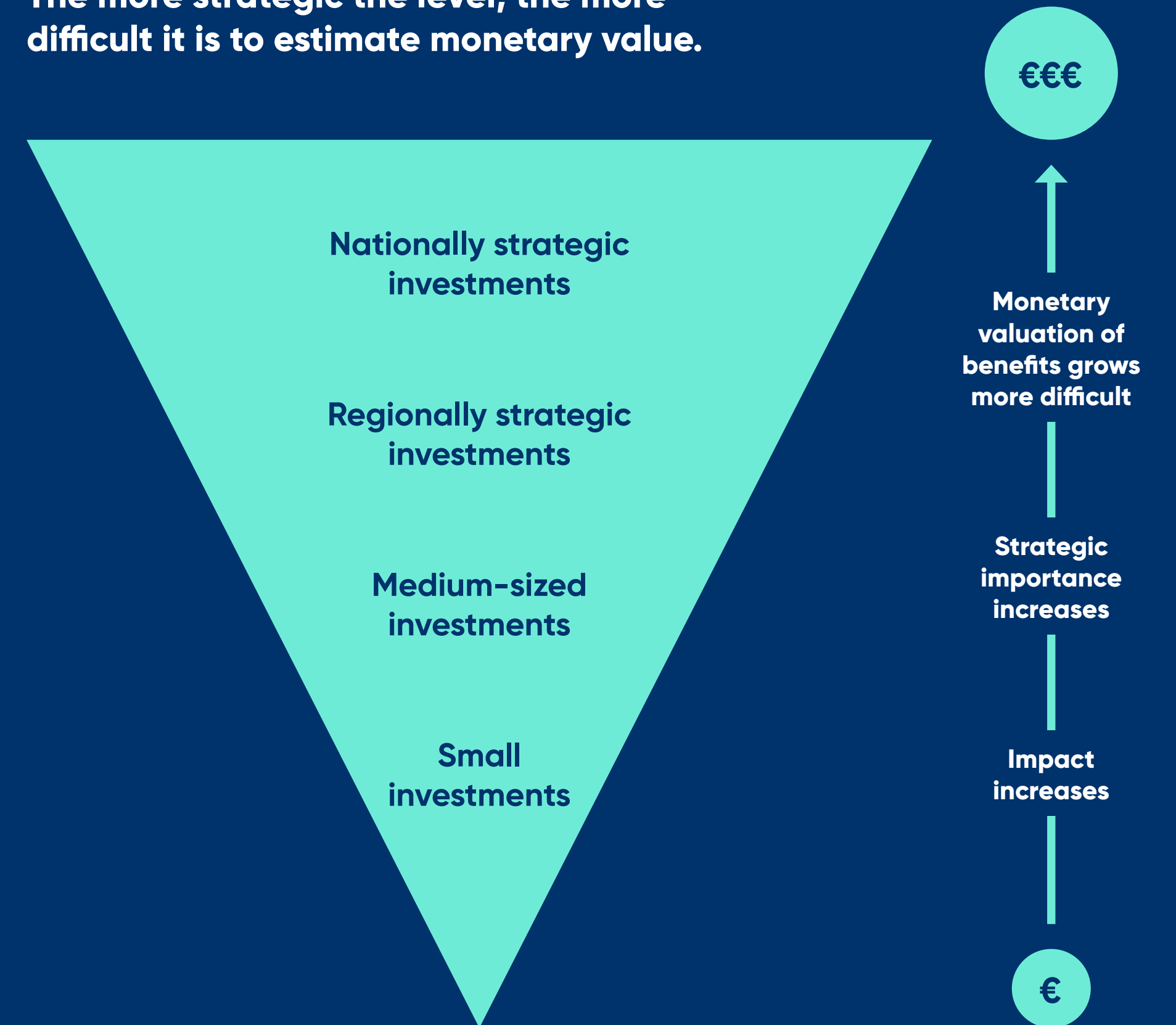
According to the OECD, structural and long-term impacts are far more significant than mere direct savings in travel time or costs. These broader societal benefits are not fully captured by standard transport cost–benefit analyses, which often leads transport authorities to deem projects unprofitable. Therefore, the prioritisation of transport projects should not be left solely to sector experts or transport policymakers. Cross-border projects frequently involve wider societal objectives and often reflect the underlying values of cross-border cooperation.

A report on strategic rail transport projects by Jorma Mäntynen and Riku Huhta of Finnish infrastructure company Destia highlights how, in small-scale transport projects, the benefits are direct and can be easily demonstrated in numerical terms.

The larger and more strategic a transport project, the harder it becomes to assign a

Strategic projects must be viewed as enablers

The more strategic the level, the more difficult it is to estimate monetary value.



Source: Strategiset raideliikennehankkeet (Mäntynen and Huhta, 2023)

monetary value to its benefits. This is why, in international and cross-border projects, greater emphasis is placed on broader societal benefits and strategic factors rather than direct economic impacts.

The benefits of major rail projects are widely dispersed across society and, in line with the principles of sound industrial policy, enhance the growth potential of all businesses and sectors. By contrast, many business subsidies target individual companies or sectors and tend to prolong the lifecycle of low-productivity activities.

The multifaceted impacts of improved connectivity

The OECD has assessed that the long-term structural benefits of transport projects include increased competition among businesses, an expanded customer base and, naturally, reduced logistics costs.

According to a Cambridge study on competitiveness, improving connectivity is a key means of strengthening the competitiveness of regions and countries in the global economy. The study also highlights the importance of removing cross-border barriers.

Improving connectivity has a broad and cross-cutting impact on growth and competitiveness. It 1) promotes social inclusion and

Railways revitalise labour markets, which increases productivity:

When a company is looking for an employee, it can find a more qualified candidate in a densely populated labour market area.

Innovations arise when different people meet. In areas with a large population, these encounters happen more often.

The development of the service sector requires a sufficiently dense population base. When the population is large enough, there is room for specialisation.

When a company is looking for partners, it can find more suitable partner in a densely populated labour market area.

Innovations can transfer to other industries in densely populated areas with several successful sectors.

Pay harmonisation accelerates with competition, and employees choose jobs based on their skills rather than pay, which increases productivity.

Employees have better incentives to pursue education because a large economic area offers jobs that match their education.

In densely populated labour market areas, employees change jobs more often. New employees revitalise companies.

labour market functioning; 2) enables an innovation- and knowledge-based economy; and 3) drives urban and regional vitality.

Economists often talk about so-called agglomeration benefits but rarely explain what they mean in practice. The mechanism works as follows: better connectivity expands labour market areas, and the most populous labour markets achieve better matching between jobs and people, which is a key driver of productivity.

For example, in the Öresund Bridge project, it was later estimated that 70 per cent of the realised benefits were specifically labour market benefits.

Naturally, agglomeration benefits also include more direct effects: in densely populated areas, reduced travel and transport needs lower logistics costs and thereby enhance competitiveness.

Urbanisation and rail transport increase productivity benefits

Rail transport offers a relative competitive advantage for passenger travel between cities, with high-speed trains performing best on inter-metropolitan routes. The more people move to cities, the more rail becomes a genuine alternative, boosting its popularity. Conversely, the improved connectivity rail provides attracts even more people to urban areas. Rail transport and urbanisation reinforce each other, and together they fuel innovation.

The World Bank (2009) estimates that urbanisation explains a large part of GDP growth in developing countries. According to a study by the consulting firm McKinsey, two-thirds of the difference in GDP growth between Europe and the United States can be attributed to the level

of urbanisation. The United States is more productive because a larger share of its population lives in cities. In the United States, employees in cities are 30–50 per cent more productive than those in towns.

Several studies indicate that productivity increases by 3–8 per cent when a city’s population or density doubles. Agglomeration benefits can raise productivity by 3–8 per cent within cities, depending on the industry and the city’s size (Rosenthal & Strange, 2004). In high-tech, knowledge-intensive and densely populated cities, the effect can reach 10–15 per cent, as observed in London, Stockholm and Helsinki (OECD, 2017).

These effects have likely informed former central banker Mario Draghi’s thinking when he developed measures for the EU aimed at boosting the continent’s competitiveness.

According to the World Bank, urbanisation accounts for the majority of developing countries’ GDP growth.

2/3 of the difference in GDP growth between the US and Europe can be explained by Europe's lower level of urbanisation

doubling population density increases productivity by

3–8%

in high-tech and population-dense cities, up to

10–15%

03

BENCH- MARKING

European dreams that came true – infrastructure projects uniting nations

Transport projects have deepened European integration.

Europe has undertaken mega-scale infrastructure projects driven by tremendous value-based objectives: advancing European integration, uniting nations and interlinking the national economies of member states.

This section examines the societal goals and visions that have ultimately brought major European infrastructure aspirations to fruition. The projects have been carried out in different decades and countries, which means direct comparisons are impossible. However, the example projects illustrate the types of societal impacts that the Nordic Capitals Railway could deliver.

The Öresund Bridge – the world's most competitive labour market

The Öresund Bridge connects the national economies of Sweden and Denmark. It links Denmark's capital, Copenhagen, with Malmö, Sweden's third-largest city, forming a single metropolitan area and the largest Nordic labour market area of 4.2 million inhabitants. The bridge serves both freight and passenger traffic, by road and rail.

Approximately 40,000 train passengers cross the bridge each day, 10,000 more than before the COVID-19 pandemic. Some 20,000 vehicles also cross daily, with a peak of 32,000 per day in 2017. In 2018, an average of 70,000 people crossed the bridge each day, about 45 per cent by train and 55 per cent by car.

Previously, Malmö and Copenhagen were connected by a ferry service. The bridge estab-

lished a more weather-resilient, round-the-clock link between Sweden and Denmark. The train journey between the cities was shortened from 45 to 35 minutes, and the car journey was cut in half. Crossing the 18-kilometre bridge takes about 7 minutes by train and 10 to 15 minutes by car.

Objective: a common economic and labour market area

Nordic policymakers set the goal of creating the world's most integrated and competitive labour market and metropolitan area in Southern Scandinavia. The aim was to integrate Scandinavia with Continental Europe and to connect the metropolitan regions of Malmö and Copenhagen. The bridge gave rise to a dynamic

Over time, 70 per cent of the societal benefits of the Öresund Bridge are related to labour markets.

economic and labour market area with 4.2 million inhabitants. Its construction was intended to accelerate regional development, stimulate economic growth in the countries, attract global companies to the area and boost tourism.

Broader societal benefits

The Öresund Bridge project is a good example of how benefits can, in the long term, exceed initial expectations. Retrospective assessments of the bridge's societal impacts over time show that 70 per cent of the benefits are related to labour markets (OECD's 2025 report "Mobility and Integrated Labour Markets for Third-country Nationals in Greater Copenhagen").

According to the research publication "Building Bridges and Widening Gaps: Efficiency Gains and Equity Concerns of Labour Market Expansions", the opening of the bridge led to an increase of 13.5 per cent in average pay for employees.

Pay effects were greatest among highly educated men and smallest among women with lower levels of education. The bridge contributed to widening income disparities and the gender pay gap, which is characteristic of more dynamic labour markets. Wage differences tend to grow as productivity differences between individuals increase. The better an employee is matched to a job that corresponds to their skills or education, the more productive they become.

The bridge gave rise to a dynamic economic and labour market area with 4.2 million inhabitants.

Transport projects that improve accessibility enhance labour market efficiency, known as labour market matching. Better accessibility fosters interaction between people, businesses and research institutions, creating more innovations and spreading them across sectors.

According to the article "Oresund Bridge: The birth of a new region", 27 per cent of Sweden and Denmark's GDP is generated in the area connected by the bridge. A study published in 2021, "Innovation in Malmö after the Öresund Bridge" (Journal of Regional Science, 2022), shows that the opening of the bridge led to a significant increase in the number of patents per capita in Malmö compared with Gothenburg and Stockholm. Statistics from 2021 indicate that Malmö is Europe's most innovative city according to EU and OECD indicators.

The Öresund region's GDP and employment have grown faster than in other parts of the countries. Sectors such as logistics, tourism, real estate and higher education have particularly benefited from the bridge project. Common labour markets have materialised especially in high-skill sectors, but the impact extends to all levels. For example, around 1,800 Swedish healthcare professionals work in Denmark every day.

The bridge was widely perceived as a symbol of Nordic cooperation, shared values and stability. The aim was to reduce cultural and administrative barriers between the two countries.

"Isolation has never led to anything good. The bridge signals belonging and confidence in our capabilities. It is the opposite of self-sufficiency, isolation, nationalism and closedness," said former Danish Prime Minister Poul Nyrup Rasmussen at the Öresund Bridge inauguration in 2000.

The positive experience of the bridge project inspired societal leaders and led to the vision of the Eight Million City, which would connect Oslo, Gothenburg and Copenhagen into a single economic area of eight million people through high-speed rail. High-speed rail projects are specifically designed to link metropolitan areas.

Rail connections improve the accessibility of cities, making them more attractive locations.



"Isolation has never led to anything good. The bridge signals belonging and confidence in our capabilities. It is the opposite of self-sufficiency, isolation, nationalism and closedness"

Poul Nyrup Rasmussen
Former Prime Minister of Denmark

As more people move to cities, rail travel becomes increasingly popular. Rail transport and urbanisation reinforce each other. And as urbanisation boosts productivity, rail transport has a significant impact on economic growth through agglomeration benefits.

In the long term, the rail link was considered a more climate-friendly alternative to the previous ferry connection.

Driving forces behind the project

In Sweden, influential business leaders such as the Wallenberg family and Pehr Gyllenhammar were key driving forces behind the bridge project.

Pehr Gyllenhammar, long-time CEO of Volvo, was known for his ability to build connections between governments and the business community. He played a decisive role in the realisation of the mega-project that linked Denmark and Sweden.

Gyllenhammar shaped public opinion in favour of the project and argued that the bridge would strengthen the economies of both countries. The project's financing was secured through the Wallenberg banks and their personal business networks.

Financing: the states split the costs

The Öresund Bridge cost, in today's value, approximately EUR 5.4 to 6.1 billion. To im-

plement the project, the company Öresundsbro Konsortiet was established, with Sund & Bælt Holding A/S (owned by the Danish state) and Svedab AB (owned by the Swedish state) each holding half of the shares.

The Danes built the rail and road connections on their side, and the Swedes did the same on theirs. The actual bridge construction costs were split equally. No taxpayers' money was used for the project. The consortium took out loans, which were repaid through bridge and user fees paid by rail operators and every driver crossing the bridge.

A car crossing costs about EUR 50, but an annual subscription provides a substantial discount on each crossing. Rail operators also pay bridge fees, which are linked to traffic volumes. Initially, operators had to pay a fixed price. The project therefore did not require permanent public funding. The estimated repayment period was 30 years.

The financial payback period is only one perspective; it is even more important to assess the achievement of societal objectives. The opening of the bridge has increased economic integration and improved the mobility of labour and businesses between Denmark and Sweden.

Fehmarnbelt tunnel connecting Denmark and Germany

The four-lane road and double-track rail tunnel between Denmark and Germany, under construction since 2000, will link Scandinavia with Continental Europe.

Objective: speeding up traffic between Denmark and Germany

Once completed, the journey between Rødbyhavn in southern Denmark and Puttgarten in northern Germany will take ten minutes by car and seven minutes by train, compared with the previous 45-minute ferry crossing. The rail journey from Copenhagen to Hamburg will be shortened by about 160 kilometres. Travel time by train between the two cities will be reduced to 2.5 hours from the current 4.5 hours.

In the future, more than 100 trains and 12,000 cars will pass through the tunnel each day. Greenhouse gas emissions will decrease significantly as rail and freight transport routes are shortened by 160 kilometres.

Broader societal benefits

The tunnel connects Denmark and Sweden to Central Europe. The project is part of the EU's Scandinavia–Mediterranean transport corridor,

placing it among the most important infrastructure projects in the Union. The tunnel will significantly benefit freight traffic between Germany and Sweden and shift cargo from road to rail.

BS Economics analysed the socio-economic benefits of the fixed Fehmarnbelt link. The assessment estimates annual benefits of one billion Danish kroner for the Region of Zealand due to shorter travel times and macroeconomic effects. In addition, tourism growth will accelerate, the region's attractiveness as an investment destination will improve and freight transport costs will decrease.

The project was expected to create 20,000 new jobs during construction and 22,000 jobs indirectly. Employment effects during construction always carry regional importance, but at the national level the impact is the same regardless of location or project. The employment effect during construction depends almost entirely on the amount of money spent on building. Therefore, only the assessment of permanent employment effects of projects is meaningful.

Driving forces behind the project

Thirty years ago, the Danish and German governments agreed in principle to build a fixed



30 years ago, the Danish and German governments agreed in principle to build a fixed tunnel connection between the two countries.

tunnel connection between the two countries. The tunnel is now under construction and will be completed towards the end of this decade. Recent reports indicate that the project has been delayed by about a year.

The first ideas for a fixed link across the Fehmarn Belt were presented as early as the 1960s, but at that time underdeveloped construction technology and the scale of costs prevented progress.

Political debate intensified after the Cold War when European integration began to advance rapidly. Uffe Ellemann-Jensen, Denmark's foreign minister in the 1980s and 1990s, was among the first politicians to speak about a fixed link between Denmark and Germany as part of a European transport vision.

The European Union included the Fehmarn connection in the TEN-T (Trans-European Transport Network) plan in the late 1990s, giving the project official strategic status. Denmark and Germany signed the agreement to implement the tunnel project in 2008.

The Fehmarnbelt tunnel project is yet another example of how cross-border infrastructure projects can take half a century to progress from an idea to a construction site.

Support from German transport minister Klaus Töpfer was also decisive. He saw the tunnel concept as part of EU transport policy and, in particular, as a way to improve Germany's connections to Scandinavia.

Financing: paid by Danes

The project's investment cost was estimated at EUR 7.1 billion in 2022. Denmark is covering the entire cost of constructing the tunnel as well as the connections on its own territory. A Danish state-owned company was established specifically for the planning and implementation of the tunnel project.

Germany is funding only the construction of the road and rail connections on its side leading to the tunnel entrance.

The EU has granted CEF funding (Connecting Europe Facility) to the project in several phases, amounting to a total of EUR 1.3 billion.

The Fehmarnbelt tunnel project is yet another example of how cross-border infra projects can take half a century to progress from an idea to a construction site.

The Channel Tunnel between France and England

The rail tunnel connecting France and England was completed in 1994. Passenger trains, freight trains and car shuttle trains run through the tunnel. The travel time between London and Paris was reduced to 2 hours and 15 minutes, with the Channel section taking 35 minutes. Previously, the entire journey between London and Paris, including changes of transport mode, took 5.5 to 7 hours, with the Channel crossing alone taking 1.5 to 2 hours.

In its best years, the tunnel has carried more than 20 million passengers. Each day, 5,000 to 6,000 lorries pass through the tunnel on Le Shuttle Freight trains. Between 40,000 and 65,000 passengers cross the Channel by rail daily.

Cars can also travel through the Channel Tunnel by driving directly onto train carriages, allowing passengers and vehicles to cross in 35 minutes.

Objective: connecting Britain and Continental Europe

The tunnel connects Britain to the European mainland and is also known as the Eurotunnel. When completed, the project was seen as a great symbol of deepening EU integration. Since

Brexit, its political significance has diminished. Air travel responded to the competition from the Channel Tunnel, and expectations of 30 million passengers have not been realised.

Broader societal benefits

The Channel nevertheless significantly reduced the need for air travel, which has helped to cut climate emissions. At the time, the tunnel was one of the largest infrastructure projects in the world.

It increased business travel and accelerated office and industrial investments. There is no estimate of its contribution to GDP growth. The OECD has noted that the economic impacts of infrastructure projects often emerge over the long term and indirectly. Southern England and northern France have benefited most from the project's economic effects.

According to Ernst & Young's 2016 report "Economic Footprint of the Channel Tunnel", 25 per cent of trade between the UK and the EU and 220,000 jobs depend on the rail tunnel. The study found that 30 per cent of UK exports to the EU (GBP 43.6 billion) and 22 per cent of EU imports (GBP 47.8 billion) rely on the speed, ease and reliability of the Channel



Tunnel. The research was conducted before Brexit, after which customs procedures and slower border crossings have reduced societal benefits.

Driving forces behind the project

The British Prime Minister Margaret Thatcher initially opposed the tunnel, and her decision to support the project in 1986 was decisive. As a Eurosceptic, she considered the Channel link a way to strengthen Britain's role in the EU without joining the Union. For Thatcher, a staunch

advocate of market-economy principles, it was essential that taxpayers' money was not used for the investment.

"No-one could doubt that some form of link would eventually be established; the question was one of method rather than principle," Thatcher said about the project.

The French Prime Minister François Mitterrand was a committed European federalist who viewed the project as a means to advance European integration and the development of the single market.



“No-one could doubt that some form of link would eventually be established; the question was one of method rather than principle.”

Margaret Thatcher
Former Prime Minister of the UK

“This is more than a technical achievement – it is a symbol of what Europe can accomplish together,” Mitterrand said at the tunnel’s inauguration in 1994.

The Englishman Sir Alastair Morton was the first CEO of the tunnel operator Eurotunnel Group, and his leadership was crucial to the project’s success. He persuaded investors to

participate in what was then one of the world’s largest infrastructure projects and managed relationships between financiers, governments and contractors.

Other influential figures from British business were also involved, such as Lord Weinstock, CEO of General Electric Company, one of the country’s largest industrial firms, and Nigel Broackes, head of the industrial conglomerate Charter Consolidated.

Financing: private money

The rail link under the Channel cost EUR 12.6 billion in 1994 prices. Construction costs doubled during the project, which is very common for infrastructure projects. A basic rule for such projects is that the more detailed the planning, the higher the cost estimates become – in other words, the earlier the implementation decision is made, the more likely it is that cost estimates will be exceeded.

The railway was built entirely with private financing. More than 600,000 investors, mainly from Britain and France, participated in the share offering, and over 200 international banks contributed to the project’s financing. The tunnel company earns revenue from usage fees for freight, passenger and car traffic through the tunnel.

Later, the company also generated income from property development. Railway projects



“This is more than a technical achievement – it is a symbol of what Europe can accomplish together.”

François Mitterrand
Former Prime Minister of France

always increase land values around stations, and the large numbers of people passing through stations create significant business opportunities. Rising land prices enable property development and allow property development revenues to be channelled into project financing.

At the time of the Channel Tunnel’s construction, Europe had strong faith in market

25% of trade between Britain and the EU and 220,000 jobs depend on the Channel Tunnel.

economics and the role of the private sector, and governments were unwilling to take financial risks on mega-projects. The 1980s were marked by strict fiscal discipline. The private sector was seen as the best party to deliver a complex and technically challenging project.

Today, Europe once again has strong confidence in state capitalism and public investment programmes, as demonstrated by former central banker Mario Draghi’s competitiveness report and its EUR 800 billion investment package. In early 2025, Germany’s new government decided to implement an investment package worth nearly EUR 1 trillion, dubbed the “double bazooka”, of which EUR 500 billion will be allocated to infrastructure projects.

The Gotthard Base Tunnel through the Alps

The Gotthard Base Tunnel is the longest railway tunnel in the world. It was opened to traffic in 2016.

Objective: connecting Central Europe through the Alps

The tunnel is a key part of Europe's transport infrastructure. It connects northern and southern Europe and facilitates the flow of goods within the continent.

The tunnel serves both freight and passenger traffic. In 2017, a total of 18,395 passenger trains and 24,757 freight trains passed through it. On peak days, as many as 165 trains have travelled through the tunnel.

Broader societal benefits

The tunnel was driven largely by Switzerland's own national transport policy. The country wanted to shift lorry traffic crossing the Alps onto rail and reduce climate and particulate emissions.

The Gotthard Base Tunnel has significantly improved traffic flow and reduced environmental impacts in the Alps' unique and sensitive mountain region. It has increased passenger numbers, boosted tourism and offered leisure

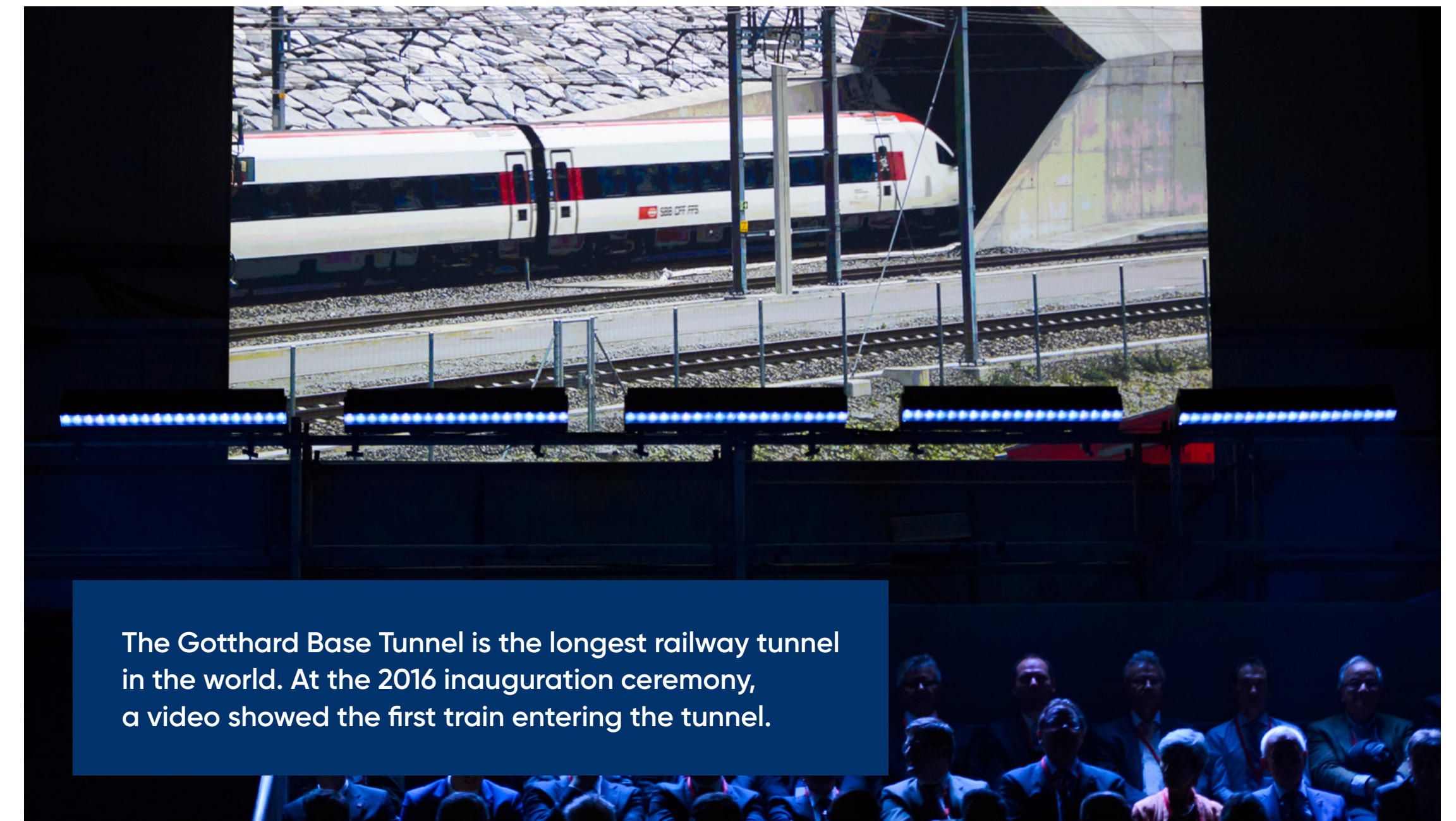
travellers a sustainable transport option.

The Gotthard Base Tunnel is part of Europe's important Rotterdam–Genoa freight corridor, which accounts for around 16 per cent of the EU's GDP. The tunnel has streamlined north–south traffic, improving Switzerland's logistics and export competitiveness. Travel time for passenger services between Zurich and Milan has been cut by about one hour.

Driving forces behind the project

The Swiss government was a major driving force when it prepared the country's infrastructure programme (NEAT Neue Eisenbahn-Alpen-transversale), known as the "Alpine transversal rail package". The purpose of the programme was to shift freight traffic crossing the Alps from road to rail for environmental and safety reasons.

In line with Swiss practice, the programme was put to a referendum. In 1992, 64 per cent of Swiss voters supported its implementation. This decision triggered the largest infrastructure investments in Switzerland's history, as the programme included not only the Gotthard tunnel but also the construction of the Lötschberg and Ceneri base tunnels.



The Gotthard Base Tunnel is the longest railway tunnel in the world. At the 2016 inauguration ceremony, a video showed the first train entering the tunnel.

The Swiss environmental movement in the 1980s and 1990s played a significant role in making Alpine protection a central societal theme. In 1994, a referendum approved the Alpine Initiative, which banned the construction of new Alpine roads and emphasised rail logistics.

Financing: state and user payments

The total cost of the Gotthard Base Tunnel was around EUR 12 to 13 billion. The project was

financed by the Swiss state. The Swiss state-owned railway company SBB was the sole owner of the project company. Once completed, the line was transferred to the railway operator's direct ownership.

The project is being repaid through several mechanisms. A share of value-added tax was earmarked for infrastructure projects, heavy goods vehicles were charged road tolls, fuel tax was increased and a large part was financed from general budgetary resources.

Rail Baltica

Rail Baltica will run from Tallinn to Warsaw, linking the Baltic states to Central Europe's railway network. Rail Baltica is one of the largest EU-supported transport infrastructure projects, which is natural given that the line passes through EU cohesion countries.

By 2030, the first phase of Rail Baltica will be completed from Tallinn to the Lithuanian–Polish border. Funding and implementation of the remaining part of the project are still undecided.

Objective: increasing the Baltic standard of living

Rail Baltica is an instrument of EU cohesion policy, originally intended to raise the standard of living in the Baltic states. Later, the need to detach the region from Russia's sphere of influence gained emphasis.

Broader societal benefits

Rail Baltica will reduce carbon dioxide emissions by 1.3 billion tonnes over a 30-year period, which is the timeframe used in cost–benefit analyses for infrastructure projects. The annual reduction corresponds to the yearly emissions of 25,000 cars. Emissions will decrease as passen-

ger and freight traffic shifts to rail and more air travellers choose climate-friendly rail transport.

According to the benefit–cost analysis updated by Boston Consulting Group in 2024, the project's direct and indirect economic benefits could reach up to EUR 48 billion. The annual GDP increase in the Baltic states would be 0.5 to 0.7 percentage points.

Rail Baltica is part of the TEN-T core network and connects the Baltic states more closely to western Europe. The project has also been a strong geopolitical instrument. The EU aims to detach the Baltic region from Russia's sphere of influence. Currently, the transport systems of Russia and the Baltic states are closely linked due to a common track gauge. Rail Baltica is part of the EU's Military Mobility initiative, which improves the rapid movement of NATO forces. Rail Baltica is not just a transport corridor; it deepens EU integration. It is a symbol of the Baltic states' connection to the West and the severing of dependence on Russia. Rail Baltica reduces reliance on Russian and Belarusian transport routes.

Social and regional integration were seen as important factors during Rail Baltica's planning phase in line with EU cohesion policy.

The Rail Baltica central station was under construction in Riga in 2025.



Smaller cities will also be connected to the high-speed rail network. Cultural interaction will increase in everyday life as travel for tourists, commuters and students within the Baltic region and towards Central Europe becomes easier.

The project will strengthen the Baltic states' business links to the markets of Germany, Poland and the Benelux countries. Faster, more reliable and more affordable container and freight connections are a key part of business competitiveness. Market expansion enabled by the railway will particularly benefit small and medium-sized businesses.

Better accessibility attracts investment. Logistics and business parks are being developed along the route. The railway enables the "just-in-time" logistics model, especially for industrial companies.

The project's benefit–cost ratio was estimated at 1.6 to 1.9, which is considered very good for a major rail project.

Driving forces behind the project

The European Commission's transport department has been a major driving force behind the project. In 1994, the Commission published its first proposal for developing transport corridors between the Baltic region and Central Europe. This was the first time the idea of a north–south rail link was officially presented.

The transport ministries and railway authorities of the Baltic states began using the name Rail Baltica for the first time in the late 1990s. In 2001, the Lithuanian government made the first national decision to advance the Rail Baltica project.

Key actors in the early stages were officials from the European Commission and the Baltic transport ministries. The first public mention of Rail Baltica occurred in 1994 when it was included in a strategy called "Vision and Strategies around the Baltic Sea 2010". This document emphasised the need to connect the Baltic states more closely to Europe and introduced the idea of a north–south rail link.

Henning Christophersen, a Dane who served as Vice-President of the European Commission from 1985 to 1995, was one of the first European politicians to bring the project into the public eye.

He was among the most important developers of TEN-T policy in the EU and repeatedly spoke about connecting the Baltic Sea region to Central Europe through transport corridors.

The European business lobby BusinessEurope has supported the project, as have several major logistics companies. The chambers of commerce in Estonia, Lithuania and Latvia have been active supporters.

The ports of Tallinn, Riga and Klaipėda have been among Rail Baltica's strongest advocates over the years. They have seen it as essential to integrate road transport and maritime freight more closely with the rail network, increase transit traffic through their countries and enhance the route's competitiveness compared with Russian and Belarusian transit routes.

Financing: EU and states taking responsibility

The aim of cohesion policy is to reduce economic and social disparities between regions of the Union, which has raised the EU's funding share for Rail Baltica to 85 per cent.

Once completed, Rail Baltica will be one of the largest rail projects ever supported by the EU. Inflation triggered by Russia's war of aggression has had a significant impact on Rail Baltica's costs. In 2017, the project's cost was estimated at EUR 5.8 billion, but the war-driven inflation has increased costs by 40 per cent. The current estimate for the first phase is EUR 15 billion.

The project is being implemented by a company owned by the Estonian, Latvian and Lithuanian states, and Rail Baltica is entirely financed through state and EU tax and budgetary resources. It is one of the most prominent projects under EU cohesion policy.

Rail Baltica is one of the most prominent projects under EU cohesion policy.

Rail projects that received the most EU funding

1. Rail Baltica

4,5 bn

2. Brenner Base Tunnel

2,2 bn

3. Turin–Lyon high-speed railway

1,5 bn

The Seikan Tunnel to Hokkaido

The Hokkaido rail tunnel connects Japan’s main island of Honshu with the northern island of Hokkaido. The railway link, over 50 kilometres long, included what was then the world’s longest underwater section at 24 kilometres. Today, the Channel Tunnel between France and Britain contains the world’s longest underwater tunnel.

Several accidents occurred during the construction of the Seikan Tunnel, resulting in more than 30 fatalities. The technical challenges were significant, and the actual construction of the tunnel took 17 years. The tunnel runs at a depth of 240 metres and opened to traffic in 1988. Around 30 high-speed trains and 50 freight trains pass through it daily.

Objective: a safer connection between islands

The objective was to create a safer connection between Japan’s main island and the island of Hokkaido than ferry services could provide.

Japan’s economy grew rapidly during the 1960s and the capacity of ferry transport became a constraint. Linking the islands with a reliable, fixed connection was considered essential for regional development and national integration.

Broader societal benefits

Passenger numbers were significantly lower than expected, and consequently the economic benefits were also less than anticipated.

The air connection between Tokyo and Sapporo was faster and often a more affordable option, which has reduced the attractiveness of rail travel.

Passenger volumes for rail were initially estimated at 9 million annually, but in the best year only 3.5 million passengers travelled through the tunnel. Today, passenger numbers are around 2 million.

Similarly, freight traffic was expected to exceed 17 million tonnes, but the actual figure remained at 5 million tonnes. In recent years, only 2.5 million tonnes have been transported, mainly agricultural products.

Driving forces behind the project

The main impetus for the project was the Toyamaru ferry disaster in 1954, in which more than 1,100 people lost their lives when the ferry sank. The accident caused a national shock and raised the already recognised safety risks of ferry connections to a new level. After the disaster, alternatives and more weather-resilient connections

between Japan’s main island and the island of Hokkaido began to be explored.

Financing

The project was funded entirely by Japanese taxpayers and led by the national railway company.

The societal benefits have been clearly lower than targeted. Costs increased significantly when safety requirements were tightened due to the risk of earthquakes.



The Seikan bullet train connects two of Japan’s main islands. A 24-kilometre section runs in an underwater tunnel.

KTX – a high-speed train connecting South Korea

South Korea's KTX (Korea Train Express) was a high-speed rail investment that replaced the line built in the early 20th century along the so-called Gyeongbu corridor between Seoul and Busan. The line is a 408-kilometre passenger route that runs mainly on the mainland. The project was launched in 1992 and the first phase opened to traffic in 2004.

Objective: connecting the largest cities

KTX connects the country's largest cities – Seoul, Daejeon, Daegu and Busan – into one dynamic economic area.

Broader societal benefits

KTX is one of the most successful high-speed rail projects in the world. It connects South Korea's most densely populated regions, such as Gyeonggi and South Gyeongsang provinces, as well as major cities including Seoul, Incheon and Busan. The area is home to two-thirds of the country's population and generates three-quarters of its GDP.

The old rail network was operating at the limits of its capacity, and the growth of air traffic caused congestion and emissions. High-speed trains offered a solution that combined efficiency,

environmental sustainability and regional development.

Travel time between Seoul and Busan was reduced from four hours to two, and the share of air traffic declined significantly, which lowered climate emissions. Commuting and labour market mobility increased, and regional investment grew, particularly in Daejeon and Daegu. KTX has also had an impact on social equality: fast and affordable travel has improved access to education and employment even in smaller towns. A study published in 2005 estimated the benefit–cost ratio of KTX at as high as 2.4.

KTX is based on French TGV technology, but its implementation emphasised strong technology transfer and the development of domestic capacity.

Technology transfer created South Korea's domestic railway industry. Through the megaproject, predominantly French high-speed rail expertise became embedded in the country. South Korea later exported its high-speed rail solutions abroad. KTX trains have been delivered to Turkey, and rolling stock and rail technology have been exported to Uzbekistan, Kazakhstan and other countries. Korean compa-



nies have participated in international tenders in Brazil, Indonesia and India.

Driving forces behind the project

The project was strongly driven by the national government, Korean National Railroad (KNR) and later KORAIL. Technology transfer was carried out in cooperation with the French rail company SYSTRA. Domestic companies such as Hyundai Rotem participated in the development of rolling stock. The project was part of the national infrastructure strategy and its im-

plementation was divided into two phases between 1992 and 2015.

Financing and costs

The total cost of the KTX project was approximately EUR 18 to 20 billion at current value, whereas the original estimate was only about EUR 10 billion. The increase in costs was due to the expanded scope of the project, technological developments and challenges related to land use. Financing was provided through the state budget, but part of the investment was covered by a PPP model and user charges.

Summary of projects compared

Name of the project	What	Length	Year of completion	Cost	Implementation model	Repayment	EU's share
Öresund Bridge	Road and railway bridge that connects Copenhagen and Malmö	18 km	2000	SEK 37.8 bn (estimation made in 2000), cost estimate in today's value approx. EUR 5.4–6.1 bn	Project company founded by the Swedish and Danish states with 50–50% shares	Bridge tolls, railway operator fees, not tax-financed	Did not contribute to the costs
Fehmarnbelt tunnel	Road and railway tunnel between Denmark and Germany	18 km	2031	EUR 7.1 bn (estimation made in 2022)	A project company in Denmark, budget-financed in Germany	Germany's budget-financing covers the costs until the tunnel, Denmark pays for the tunnel itself and the access to the tunnel from Denmark's side. Users are charged tunnel tolls.	EUR 1.3 bn so ca. 9%
Channel Tunnel between France and Britain	Railway tunnel for passenger traffic and truck/car trains between France and Britain	Approx. 50.5 km (38 km as the world's longest underwater tunnel)	1994	EUR 12.6 bn (1994)	Private project company, 600,000 investors and 200 international banks	User fees, property development	Did not contribute to construction
Gotthard Base Tunnel	World's longest railway tunnel through the Swiss Alps	57 km	2016	EUR 12.2 bn	The project company's sole owner was the railway company SBB, owned by the state. Once completed, the railway was transferred under direct ownership of the railway operator	VAT includes infrastructure, heavy traffic road charges, fuel tax increase, general budget financing	(Switzerland is not part of the EU)
Rail Baltica	Rail connection with the European track width from Tallinn to Warsaw	New two-track railway section 870km	2031, two-track section 2035	15,3 million	A project company owned by Estonian, Latvian and Lithuanian states	EU and Estonia, Latvia and Lithuania's budget-financing	85% maximum
Seikan Tunnel	Railway tunnel from Japan's main island to the northern island of Hokkaido for bullet trains and freight traffic	54 km, of which 23 km under the seabed (world's second longest underwater tunnel)	1988	YEN 690–900 bn, which translates to ca. EUR 4.3–5.6 bn today	Government project, carried out by Japan's national railway company	Funded by the government	-
South Korean KTX	High-speed train from Busan to Seoul	408 km, mostly flat, some tunnels a few kilometres long	2004	18–20 bn in today's value	Public infrastructure project	Government funding and user fees	-

Traffic impacts

Name of the project	BCR	Travel impact	Traffic volume	Climate impact
Öresund Bridge	Not available	Train journey reduced by 10 minutes and car journey reduced by half between Copenhagen and Malmö	70,000 passengers and 20,000 vehicles per day	Fossil-fuel-using ferry traffic transitioned to climate-friendly train traffic, the construction phase was emission-intensive
Fehmarnbelt tunnel	Very large numbers from different sources	Journey from Copenhagen to Hamburg will reduce by ca. 160 km translating to ca. 2 hours	Hundred train and 12,000 cars per day	Freight traffic between Germany and Scandinavia will transition from wheels to rails
Channel Tunnel between France and Britain	1.5–2.0	Travel time between London and Paris was reduced to 2 h 15 min. Previously, including changes in mode of transport, the overall journey took ca. 5.5–7 h.	During the top year, over 20 million passengers and at its peak, 285 trains per day.	Mode of transport shifted from air to rails
Gotthard Base Tunnel	1.3–1.4	Travel time between Zurich–Milan reduced by 45 min. Heavy traffic travel times reduced by 1–1,5 h cf. “mountain routes”	During the peak year, over 18,300 passenger trains and 24,750 freight trains in total. Up to 165 trains have travelled through the tunnel per day.	Minimum reduction of 500,000 tonnes of CO ₂ per year.
Rail Baltica	1.19	The trip from Tallinn to Riga will be done in less than 2 h, and from Kaunas, Lithuania, to Warsaw in 3.5 hours	According to the traffic forecast, 33 million passengers per year and 11 million tonnes of freight traffic.	Reduction of 400,000 tonnes of CO ₂ emissions per year (estimate for 2040 level)
Seikan Tunnel	Not available	Previously, the ferry ride took 3,5–4 h. Now, it takes 8 min by rail.	Annual passenger traffic 2.1 million passengers and 2.5 million tonnes of freight. 80 trains per day.	Emissions during construction remain the largest emissions over the lifecycle (cf. the energy efficiency of construction techniques from the 1960s)
South Korean KTX	2.4	Journey by train reduced from 4 h to 2 h.	The KTX’s different lines host over 230 train rides daily, totalling 70 million passengers yearly. Most of the passengers on the Seoul–Busan route.	Air traffic CO ₂ emissions reduced by 87% during 2004–2008 after KTX was deployed. Eg. flights between Seoul and Daegu decreased by 92% in two years.

Strategic, broader societal benefits

Name of the project	Integration	Economic growth and labour market effects	Maintenance and operational reliability	Political objective
Öresund Bridge	A regional integration between two countries, no EU level integration	Produced the largest common labour market area for 4.2 million residents in the Nordics.	Round the clock, functional and weather-proof connection compared to a ferry connection.	To create the world's most integrated economic and labour market area
Fehmarnbelt tunnel	Connects Scandinavia to Central Europe	Increased mobility in labour force and reduced logistics costs in the Northern Europe area. Connects the most important industrial areas in Northern Europe.	Military mobility is an important part in the defence planning in Northern Europe. Connects the most important industrial areas in Northern Europe.	Free movement of goods and services between Northern Europe and Central Europe
Channel Tunnel between France and Britain	A great symbol for the European unity, also referred to as Eurotunnel	A quarter of the trade between EU and Britain, and 220,000 jobs in were dependent on the tunnel (before Brexit).	Freight and passenger traffic is not dependent on weather-sensitive ferry traffic. Military mobility was not a factor when deciding on the project.	Political unification of Europe
Gotthard Base Tunnel	Connects North and South Europe	Quicker and more reliable freight transportations over the Alps, reducing the effects of varying mountain weather	Quicker and more reliable freight transportations over the Alps, reducing the effects of varying mountain weather	Crossing the Alps in a more environmentally and economically sustainable way
Rail Baltica	Strongly connects the Baltics to the West and Europe	Increase in the GDP of Baltic countries by 0.5–0.7% yearly	Military mobility important and enables quick transfers of NATO troops. Reduces dependency on Russian and Belarusian transport routes.	Geopolitical logistics tool to connect the Baltics more strongly to Europe
Seikan Tunnel	Country's internal integration	Minor compared to the project costs	More reliable and safer connection compared to the previous ferry connection	The response to the ferry accident that killed over a thousand people
South Korean KTX	Connected 2/3 of the country's population	Economic activity in rural municipalities near the stations increased by 10%	Improved train punctuality	Accelerating economic growth and technology transfer

Name of the project	NB
Öresund Bridge	Over time, 70% of the benefits are labour market benefits
Fehmarnbelt tunnel	Denmark pays for the tunnel section on its own
Channel Tunnel between France and Britain	The project ultimately turned out to be commercially viable, even though cost estimates were greatly exceeded
Gotthard Base Tunnel	The project was completely funded by the Swiss government

Name of the project	NB
Rail Baltica	The project is a prominent example of the EU's cohesion policy, and military mobility has become a major factor following Russia's war of aggression
Seikan Tunnel	A single accident as a key driver
South Korean KTX	One of the most successful high-speed rail projects in the world

Summary and conclusions of major projects

The progress of major cross-border connectivity projects in Europe has been driven by the strong visionary leadership of heads of state and key business figures. They have been inspired by the prospect of increased interaction between national economies and cultures, and by deeper EU integration in economic, political and citizens' terms.

The value-based deepening of European integration has driven the EU's efforts to finance mega-scale infrastructure projects. Financing models and cost-sharing arrangements for cross-border projects differ significantly. In the Öresund Bridge project, Sweden and Denmark split the costs evenly, and the project was funded through bridge tolls. In the Fehmarnbelt tunnel project, Denmark, which received the greater benefits, covered the majority of the costs. The Channel Tunnel between Britain and France was only realised on the condition that no taxpayer money would be used. Rail Baltica, by contrast, is fully publicly funded and serves as a showcase of the strength of EU cohesion policy.

Based on other comparable investments, a preliminary assessment can be made of the financing model for the Helsinki–Stockholm–Oslo project. The project would almost certainly be financed through a hybrid structure, incorporating elements from the benchmark projects

outlined in this report. Public funding from national governments and the EU would cover most of the project's costs, while a portion could be raised through tunnel access charges levied on railway operators.

A dedicated infrastructure fund could be established for insurance companies and institutional investors to provide financing during the construction phase of the project. Arranging construction financing is easier than securing the ultimate payer for the project. Ultimately, the costs are covered by taxpayers and by users of the transport link through ticket prices.

Constructing a tunnel between Helsinki and Stockholm would only be viable for rail traffic. Building a four-lane road tunnel would significantly increase costs. As the project would involve constructing the world's longest underwater tunnel section, even as a rail-only scheme the cost estimate would be expected to reach several tens of billions of euros.

The climate benefits of rail projects are described as significant across all cases. High-speed rail is a key solution for achieving long-term climate objectives. Transport remains one of the EU's greatest climate challenges, accounting for one third of the Union's greenhouse gas emissions. Rail transport contributes only 0.4 per cent of EU transport emissions while carrying 7 per cent of all passengers.

Building railways alone does not guarantee sustainable consumer choices. Millions of travellers still opt for short-haul flights, even though high-speed rail connections generate up to 90 per cent fewer CO₂ emissions. France and Austria have already begun restricting short-haul flights where a rail alternative exists. Pricing mechanisms and the expanding emissions trading scheme will increasingly steer travel towards rail.

In recent years, the climate impacts of major infrastructure projects have been scrutinised more closely, as the net effects of other projects have become clearer. Large-scale megaprojects consume vast amounts of steel and concrete, resulting in substantial construction-phase emissions that remain significant even when assessed over the full life cycle. Construction technology is expected to advance over the coming decades, and carbon-free steel and low-emission concrete solutions are currently being developed at pace. Emissions from infrastructure construction are estimated to halve over the next decade.

If the Nordic Capitals Railway project were to be approved, construction could optimistically begin in 25–30 years, but based on the experiences of previous benchmark projects, groundbreaking might not occur for another 50 years. By then, construction technology is expected to have advanced significantly toward lower-emission solutions.

According to Søren Brøndum of Ramboll, the costs of megaprojects are consistently underestimated, and construction invariably takes longer than expected. A Danish colleague of Brøndum warned against the “honeymoon thinking” that often surrounds major infrastructure projects. Credibility in project delivery depends on addressing risks sufficiently early. Cost–benefit analyses and environmental impact assessments must be as realistic as possible.

04 VISION

Vision: Nordic Capitals Railway – a more united North, a stronger Europe

According to the Confederation of Finnish Industries, there is particular interest in the Helsinki–Stockholm connection, which has not yet been explored.

Current situation

The Confederation of Finnish Industries (EK) has proposed studying the feasibility of a fixed link along the Helsinki–Turku–Åland–Stockholm corridor. The proposal was presented in their research report “Vision for Finland: Future International Transport Connections”. The report’s authors interviewed industry representatives, who emphasised the need to strengthen Finland’s western connections.

According to EK, the Finnish Government should launch a study focusing on three concrete alternatives: 1) Helsinki–Tallinn; 2) Helsinki–Stockholm–Copenhagen; and 3) Vaasa–Umeå. EK notes that the Stockholm connection is of particular interest and has received little analysis to date.

The Confederation of Swedish Enterprise (Svenskt Näringsliv) has proposed that the three infrastructure projects should be financed outside the national transport system plan, with

the Stockholm–Oslo rail link identified as the highest priority.

Svenskt Näringsliv considers the project suitable for a public–private partnership (PPP). Svenskt Näringsliv also proposes raising the central government debt anchor from 35 per cent to 40 per cent to enable the implementation of key infrastructure projects. The Swedish Government’s objective is to maintain the government debt ratio at 35 per cent \pm 5 percentage points of GDP over the medium term.

Swedish Prime Minister Ulf Kristersson has described the Stockholm–Oslo rail link as a “better idea” than the proposed new main lines between Stockholm and Gothenburg, and between Stockholm and Malmö. The Swedish Government halted preparations for these projects during the 2022 government formation negotiations.

Instead, the Swedish Government has added the Stockholm–Oslo route to the EU TEN-T network, making the project eligible for EU funding.

Meetings of Nordic transport ministers have advanced Rail Nordica and the idea of developing a joint Nordic transport system plan. The Stockholm–Oslo rail project has not featured in the discussions.

Oslo–Sthlm 2.55 is a Swedish project company owned by municipal and regional authorities, aiming to establish a three-hour connection between the two capitals. A corresponding company operates on the Norwegian side.

Construction company Skanska and Alstom, one of the world’s leading railway companies, have explored cost-effective solutions for building the new rail link. The report “Nya skandinaviska järnvägen Oslo–Stockholm” presents a vision of reducing travel time to three hours. The project’s estimated cost is around EUR 6.7 billion. According to a report prepared by Sweco, the project’s benefit–cost ratio is approximately 1.6–2.0.

The Swedish Transport Administration has estimated that two-thirds of the current 1.4 mil-

lion annual air journeys could be replaced by rail if travel time can be reduced from five hours to under three hours.

A strategically important east–west corridor in Northern Europe

The business communities of Finland and Sweden have each highlighted the importance of a rail link to Stockholm. Finnish industry has called for a connection from Helsinki to Stockholm, while Swedish industry has advocated a link from Stockholm to Oslo.

The security situation and NATO membership have changed the strategic landscape. The importance of east–west connections for enhancing military mobility in Northern Europe is emphasised in NATO’s defence planning.

The Nordic Capitals Railway – a west–east logistics corridor from Oslo via Stockholm to Helsinki – would provide an alternative route in times of crisis, particularly if the Baltic States or Finland were under threat. The railway would offer a secure transport channel should critical maritime routes in the Baltic Sea be compromised in exceptional circumstances. This would reduce Finland’s logistical vulnerability and strengthen security of supply across Northern Europe. The connection would enable the rapid cross-border movement of troops, equipment and essential supplies during emergencies.

Critical Nordic data cables could also be routed through the underwater tunnel sections.

Together with the Fehmarnbelt tunnel, due for completion at the end of the decade, the Nordic Capitals Railway would shorten transport and travel times to Western Europe.

According to EK’s logistics report, fixed links would improve logistics service levels and offer a faster alternative to sea freight for goods unsuitable for conventional shipping due to their size or value.

The Nordic Capitals Railway would link the national economies and metropolitan areas of Finland, Sweden and Norway, while creating a militarily significant east–west connection across the Nordics. From Stockholm, the route would also branch south towards Copenhagen. The new railway would strengthen Stockholm’s position as a central hub in the Nordic economy.

The Nordic Capitals Railway is, above all, a political project aimed at deepening European integration, strengthening economic growth in Northern Europe, boosting productivity, creating common labour markets and fostering interaction between nations. At the same time, it would enhance security of supply and military mobility. A “dual-use” transport network serving both commercial and military needs is ultimately one of the most effective solutions for ensuring resilience. Infrastructure projects built solely for military purposes remain the exception.

Europe’s major economic hubs

The Nordic Capitals Railway would connect the metropolitan areas of the three capitals, home to 7.3 million people. This represents 34 per cent of the combined population of Finland, Sweden and Norway, and would also accelerate growth across Scandinavia. The region includes around 4.1 million people of working age, which is more than one third of the total labour force in these countries. Its combined GDP is approximately EUR 455 billion, averaging about EUR 62,000 per capita. These figures show that the area already ranks among Europe’s major economic hubs.

In larger and more densely populated labour markets, companies can find better collaboration partners and a workforce that more closely matches their needs. Competition between companies and interaction with the scientific community increase. Employees are more likely to find jobs that correspond to their education and skills and to change positions more frequently. This growing interaction accelerates innovation and enhances economic productivity.

The region’s innovation potential is exceptionally high. In 2023, more than 35 per cent of the three countries’ research and development investments were concentrated in these four urban areas. Stockholm and the Helsinki metropolitan area are particularly strong R&D hubs,

Europe's most significant economic area

7.3 million residents

4.1 million working-age residents

EUR **455** bn GDP

EUR **14.3** bn RDI

Nordic Capitals Railway connects the capital cities of the Nordics

- New railway: Rail Nordica Helsinki–Stockholm–Oslo
- Planned railway section: Oslo–Gothenburg
- Existing railway section: Stockholm–Copenhagen



with investments growing at an annual rate of over 5 per cent in recent years. A rail link could further strengthen collaboration between the region’s leading universities, research institutes and companies, thereby accelerating innovation and productivity growth.

Export figures also highlight the region’s strategic importance. In total, the area accounts for an estimated EUR 125 billion in exports, representing a significant share of the three countries’ combined exports. At present, export relies heavily on maritime routes, with as much as 97 per cent of Finland’s exports carried by sea. A rail link would provide an alternative, crisis-resilient transport corridor, strengthening the region’s security of supply and logistical resilience.

Denmark fears that, with the upcoming Fehmarnbelt tunnel, the country could become a transit route to Central Europe via Sweden, although it could gain financial compensation through tunnel tolls. In Sweden, concerns have emerged about falling behind Denmark and the Copenhagen metropolitan area in terms of development. The Nordic Capitals Railway would strengthen Stockholm’s position as the economic hub of the Nordic region.

Åland would gain a unique political role as a connector between Finland and Sweden, a role it has historically held. Åland’s signifi-

The Nordic Capitals Railway is a political project that deepens European integration and strengthens economic growth in Northern Europe.

cance should not be viewed solely through the objectives of Finland and Sweden; its own regional economic vitality would be significantly strengthened.

The Nordic Capitals Railway would connect the entire Nordic growth triangle, including Oslo, Stockholm, Helsinki and Copenhagen. A rail link already exists between Stockholm and Copenhagen. Finland’s own growth triangle of Helsinki–Turku–Tampere would be integrated into the Nordic growth triangle.

Strategic vision: Nordic Capitals Railway – a more united North, a stronger Europe

The connection implements the EU initiative for a high-speed rail network linking capital cities.

Connecting metropolises: Agglomeration benefits and a productivity leap

The Nordic Capitals Railway would connect one of Europe's most significant economic hubs with Central Europe. Finland's growth triangle Helsinki–Tampere–Turku, together with Stockholm and Oslo, forms a metropolitan region of 7 million people and a combined GDP exceeding EUR 455 billion.

A high-speed rail link expands labour markets, increases competition among companies and improves the mobility of skilled labour. According to studies by the OECD and the University of Cambridge, better accessibility boosts productivity, drives innovation and strengthens regional vitality. Experience from the Öresund Bridge show that 70 per cent of the project's benefits came from labour market effects.

Innovation potential: Combining R&D investments

In 2023, more than 35 per cent of Finland's, Sweden's and Norway's R&D investments were concentrated in these three cities. The Helsinki metropolitan area, Stockholm and Oslo are strong research and innovation hubs, and a high-speed rail link could further strengthen collaboration between them.

Faster mobility enables closer interaction between universities, research institutes and companies. This accelerates innovation, speeds up technology transfer and strengthens the countries' competitiveness in the global economy.

Logistics and security of supply: Strategic resilience

As a "dual-use" infrastructure project, the Nordic Capitals Railway would create a strategically important west–east connection from Norway's Atlantic coast, enhancing military mobility and supply security. The project would significantly strengthen Northern Europe's resilience and crisis preparedness.

The connection would also enable the rapid movement of troops and materiel in line with NATO's defence planning. It would support the EU's Military Mobility initiative and strengthen Europe's strategic autonomy.

97 per cent of Finland's exports and imports are transported by sea through the geopolitically tense Baltic Sea. The Nordic Capitals Railway would provide an alternative freight route.

Opportunities of the Nordic Capitals Railway

Nordic level

- A strong political symbol of Nordic cooperation and interaction among European nations
- Integrating the economies of Finland, Sweden, Norway and Denmark would accelerate economic and productivity growth in Northern Europe
- Increasing interaction across the capitals' metropolitan regions of 7 million inhabitants – among the economic, labour-market and business sectors, as well as among research and innovation actors – would accelerate economic growth and productivity
- The connection would strengthen the functioning of the internal market in Northern Europe, increase trade between the countries and expand market access particularly for small and medium-sized enterprises
- Strengthening east–west connections would enhance military mobility in Northern Europe. A logistical route from west to east, running from Oslo via Stockholm to Helsinki, would provide an alternative corridor in crisis situations, particularly in the face of the Russian threat
- Critical data cables between the Nordic countries could be routed through the underwater tunnel sections

EU-level

- Would deepen EU integration and improve the functioning of the single market
- Would implement the Commission's objective in Northern Europe to link the EU's capitals through a high-speed rail network
- Would genuinely connect Northern Europe to Continental Europe
- Would link Finland, the NATO member bordering Russia in the east, more closely to the West
- Would create alternative transport routes and enhance Europe's security of supply and strategic autonomy
- EU integration is only complete when the Nordic countries are strongly connected logistically and Finland, the last "island state," is fully connected to Continental Europe

Risks and threats

- There is no political consensus among Finland, Sweden and Norway regarding the implementation of the project
- Government changes weaken cross-party political support in individual countries
- The costs of the bridge project would become high relative to its benefits
- Decision-makers' perspective does not extend far enough over a 100-year horizon, but instead narrows to a few decades, as encouraged by the 30-year calculation period used in cost–benefit analyses
- The travel time would remain long enough for aviation to retain its relative advantage in passenger traffic, while car ferry services would remain relatively competitive in freight transport
- The long travel time would not support daily commuting, and the labour market effects would be smaller than expected
- Bridge and tunnel infrastructure is perceived as too vulnerable in crisis or wartime situations
- The project's climate, environmental and landscape impacts in Finland's Archipelago Sea, Åland, and off the coast of Stockholm are expected to be significant
- The Nordic countries are not so-called cohesion countries, so EU support for the project would ultimately remain too low

Nordic Capitals Railway: Dynamic economic and labour market area

Region	Population base* (including nearby areas)	GDP and GDP per person (2022)	Working-age population* (including nearby areas)	Most important nearby cities (<100 km distance) and main importance
Uusimaa (Helsinki)	1.78 million residents (32% of Finland's population) Annual growth pace for the last 5 years: 0.7%	EUR 107.63 bn (EUR 60,376 per person)	1.18 million residents (34% of Finland's working-age population) Annual growth pace for the last 5 years: 1.2%	Espoo (Technology industry) Vantaa (Logistics) Porvoo (Tourism)
Southwest Finland (Turku)	0.50 million residents (9% of Finland's population) Annual growth pace for the last 5 years: 0.2%	EUR 22.11 bn (EUR 44,630 per person)	0.31 million residents (9% of Finland's working-age population) Annual growth pace for the last 5 years: 0.5%	Naantali (Harbour/industry) Uusikaupunki (Car industry) Raisio (Logistics)
Åland	0.03 million resident (0.6% of Finland's population) Annual growth pace for the last 5 years: 0.5%	EUR 1.51 bn (EUR 48,973 per person)	0.02 million residents (0.5% of Finland's working-age population) Annual growth pace for the last 5 years: 0.9%	Turku (~135 km) Stockholm (~130 km)
Pirkanmaa (Tampere)	0.57 million residents (10% of Finland's population) Annual growth pace for the last 5 years: 0.7%	EUR 24.12 bn (EUR 44,134 per person)	0.35 million residents (10% of Finland's working-age population) Annual growth pace for the last 5 years: 1.1%	Hämeenlinna (Historical industry) Nokia (Industry) Pirkkala (Aviation)
Stockholm (Metropolitan area)	2.45 million residents (23% of Sweden's population) Annual growth pace for the last 5 years: 1.0%	EUR 162.11 bn (EUR 65,946 per person)	1.54 million residents (24% of Sweden's working-age population) Annual growth pace for the last 5 years: 1.1%	Uppsala (University and research) Södertälje (Industry) Västerås (Industry)
Oslo (Metropolitan area)	1.95 million residents (35% of Norway's population) Annual growth pace for the last 5 years: 1.4%	EUR 136.83 bn (EUR 69,873 per person)	1.23 million residents** (34% of Norway's working-age population) Annual growth pace for the last 5 years: 0.7%**	Lillestrøm (Growing city) Sarpsborg (Industry) Drammen (Business)
Total	7.28 million residents (34% of the countries' population)	EUR 454.45 bn (EUR 62,401 per person)	4.12 million residents in total (31% of the countries' working-age population)	-

Sources: Eurostat, Nordstat, national statistics centres, World Bank

*Latest available number **In relation to Norway's total working-age population (63%) and growth pace (0.7%)

Nordic Capitals Railway: Innovation hub

Region	Leading universities in nearby area	RDI expenses (2023)	RDI investments per person in relation to GDP/person
Uusimaa (Helsinki)	Aalto University University of Helsinki University of Arts Helsinki Hanken	EUR 4.21 bn (50.0% of Finland’s RDI expenses) Annual growth pace for the last 5 years: 5.5%	3.6% (Finland in total 3.1%)
Southwest Finland (Turku)	University of Turku Åbo Akademi Turku University of Applied Sciences	EUR 0.55 bn (6.6% of Finland’s RDI expenses) Annual growth pace for the last 5 years: 3.0%	2.3% (Finland in total 3.1%)
Åland	Åland University of Applied Sciences	EUR 0.01 bn (0.1% of Finland’s RDI expenses) Annual growth pace for the last 5 years: 12.8%	0.3% (Finland in total 3.1%)
Pirkanmaa (Tampere)	University of Tampere Tampere University of Applied Sciences	EUR 1.04 bn (12.3% of Finland’s RDI expenses) Annual growth pace for the last 5 years: 2.0%	3.6% (Finland in total 3.1%)
Stockholm (Metropolitan area)	University of Stockholm Karolinska Institutet KTH Royal Institute of Technology Stockholm School of Economics Stockholm University of the Arts	Stockholm region: EUR 5.93 bn (30.3% of Sweden’s RDI expenses) Annual growth pace for the last 5 years: 6.4%	Stockholm 3.8% (Sweden in total 3.6%)
Oslo (Metropolitan area)	University of Oslo BI Norwegian Business School Oslo Metropolitan University	Oslo region: EUR ~2.60 bn (31.2% of Norway’s RDI expenses) Annual growth pace for the last 5 years: 5.4%	Oslo 1.9% (Norway in total 1.8%)
Total	-	EUR 14.34 bn (35.3% of the countries’ RDI expenses)	-

Sources: Eurostat, national statistics centres, Nordstat

Current passenger traffic

City	Maritime traffic (Annual passengers 2023)					Estimated aviation traffic (Direct flights per year, 2023)				
	Northwest Finland	Åland	Pirkanmaa	Stockholm	Oslo	Northwest Finland	Åland	Pirkanmaa	Stockholm	Oslo
Uusimaa (Helsinki)	3.0 million*	~0.04 million passengers**	-	3.1 million	-	-	~ 150	-	~ 4,700	~ 1 500
Southwest Finland (Turku)	Uusimaa	Åland	Pirkanmaa	Stockholm	Oslo	Uusimaa	Åland	Pirkanmaa	Stockholm	Oslo
	3.0 million	0.01 million	-	2.1 million	-	-	-	-	~ 550	~ 350
Åland	Uusimaa	Northwest Finland	Pirkanmaa	Stockholm	Oslo	Uusimaa	Northwest Finland	Pirkanmaa	Stockholm	Oslo
	0.04 million*	0.01 million	-	0.9 million	-	~ 150	-	-	~ 350	-
Pirkanmaa (Tampere)	Uusimaa	Northwest Finland	Åland	Tukholma	Oslo	Uusimaa	Northwest Finland	Åland	Stockholm	Oslo
	-	-	-	-	-	-	-	-	>100	-
Stockholm	Uusimaa	Northwest Finland	Åland	Pirkanmaa	Oslo	Uusimaa	Northwest Finland	Åland	Pirkanmaa	Oslo
	3.1 million	2.1 million	0.9 million	-	-	~ 4,700	~ 550	~ 350	>100	~ 4,100
Oslo	Uusimaa	Northwest Finland	Åland	Pirkanmaa	Stockholm	Uusimaa	Northwest Finland	Åland	Pirkanmaa	Stockholm
	-	-	-	-	-	~ 1,500	~ 350	-	-	~ 4,100

Sources: Eurostat, Finnair, Port of Helsinki, Skyscanner

*Helsinki–Turku statistics are not available: presumed Helsinki–Stockholm passengers excluding Helsinki–Åland traffic

**Helsinki–Mariehamn traffic only: Åland functions as a way station between Helsinki and Stockholm

Current cargo traffic

City	Export value by province, 2023	Export value between countries, 2023		Country's weight-based distribution of export transportation***			Country's weight-based distribution of import transportation***		
Uusimaa	EUR 25.85 bn (33.9% of Finland's export value)	 EUR 8.14 bn	 EUR 2.35 bn	95%	4%	0.1%	97%	3%	0.9%
Southwest Finland	EUR 6.99 bn (9.1% of Finland's export value)								
Åland	EUR 0.02 bn (0.2% of Finland's export value)								
Pirkanmaa	EUR 8.83 bn (11.6% of Finland's export value)								
Stockholm	Stockholm region: EUR 51.93 bn (27.5% of Sweden's export value in total)	 EUR 8.76 bn	 EUR 16.80 bn	85%	12%	3%	80%	15%	4%
Oslo	Oslo region: EUR 31.45 bn*** (20.0% of Norway's export value in total)	 EUR 5.94 bn	 EUR 12.60 bn	87%	10%	1%	70%	27%	2%
Total	EUR 125.07 bn	EUR 54.52 bn		-			-		

Sources: Customs, national statistics centres

*State's relative numbers, the same distribution assumed in cities as well. Latest available year.

**Estimation: Oslo's portion estimated to be 20% of Norway's total exports in 2024 (EUR ~157 bn)

***State's relative number, the same distribution assumed in cities as well. Latest available year.



05

CONCLUSIONS

Key messages

Next, it is Northern Europe's turn to implement a strategic transport project that unites the peoples of Europe – the countries of Northern Europe have a once-in-a-century political momentum to advance a mega-scale infrastructure project within the EU.

Defence spending targets of 5 per cent set by NATO can include dual-use transport projects.

The benefits of rail projects accumulate from completion into perpetuity, and up to 70 per cent of these benefits relate to the labour market: improved job matching and innovations driven by interaction.

Major accessibility projects belong on the agenda of heads of state, not for assessment by transport-oriented policymakers.

In international and cross-border projects, long-term strategic benefits take precedence over directly quantifiable economic impacts – and these cannot be calculated in any case.

Large cross-border projects materialise at the earliest 30 to 50 years after the initial idea.

Policy recommendation

The European Commission and the governments of Finland, Sweden and Norway should launch a joint study on the societal benefits and strategic significance of the Nordic Capitals Railway for Europe, as well as the project's feasibility and financing options.

The programme of Finland's next government should include a commitment to commissioning this joint study. The same political commitment is also required from the governments of Sweden and Norway.

06

APPENDICES

Appendix 1: Cost estimate and political sensitivity analysis

Nordic Capitals Railway: estimated costs at tens of billions

The costs of the Nordic Capitals Railway project are significant. According to research by Bent Flyvbjerg, an expert on megaprojects, cost estimates for such projects are also systematically exceeded. The average cost overrun for major railway projects is 45 to 60 per cent, and for tunnel projects as much as 70 to 90 per cent. For combined rail and tunnel megaprojects, cost overruns typically range from 60 to 80 per cent.

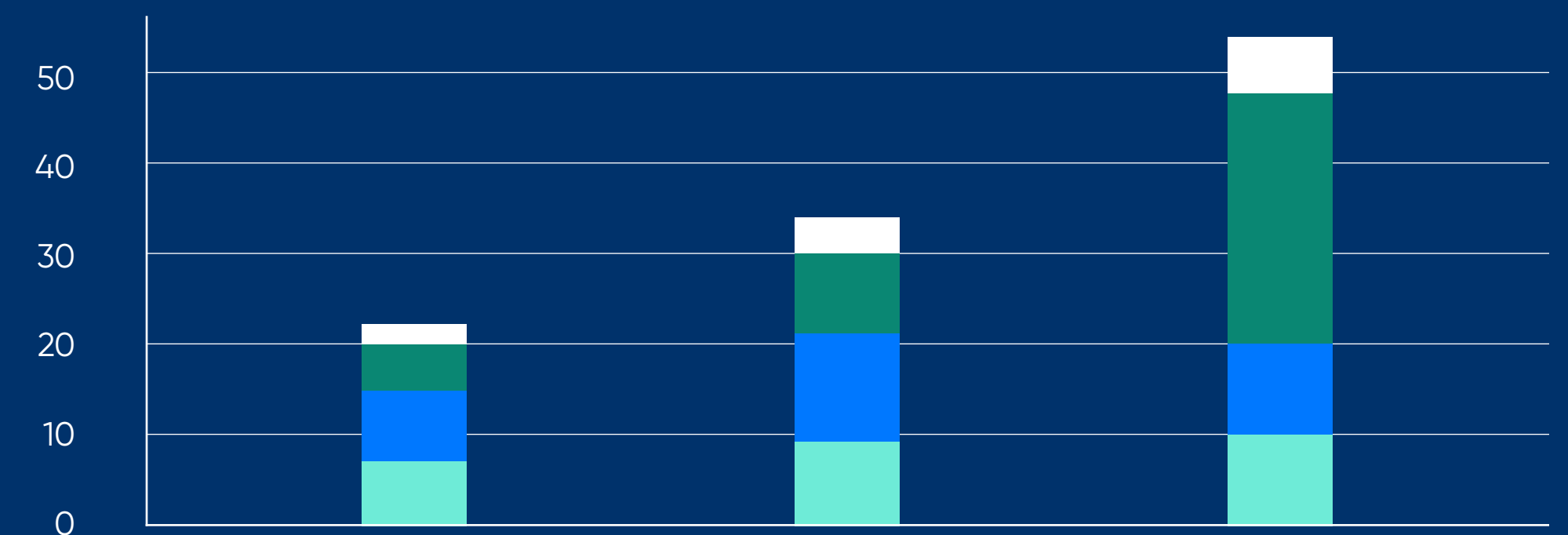
Based on the actual costs of the closest comparable projects, a rough cost range has been

estimated for the Nordic Capitals Railway investment. Preparing an accurate cost estimate naturally requires a separate and professional project study.

Between Helsinki and Stockholm, the rail project would require approximately 200 to 300 kilometres of high-speed rail connection and a sea-crossing section of 70 to 120 kilometres, incorporating bridge solutions and significant stretches in tunnels. The estimated cost range is EUR 22 to 54 billion.

Fehmarnbelt	Underwater tunnel	EUR 0.4–0.45 bn/km
Öresund	Large bridges, inter-island roads	EUR 0.35–0.45 bn/km
High-speed trains	New high-speed rails	EUR 20–40 m/km
Project management	Planning reservation	10–20%

Indicative capital cost scenarios for a Helsinki–Stockholm fixed link via Åland



Political risks

Nordic Capitals Railway: a grimly realistic cost estimate

The cost estimate for the Nordic Capitals Railway is based on the average for high-speed rail projects, approximately EUR 20 to 40 million per kilometre. The entire Helsinki–Oslo corridor would require roughly 500 kilometres of new high-speed track, giving an estimated cost of EUR 10 to 20 billion. When allowing for typical cost overruns, the figure rises to EUR 15 to 30 billion.

The cost range for the Nordic Capitals Railway would be roughly EUR 37 to 84 billion. A more accurate estimate will emerge from future feasibility studies once the route alignment and implementation method are known.

In all scenarios, the cost amounts to several tens of billions of euros.

1. Lack of political consensus

There is no shared political vision among the countries for the implementation of the project. Mega-projects succeed only when anchored in a broader political strategy – such as the EU’s TEN-T network, NATO’s logistical requirements, or a comprehensive Nordic vision.

2. Impact of government changes

Political commitment is vulnerable to changes in government. Finland has previously withdrawn from agreed projects, such as the Suomirata line. This undermines credibility with the European Commission and makes it more difficult to secure CEF funding. Long-term, cross-party commitment is essential.

3. Cost increases

As KTX and California High-Speed Rail demonstrate, initial cost estimates can double or even triple. Advances in construction technology may bring savings, but in tunnel projects, ground conditions, safety requirements and environmental impacts drive costs up. Realistic budgeting is essential to secure EU funding and investor confidence.

4. Travel time and competitiveness

If travel times remain too long, air connections will retain their competitive advantage for passenger traffic and ferry services for freight. This undermines the project’s viability and reduces its impact on labour markets. As Sweden’s assessment of the Stockholm–Oslo link shows, a journey time of under three hours is critical for commuting.

5. Safety and vulnerability

Bridge and tunnel structures can be vulnerable in crisis situations. This requires special design and contingency planning, and potentially military protection. “Dual-use” infrastructure for both civilian and military purposes strengthens the case for investment.

6. Environmental and landscape impacts

The Archipelago Sea, Åland and the Stockholm archipelago are sensitive areas with high ecological and cultural value. The project’s environmental impacts would likely provoke opposition, and it is likely that permit and appeal processes would be lengthy. Compared with existing logistics and travel options, natural, environmental and landscape impacts could well become a barrier to implementing the connection.

7. Limited EU support

The Nordic countries are not cohesion countries, so the EU’s funding share would remain below 50 per cent. This requires strong national financing and innovative funding models, such as infrastructure funds and public–private partnerships.

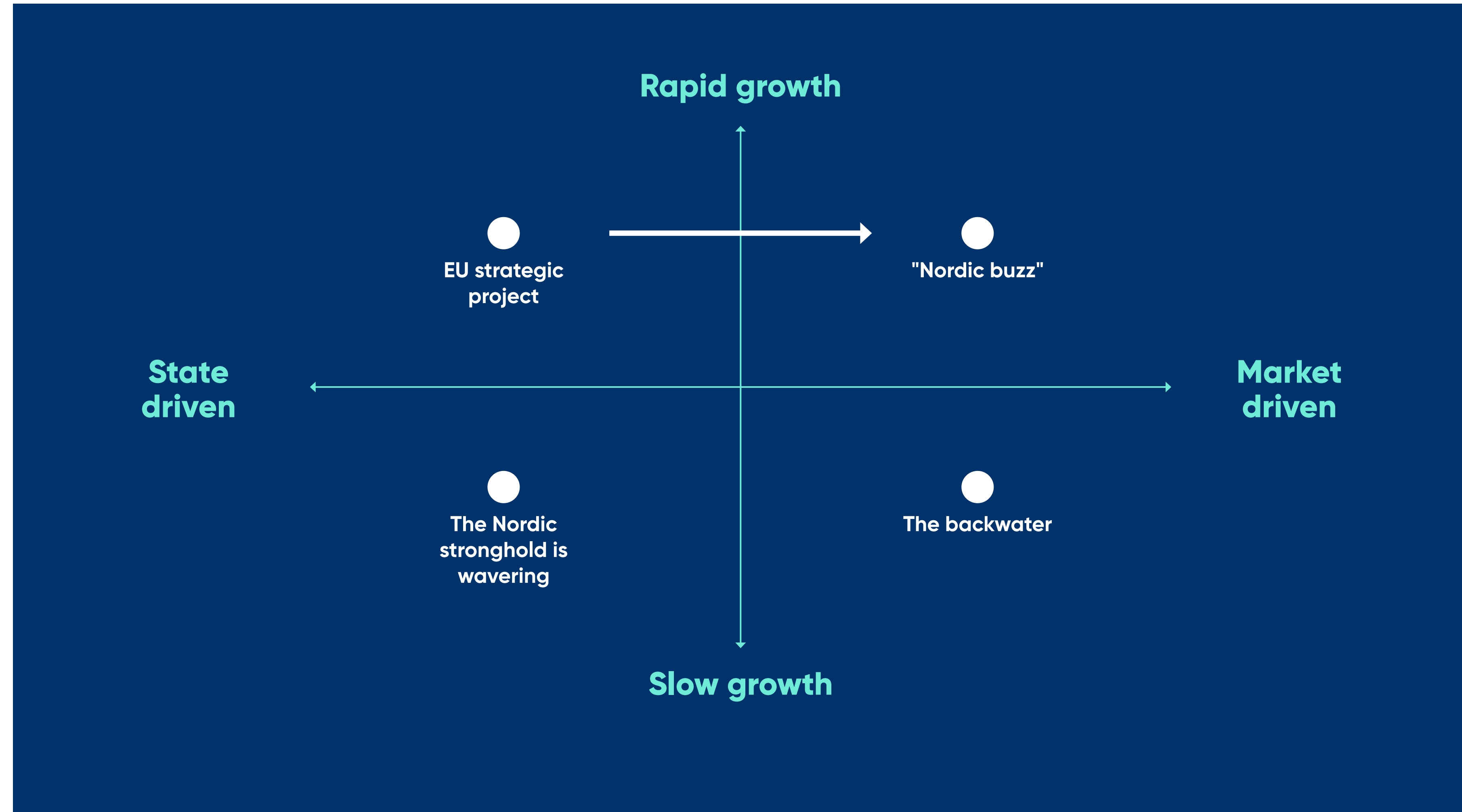
Appendix 2: Scenarios

Scenarios 2030–2060

The following section examines three different scenarios for the development of the Nordic countries, Finland and Sweden over the coming decades. These alternative trajectories serve as a “stress test” for the viability of the high-speed rail, bridge and tunnel project between Helsinki and Stockholm.

The drivers selected for the scenario exercise are geopolitics and the economy, as illustrated in the figure below. As is usually the case with scenarios, the developments described are not exhaustive, but they provide additional perspectives on the topic. The purpose of the scenarios in this report is to stimulate discussion.

By examining the scenarios, it becomes clear that the policies of Finland and Sweden, as well as decisions regarding infrastructure projects, such as whether to build a bridge or not, can have a significant impact on the type of future that unfolds.



Scenario 1: “From an EU strategic project to Nordic buzz”

The latter part of the 2020s finally gave the EU a strong push towards implementing strategic autonomy. The United States saw China as its primary adversary and decided to commit all resources to East Asia for the next 40 years. As a result, Europe fell significantly lower on the U.S. priority list.

The EU, following the example of great powers – the United States and China – adopted a strategic capitalism approach, placing strong emphasis on strategic investments and industrial policy. Full commitment was also made to political integration within the EU and to close cooperation with neighbouring countries.

Even in a heightened security environment, the Commission regarded the Nordic countries as a strategically important region and as an extension of the EU “backbone” formed by Germany and France. Nordic cooperation had already become closer than ever following Finland’s and Sweden’s accession to NATO. The countries saw this situation not only as a security necessity but also as an opportunity to accelerate their economies. A fixed connection with a railway was also considered important for the green transition.

The bridge was built with joint funding from Finland and Sweden, supplemented by

user charges, following the example of the Öresund Bridge. The EU also strongly supported the project.

In the 2030s, a change of power in Russia and a cautious process of democratisation eased the security environment for Europe and the Nordic countries. Pressure from across the border diminished, allowing Northern Europe to focus on development without a constant existential threat.

Global flows, such as trade and migration, gradually became freer, creating new opportunities for the economy, culture and technology. The liberalisation accelerated technological development, leading to services accounting for an even larger share of GDP in the EU. As commuting increased, the demand for public transport also grew.

The bridge was completed in the late 2040s, by which time Finland and Sweden had once again raised their profile as some of Europe’s most advanced countries. Both countries boasted strong technology sectors and reputations for innovation. “Greater Stockholm” had evolved into a hub for the creative class, attracting highly skilled professionals from around the world. Significantly faster rail connections facilitated the mobility of experts between regions.

After the bridge was completed, user charges were introduced, and the project’s financing was supported not only by highly mobile, well-paid

professionals but also by increased tourism to the Nordic countries.

In retrospect, the decision to build a fixed connection also strengthened the political will to pursue a shared vision of the Nordic region as a strong hub. The elements were already in place; they simply needed to be aligned. Consolidating Stockholm as a key junction proved worthwhile. Norway and Denmark likewise began investing in improving their fixed connections, in parallel with the project between Finland and Sweden. The Nordic Capitals Railway became a symbol of the Nordic region’s rise.

Scenario 2: “The Nordic stronghold is wavering”

By the late 2020s, making security the Nordic countries’ overriding priority had become an existential imperative. Finland recognised the threat in time and, despite a challenging economic situation, chose to direct its resources towards strengthening national preparedness.

Building on the momentum of the five per cent defence spending targets, Finland decided to invest in improving infrastructure as well, even though Sweden’s commitment to the project was minimal. Plans were made to construct the tunnel and bridge in a modular manner, progressing towards Åland. As Russia began to breach its own agreements, discussion in Finland increasingly

turned to withdrawing from the Åland treaties and expanding military construction on the islands.

During the 2030s, the Nordic countries were drawn ever deeper into crises. Russia’s hybrid warfare against the West eventually escalated into armed confrontations in Eastern Europe and along the Finnish–Russian border. Finland became a crisis state, maintaining constant high levels of military surveillance on its eastern border and readiness for mobilisation. Citizens lived in a culture of continuous preparedness. The Baltic Sea became an extremely challenging area for freight operations and could no longer be relied upon for security of supply. Threats in both the Baltic Sea and Arctic waters severely disrupted trade.

Companies suffered from uncertainty, yet defence industries, cybersecurity, and energy self-sufficiency grew into massive sectors. The need for alternative land-based logistics chains proved critical for both security of supply and the transport of arms and military equipment. The bridge–tunnel project continued at a measured but consistent pace, despite its considerable costs.

With the Arctic region’s growing strategic importance, the Nordic countries found themselves at the centre of geopolitical attention. As a consequence of climate change, the region’s maritime routes opened and its natural resources became more accessible, turning it into a new arena of competition among the great powers.

In the Arctic region, China and Russia joined forces, which in turn drew the attention of the United States. The United States strengthened its northern naval presence and the readiness of its air forces, emphasising NATO's role in the area. The Nordic countries effectively became the West's frontline monitoring zone, providing infrastructure, logistical expertise and local knowledge.

During the 2040s, Finland, as the frontline state, suffered the heaviest impacts. The Nordic countries remained alongside Finland, yet faced their own challenges. Uncontrolled climate-induced migration flowed from south to north, testing the resilience of societies. On the economic front, the outlook remained challenging.

Scenario 3: "The backwater"

Sweden, Norway and Denmark continued to advance their cooperation in areas such as climate, economy and technology, but Finland failed to keep pace. Finland did not participate in Nordic or European development projects, and innovation hubs relocated elsewhere. Instead of the Nordic countries, Finland's reference group increasingly consisted of the Baltic states and Eastern Europe. The need to build bridges was difficult to justify.

Successive Finnish governments made contradictory decisions, resulting in inconsistent policies

across all sectors. Consequently, Finland's economy stagnated during the 2030s, preventing recovery.

Immigration policy failed spectacularly, which manifested in the full impact of the pension time bomb in Finland. Known for high expertise and innovation, Finland lost its status and, from the 2040s onwards, suffered from chronic labour shortages.

The EU failed to find a common voice and the euro area collapsed due to disagreements. The European single market was on the verge of disintegration, but strong previous dependencies meant trade could not be completely halted. Border formalities returned, further complicating trade and logistics. Border checks reduced mobility within Europe. Student exchanges and working in other countries became more difficult, reducing the need for public transport between nations.

Bilateral relations and regional alliances became more prominent, but Finland was left behind. A fragmented Europe was in a weaker position compared to the United States, China and India. Larger players aligned with blocs formed within Europe. Trade wars also contributed to the situation, as great power rivalries led to a spiral of protectionism and retaliatory sanctions.

The bridge and tunnel project was discussed from time to time, but no unified will or means to establish the connection were found. Finland remained an island.

Building or not building the Nordic Capitals Railway can have a significant impact on what our future will look like.

**In major geopolitical upheavals,
far-reaching decisions have
always been made.**

milton

RT RAKENNUS-
TEOLLISUUS

RAMBOLL



TURUN
KAUPPAKAMARI


Varsinais-Suomen liitto
Egentliga Finlands förbund