Financing of Large-scale Infrastructure, case Nordic Connector (FLINC)

Work Package 1

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Final report

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1 Executive Summary

This report assesses how the Nordic Connector could be financed, with a focus on financial feasibility, bankability and risk allocation. The analysis is based on scenario-based financial modelling and evaluation of alternative financing structures.

The Nordic Connector should not be viewed as a single infrastructure project, but rather as a **program investment consisting of several interrelated subprojects**. These include the fixed link itself (“Bare bridge”), shore-side transport infrastructure, and potential complementary investments such as electricity transmission, hydrogen pipelines and digital data connections. This program-based perspective enables different components to be structured, financed and risk-managed in different ways, improving overall financial feasibility and flexibility.

Large-scale transport infrastructure is seldom fully self-financing through user charges. **The Nordic Connector is no exception to this**. Instead, **investments of this scale are typically justified by broader socio-economic and strategic benefits**.

Financial modelling demonstrates that **financial feasibility and bankability is conditional rather than fixed**. Under more favourable assumptions—including reduced capital expenditure, access to EU co-financing, lower financing costs and higher realised traffic demand—the project can achieve financial sustainability. The analysis shows that no single factor is sufficient on its own; rather, a combination of measures is required to close the funding gap.

A **hybrid model based on a publicly owned Special Purpose Vehicle (SPV)** is identified as the most viable financing structure. In this model, Finland and Sweden jointly establish and own a project company (SPV) responsible for developing, financing, operating and maintaining the fixed link. Public sector involvement, including state guarantees and equity contributions, is essential to enable long-term debt financing on acceptable terms. Private sector participation is expected primarily in construction, operation and maintenance.

Public co-financing for the Nordic Connector will be critical. EU instruments, particularly the Connecting Europe Facility (CEF) incl. Military Mobility, are assessed as the most relevant sources, with potential contributions in the range of 10–30% of total capital expenditure. Access to such co-financing requires TEN-T status, strong alignment with TEN-T priorities, demonstration of cross-border value, and dual-use functionality. National funding, including potential allocation under NATO’s 1.5% defence-related spending framework, can contribute indirectly to financing.

A central conclusion of the study is the **importance of distinguishing between bankability and societal value of transport infrastructure**. While the fixed link is, in most cases, not bankable based on user charges alone, it may generate substantial **Wider Economic Impacts (WEI)**, including productivity gains, regional development, improved labour market integration and increased economic resilience. **Demonstrated strategic benefits related to military mobility and security of supply will further strengthen the case for investment**. These impacts do not translate into direct project revenues, but provide the primary justification for long-term public funding, state guarantees and EU co-financing. **At the time of this study, the results of the WEI and security analyses are not yet available.** Hence, it is not yet possible to determine whether these broader benefits are large enough to justify the level of public funding required. The **key decision question is therefore not whether the project can pay for itself, but whether its wider economic and strategic benefits are sufficient to justify the required public investment.**

The most critical risks from a financing perspective include dependence on national and EU funding, top-level national political commitment over time in both Sweden and Finland, uncertainty in traffic demand, permitting risks and potential construction cost overruns. These risks underline the importance of early political alignment between Finland and Sweden.

Transferability and broader applicability

The methodology and conclusions of this study are directly applicable to other large-scale cross-border infrastructure projects in the Nordics, particularly in less densely populated regions. Such projects often share similar characteristics: high capital costs relative to expected traffic demand, long investment horizons, and strong strategic importance. The approach demonstrated in this study provides a practical framework for distinguishing between financial feasibility and broader societal value. It also highlights the relevance of hybrid financing models, public risk-sharing, and EU co-financing in situations where projects are not commercially self-sustaining. As such, the findings can support more realistic and transparent decision-making for future Nordic cross-border investments.

Recommended next steps from a financing perspective for the Nordic Connector:

- Securing and strengthening TEN-T status for the Nordic Connector and key nodes along its route (e.g. Port of Vaasa)
- Clarifying eligibility and maximising potential for EU funding through early engagement with EU institutions (CINEA).
- Advancing bilateral agreements between Finland and Sweden on governance, risk sharing and SPV structure.

In conclusion, the **Nordic Connector should be considered as a long-term strategic infrastructure investment**, rather than a purely commercial project. The decision to proceed with the Nordic Connector should be based not solely on financial feasibility/bankability, but on a comprehensive assessment of its long-term economic, and strategic value.

2 Background, Aim, Scope of study

The Nordic Connector (Kvarken Fixed Connection) is a visionary cross-border infrastructure initiative proposing a fixed link across the Kvarken Strait between Vaasa in Finland and Umeå in Sweden[1]. The Nordic Connector initiative aims not only to shorten travel times and strengthen regional connectivity, but also to support the green transition, enhance preparedness and military mobility in the northern Nordics, and deliver synergies in energy transfer and economic integration[1].

In 2025, the Finnish Transport Infrastructure Agency (later: FTIA) completed a prefeasibility study[2] assessing six technically feasible implementation options with road, rail or combinations thereof, see Figure 1 below.

Figure 1 Alternative solutions for a fixed linked over the Kvarken strait. Source: *Kvarken Fixed Link feasibility study*, Finnish Transport Infrastructure Agency, 2025.

Costs estimates for the six evaluated options are described in Figure 2 below. Forecasted transport demand, compared with the current ferry service, forecast daily vehicle traffic in

[1] Kvarken Council, Nordic Connector

[2] Kvarken Fixed Link feasibility study, WSP Finland Oy, 2025

the range of 2,000–3,000 passenger vehicles and 500–600 freight vehicles under normal scenarios[3].

structure	Option 1: Road on the surface	Option 2: Road on the surface and in a tunnel	Option 3: Railway on the surface	Option 4: Rail-way on the sur-face and in a tun-nel	Option 5: Rail-way as a long tunnel	Option 6: A combi-nation of road and railway
mainland	0,125	0,125	0,329	0,342	0	0,471
embankment (sea)	0,656	0,610	0,650	0,485	0	0,653
bridge	4,133	3,328	4,924	3,054	0	5,720
artificial islands	0	0,287	0	0,741	0*	1,037
technical systems	0,001	0,002	<0,001	0,001	0,004	0,002
Improvement of the current road	0,002	0,002	0	0	0	0,002
Vaasa underground station	0	0	0	0	0,200	0
Total	4,917	6,190	5,903	10,266	17,003	16,663
risk provision (70%)	3,442	4,333	4,132	7,186	11,902	11,664
TOTAL (billion €)	**8,359**	**10,522**	**10,035**	**17,452**	**28,906**	**28,237**

Figure 2 Breakdown of cost estimates for different implementation options (EUR billion, Cost index of civil engineering works (FI: MAKU) 145, 2020=100). * Option 5 artificial island costs are included in the tunnel price[4].

Kvarken Council EGTC is the designated project owner of the INTERREG Aurora *Financing Large-Scale Infrastructure – Nordic Connector* (FLINC) project. FLINC aims to '*develop new methodologies for assessing the wider benefits and financial engineering of large-scale, cross-border infrastructure. This is done by using the Nordic Connector – a fixed link across the Kvarken strait – as a case study*'[5].

FLINC complements* FTIA's *prefeasibility studies by delivering additional analysis through three separate Work Packages.

The focus and scope of the report at hand is Work Package 1 (Alternative financing models) highlighted as dark blue in Figure 3.

[3] Finnish Transport Infrastructure Agency, 2025

[4] Kvarken Fixed Link feasibility study, WSP Finland Oy, 2025

[5] Interreg Aurora - FLINC

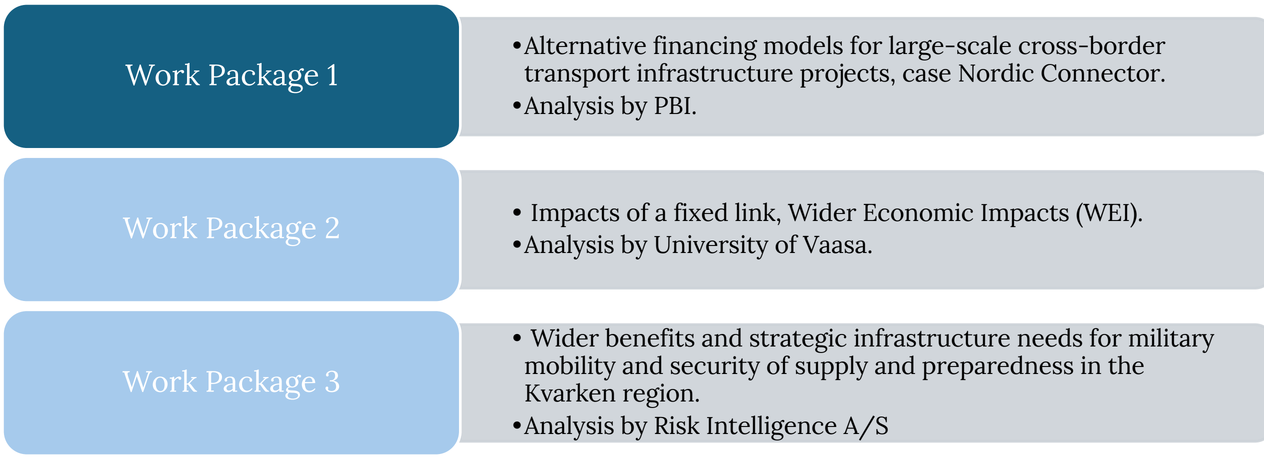

Figure 3. Work Packages in FLINC. The focus of the report at hand is Work Package 1.

Aim of Work Package 1 is to:

Analyse and develop alternative ways to finance a cross-border mega transport infrastructure project, case Nordic Connector. While the Nordic Connector serves as the primary case study, the aim is to develop a transferable methodology for assessing the financing of large-scale cross-border infrastructure projects in the Nordics, especially in sparsely populated areas. More specifically:

- What should the financing structure look like for Nordic Connector? What is the role of national funding, private capital and EU grants?
- Who are the key actors that should be involved in financing?
- Is Nordic Connector *bankable as an investment*? If yes, under what circumstances?
- What would be reasonable initial risk sharing structure between the public and private sector?
- Can Wider Economic Benefits generated by the Nordic Connector be linked/turned into revenue streams to support Nordic Connector becoming bankable? WEI effects are important for assessing the broader societal benefit of large cross-border transport infrastructure projects.

2. What should be done next in Nordic Connector, especially from a financing perspective?

The financing model structures presented in this report are conceptual. Actual financing deals would involve negotiation of terms, legal frameworks (especially for a cross-border SPV), and market conditions at financial close. Also, the financial projections are based on best-available data primarily from FTIA's feasibility study. The forecasting horizon for this type of extensive infrastructure investments are typically long (50 years). The results on bankability are therefore initial and should be revisited as more information becomes available.

3 Financing Model for the Nordic Connector

An overview of traditional and alternative/complimentary models for how to procure, organize and finance transport infrastructure projects in a Nordic context is presented in Table 1. Internationally, major cross-border infrastructure projects have typically required public support, such as grants, subsidies, or minimum revenue guarantees, to ensure their bankability.

	Traditional public procurement	**Examples of complementary models for alternative financing and organization**		
Organization	**TRADITIONAL** Design, build	**ALTERNATIVE PUBLIC** Project company with public ownership and long-term responsibility for the facility "State-guarantee model"	**HYBRID** Project company with wholly or partly private ownership/responsibility. Long-term responsibility via a concession. Greater use of risk-reducing measures	**PRIVATE** Project company with primarily private ownership/responsibility. Long-term responsibility via a concession. The project company bears a larger share of risks (e.g. revenue risk)
Responsibility (design, construction, O&M)	Different stages are often procured separately	Often full responsibility for all stages throughout the facility's life cycle. Project company also expected to hand over the facility in good condition at the end of the contract/concession. Risks often shared between the contracting authority and the project company to reduce financing needs and risks for the parties.		
Examples of compensation models	Budget (via taxes), EU grants, Co-financing	Budget, EU grants, User fees/tolls, Availability payments, Land value effects, Co-financing	User financing, Availability payments, Land value effects, Co-financing	User financing, Land value effects, Availability payments
Examples of financing	Possible advance funding ("förskottering")	Loans, guarantees, advance funding	Loans, guarantees, equity capital, milestone payments (which may also be partly financed via advance funding)	Loans, guarantees, equity capital
Examples of projects	Design–build, performance-based and turnkey contracts	Öresund bridge, Fehrman Belt Botniabanan, Skuru bridge Sundsvall bridge	Norwegian roads (RV 3, 25) and Finnish roads (E75, E18) with alternative arrangements	Arlanda Rail Link Oslo-Stockholm 2.55?

Table 1 Alternative ways to procure, organize and finance transport infrastructure. Adopted from Bergström et al 2024[6].

3.1 Qualitative assessment to identify most feasible financing model

An initial assessment of the most feasible financing model was done using six evaluation criteria. Table 2 below summarizes the findings.

Evaluation criteria	Key Question	Public Funding (100% budget)	State-Guaranteed SPV	Hybrid (SGM incl. EU grants)	PPP (User-pay Concession)
1. Financial Sustainability	Does the model close the funding gap and ensure long-term stability?	High	High	High	Low
2. Bankability & Risk Allocation	Risk allocation to the actor most	Medium	High-Medium	High	High. Low (for traffic

[6] Bergström, F., & Bengtsson, I. (2024)

	capable of managing risks?				demand risk)
3. Compatibility with national planning	Fits within Transport 12 (FI) and NTP (SE)? Compliant with public accounting rules?	High	High-Medium	High	Medium
4. EU grant eligibility	Maximises access to CEF, Military Mobility grants?	Medium/ High	High	High	High
5. Political feasibility	Politically acceptable in both countries?	Medium	Medium	Medium–High	Low/Medium (strategic infra control)
6. Implementation Practicality	Manageable cross-border governance? Reasonable complexity?	High	Medium	Medium	Medium
INCREASING RISK TRANSFER TO PRIVATE SECTOR →					

Table 2 *Qualitative assessment of different financing models for Nordic Connector. High = Strong alignment with criterion, Medium = Acceptable but with constraints, Low = Significant weaknesses or risks.*

Based on the **qualitative assessment**, the following **initial conclusions** can be made:

- Nordic Connector should be considered a *program* investment consisting of "mini mega projects" as outlined in Figure 4 below.
    - The fixed link itself ("bare bridge" including shore-side connecting infrastructure) by public financing with strong state/public sector involvement similar to the state-guarantee model used for the Öresund bridge. A hybrid model (SPV with state-guarantee model + EU grants + possible PPP elements and revenues from energy/data links) for the fixed link seems to perform strongest overall across criteria.
    - Subprojects as Public Private Partnerships involving private capital (e.g. additional shore-side connecting infrastructure, electricity transmissions and H2 pipelines, data communication cables). Energy transmission across Kvarken could create strategic synergies, particularly if Finland becomes a net electricity exporter or if/when hydrogen infrastructure develops. A fixed

link structure could provide a safer and more cost-efficient route for hydrogen pipelines compared to seabed installation[7].

- Full national public funding is financially robust but places a (too) heavy fiscal burden on the Finnish and Swedish states alone.
- A pure PPP concession model, where the private sector also bears traffic demand risk, is not feasible. This was confirmed also through PBI's consultation with several private sector representatives.

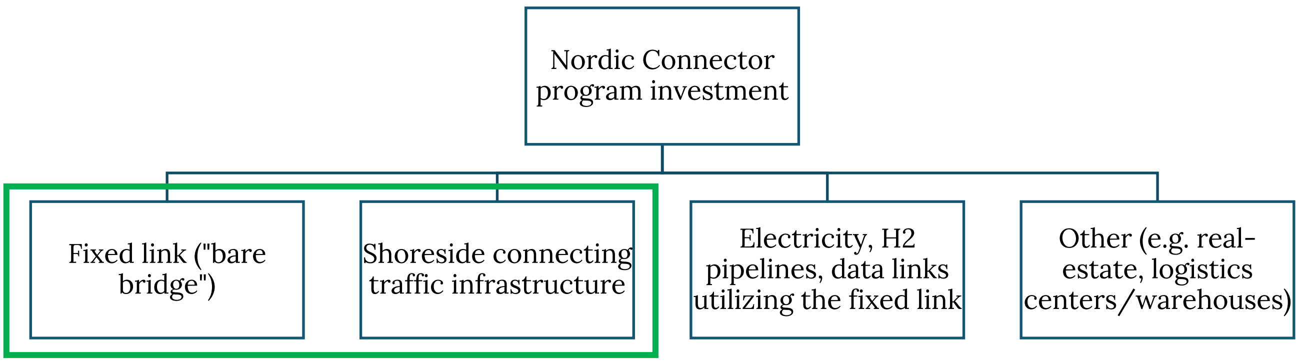

Figure 4 *Nordic Connector as a program investment. Investment within the green box is the scope of the SPV. Parts of the shoreside connecting investments could also have stronger private sector involvement incl. financing through e.g. availability-based PPPs.*

An initial outline of risk sharing between the public and private sector for the Nordic Connector as a program investment, is described in the table below.

Investment → ↓ Risk Category	**Fixed link ("bare bridge" and shore-connecting traffic infrastructure)**	**Electricity, H2 transmission pipelines, data links**	**Other (e.g. real-estate, logistics/warehouses)**
Demand / Revenue Risk	Public (SPV)	Public/Private (NB. FIN and SWE states majority owners of TSOs)	Private
Cost & Construction Risk (cost overruns, schedule overruns	Private (contractors to SPV)	Public/Private (contractors)	Private
Financial & Funding Risk	Public (SPV)	Public/Private	Private
Environmental & Permitting Risk	Public (SPV)	Public/Private	Private

[7] FTIA, Kvarken Fixed Connection, Needs Assessment, 2025

Technical & Operational Risk	Public (SPV)/Private (e.g. maintenance contractors)	Public/Private	Private
Political Risk	Public (SPV)	Public/Private	Private

Table 3 *Initial risk sharing between public and private sector for Nordic Connector as a program investment*

3.2 Hybrid model

The hybrid model (Figure 5) illustrates a financing and delivery structure where a state-owned special purpose vehicle (SPV) is established to develop, finance, operate, and maintain the project (bare bridge and shoreside connecting infrastructure). Under this model, ownership and strategic control remain with the public sector through the state-owned SPV, while private parties participate through financing, construction, and service delivery roles.

The Finnish and Swedish states establish a jointly owned company (e.g., "Kvarken Link Oy/Ab"). The state(s) would play a crucial role by providing equity and/or guarantees to the SPV. This public backing strengthens the SPV's credit profile and enables it to raise debt financing on more favourable terms. Lenders provide loans to the SPV, which are repaid over time from project revenues.

The SPV acts as the contractual hub of the project by entering design and build contracts with several entities responsible for construction of the asset, while separate operation and maintenance (O&M) contracts cover long term operation and upkeep of the infrastructure asset.

The CapEx of Nordic Connector ("bare bridge" and shore-side connections) means that contractors will most probably need to limit their liabilities. As one rule of thumb, 3 EPC contractors per 1 billion CAPEX could be feasible[8]. For the SPV, this would imply a great number of contractors who are willing to take on the liabilities. It will be easier to attract interest from bidders if the scope is split in parts, e.g. tunnel and bridge separated. Payments to contractors are made by the SPV in accordance with the respective contractual agreements.

Project revenues flow into the SPV from several potential sources, including user tolls paid by infrastructure users, availability or lease type payments from the public sector, and potentially EU grants or other public funding instruments. These income streams are used to cover operating and maintenance costs, service debt, and support the long-term financial sustainability of the project.

[8] PBI discussions with global investor and developer in infrastructure projects.

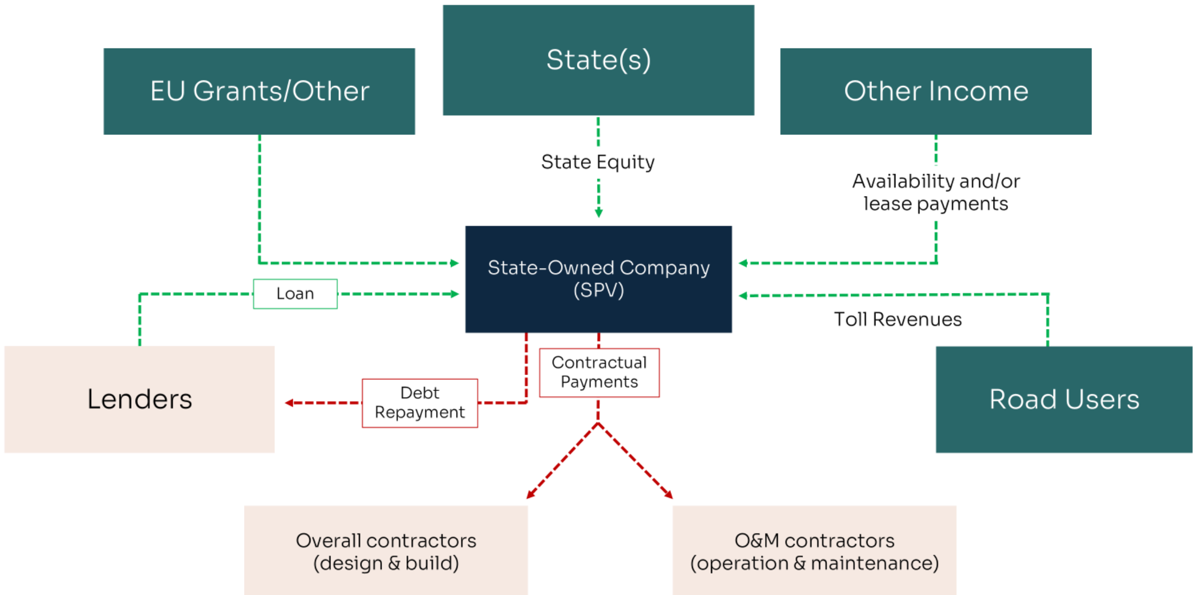

Figure 5. *Hybrid model with key contractual parties*

Main advantages of the hybrid model

1. **Public ownership with private-sector efficiency**
   The model allows the public sector to retain ownership and strategic control of a critical infrastructure asset, while leveraging private-sector expertise in design, construction, financing, and long-term operation through competitively procured contracts. It's **crucial for the success of the project that the SPV operations rely on management with strong experience in projects of this magnitude**.

2. **Lower financing costs through state backing**
   Equity contributions and/or state guarantees improves the SPV's credit profile, enabling access to more favourable financing terms. This reduces overall financing costs and improves value for money over the project lifecycle.

3. **Diversified revenue base**
   Combining user tolls, availability or lease-type payments, and EU grants reduces reliance on a single revenue stream and improves resilience to demand volatility. This diversification strengthens bankability and financial robustness of the project, particularly in projects with expected limited traffic demand/flows.

4. **Incentives for whole-life cost optimisation**
   Long-term O&M contracts incentivise contractors to optimise lifecycle costs already at the design and construction stage, leading to higher asset quality and more predictable long-term performance.

5. **Proven model**
   The fundamental structure has been successfully applied in other large-scale, cross-border projects, notably the Öresund fixed link and Fehmarnbelt tunnel.

While the model offers several valuable advantages, it also entails challenges and risks, which are discussed in the following section.

Main challenges of the hybrid model

1. **Critical role of EU grants and state equity**
   EU grants and upfront state equity are essential for reducing the initial debt burden and financing costs. In their absence, the project's fiscal risk would increase significantly, and repayment periods would be greatly extended.

2. **Demand and revenue risk ultimately remains with the public sector**
   The financial viability of the model depends on long-term traffic volumes and toll revenues. If actual demand falls significantly short of forecasts, the SPV may be unable to service its debt, triggering state guarantees. In practice, this means that demand risk is not eliminated but transferred over time, with the public sector bearing the residual risk rather than absorbing it upfront.

3. **Complex cross-border governance and institutional setup**
   Establishing and operating the SPV requires a robust bilateral agreement between the two states, covering ownership, guarantees, risk-sharing, decision-making, and dispute resolution. Additional complexities may arise from operating across two jurisdictions, including issues related to currency, accounting standards, taxation, and financial hedging. Considering its +50 years of experience from enhancing cross-border collaboration in the region, the Kvarken Council EGTC could play a supportive role to the SPV in reducing the complexity of cross-border governance and administrative processes.

4. **High requirements for SPV governance competence and discipline**
   Although the model benefits from lower financing costs, it places strong demands on the governance and management capabilities of the SPV. Without strong commercial and competent leadership and clear performance incentives, there is a risk of weaker cost control and efficiency compared to models with greater private risk exposure.

5. **Construction risk and cost overruns**
   Although construction risk is largely transferred to the design and build contractors through contractual arrangements, the public sector remains indirectly exposed to delays or cost overruns in large and complex megaprojects. Significant construction issues can increase financing costs, delay revenue generation, and ultimately affect the SPV's ability to service debt.

6. **Refinancing and interest-rate risk**
   Given the long project lifecycle, the SPV may face refinancing risk if debt needs to be rolled over under less favourable market conditions. Changes in interest rates or capital market conditions could increase debt servicing costs, potentially requiring additional public support despite the presence of state guarantees.

In summary, the hybrid model offers a structured approach that combines public ownership and strategic control with private sector efficiency. The suitability of the hybrid model mainly depends on access to EU funding, and the institutional capacity of the participating states.

4 Financial Analysis: Cash Flow Projections and Viability

This chapter examines the financial implications of the hybrid model through cash-flow-based financial modelling. The analysis assesses whether projected revenues are sufficient to cover operating costs, debt service, and financing obligations over the project lifecycle, and to what extent public support is required.

The financial analysis focuses on the project company's cash flows under a range of scenarios, considering construction costs, financing terms, traffic demand, toll revenues, and potential EU grants and state equity. The objective is not to reassess the project's socio-economic desirability, but to evaluate its financial feasibility and bankability under different assumptions, and to identify the scale and nature of any remaining funding gap.

4.1 Financial modelling

The financial model is based on Option 1 (SPV): a 94 km fully on-surface route with an estimated CapEx of 4,9 billion euros. This figure represents the absolute low-end estimate and excludes the 70% risk reserve. Five scenarios are evaluated against current information and working assumptions to test the project's financial viability and its sensitivity to key parameters.

4.1.1 Modelling assumptions

This **financial model is conducted at a prefeasibility level. Inputs are based on the best information available at this stage of project development**, including indicative cost and revenue estimates, as well as reference data from other infrastructure projects and studies.

- All cashflows are stated in EUR and nominal terms, anchored to the start of construction, with monetary inputs escalated forward at 2% annual inflation.
- The project is evaluated over a 50-year operating horizon following construction. No residual/terminal value is assumed at end of operating horizon.
- Construction CapEx is divided evenly across the construction period and no major refurbishment or mid-life capital expenditures during operations is assumed. Operating revenue and OpEx begin when the asset becomes operational.
- Project grants and state equity are treated as non-return-bearing and are deducted as a percentage from total CapEx at project start.

- The remaining CapEx is assumed to be fully funded by senior debt. Interest accrues and is capitalized onto the outstanding debt balance during the construction period and debt repayment begins the first year of operation.
- Since project grants and state equity are assumed to carry no return requirement and the residual CapEx is fully debt-financed, the cost of senior debt is applied as the project's discount rate.
- After deducting OpEx, all residual toll revenues are applied to the repayment of senior debt.
- Detailed debt structuring events such as covenants, scheduled bullet repayments, or refinancing are not assumed over the project's life.
- Project revenues are derived from annual toll revenues, assuming 1% annual traffic increase among both passenger and heavy vehicles.
- Taxes are excluded from the model.

The reported NPVs should be interpreted in the context of the 50-year operating horizon applied in the modelling. Large-scale transport infrastructure projects of this kind are typically not fully financed through user fees alone, and a substantial share of project value typically materializes only over very long-time horizons. Project cashflows follow a back-loaded profile, with a meaningful share of cumulative revenues arising in the later operating decades, increasing the sensitivity of headline NPV figures. Individual input assumptions, for example, that toll prices track inflation continuously over the full operating period, are reasonable modelling conventions but are subject to a wide range of possible outcomes over such long horizons.

4.1.2 Scenario modelling

To test and develop the project's financial viability across a plausible range of conditions, **five scenarios have been defined: Conservative, Moderate, Improved, Favourable, and Optimistic**. Each scenario varies the principal value drivers: CapEx (reflecting the assumed risk reserve), construction time, OpEx, project discount rate, the share of CapEx covered by grants and state equity, and traffic volumes and toll levels for both passenger cars and heavy vehicles. Table 4 presents the inputs for each scenario studied.

Inputs / Scenarios	Conservative	Moderate	Improved	Favourable	Optimistic

CapEx Risk Reserve	+70%	+50%	+30%	+20%	0%
Project Capex (BEUR)	8.3	7.35	6.37	5.88	4.9
Project Annual Opex (MEUR)	30	20	15	15	10
Project Discount Rate (REAL)	3.5%	3.5%	2%	1.5%	1.5%
Construction Time (YEARS)	10	10	7	7	7
Project Grant Connecting Europe Facility/Military Mobility	0%	0%	10%	18%	18%
State Equity	10%	10%	15%	10%	20%
Number of Passenger Cars / day	2000	2700	3105	3510	3510
Toll per Passenger Car (EUR)	37€	60€	70€	85€	85€
Number of Heavy Vehicles/day	200	500	575	650	650
Toll per Heavy Vehicle (EUR)	93€	200€	225€	250€	250€

Table 4. *Inputs for each scenario.*

4.1.3 The Conservative Scenario

The Conservative scenario applies the most cautious set of assumptions across all input parameters: the full 70% CapEx risk reserve, a 10-year construction period, a 3.5% project discount rate, 30 million euro annual OpEx, no grant funding, 10% state equity, and the lowest assumed/projected traffic volumes and toll levels.

PROJECT NPV | -5,917 MEUR
CAPEX = 8,300 MEUR

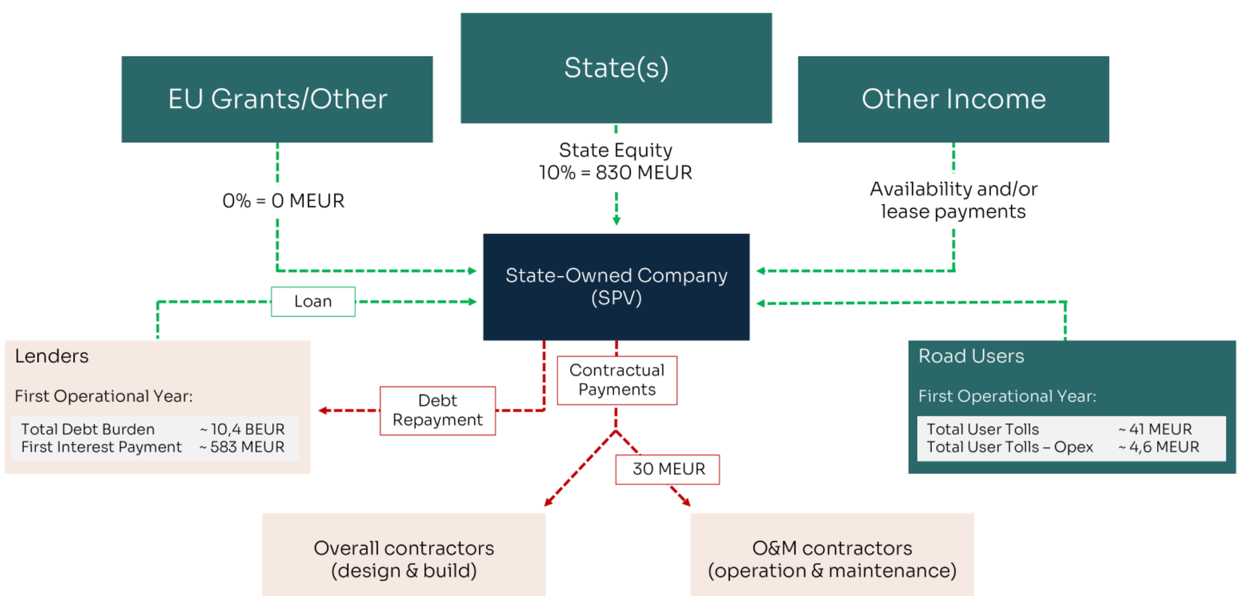

Figure 6. *Project structure of the Conservative scenario.*

By the start of operations in 2040, capitalized interest has lifted the debt balance to approximately 10,4 billion euros. Year-one net operating cashflow is just 4,6 million euros, covering under 1% of required annual debt service. The project NPV is negative 5,9 billion euros, and the outstanding principal will not be repaid during the project's lifetime using these assumptions. The scenario establishes the lower bound of viability and quantifies the public co-funding gap: increased grant and state equity support, as well as increased traffic demand is required for the project to be commercially bankable.

4.1.4 The Moderate Scenario

The Moderate scenario applies a reduced risk reserve and higher operating assumptions: 50% CapEx risk reserve, 10-year construction period, a 3.5% project discount rate, 20 million euro annual OpEx, no grant funding, 10% state equity, and slightly higher traffic volumes and toll levels.

PROJECT NPV | -3,844 MEUR

CAPEX = 7,350 MEUR

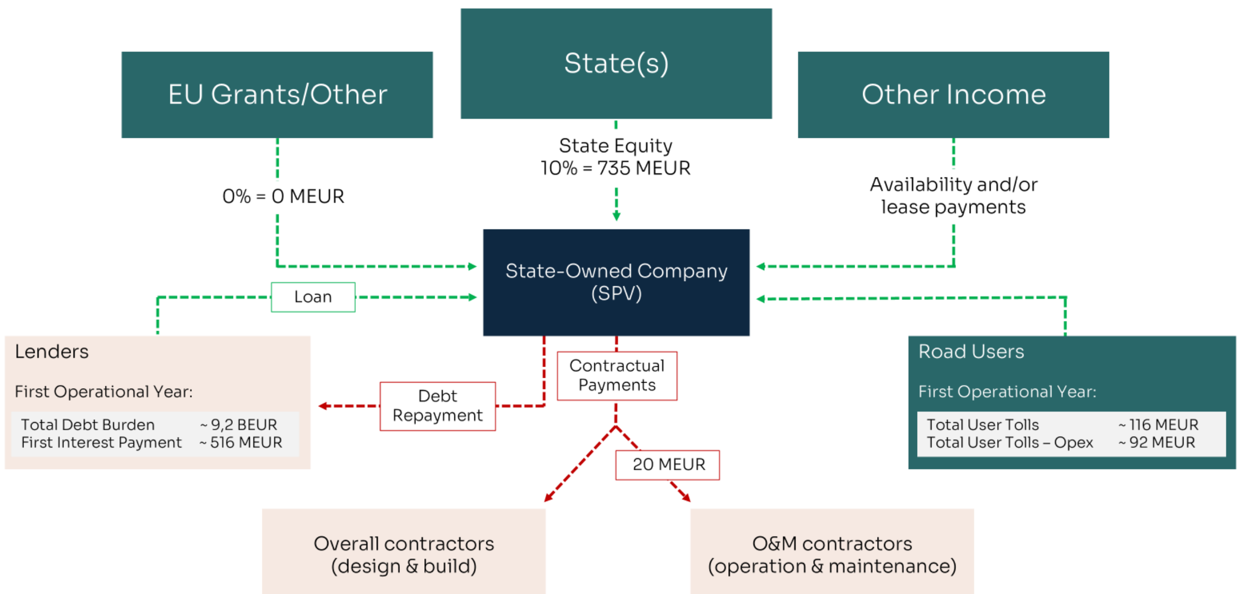

Figure 7. *Project structure of the Moderate scenario.*

The results show that, although the first-year net revenues are significantly higher (approximately 92 million euros) compared to the Conservative scenario, the revenues are insufficient to cover the interest payments during the project's lifetime. The project NPV is negative 3,8 billion euros, and while stronger than the Conservative case, this scenario still requires higher project grant and state equity support to become bankable, indicating that materially stronger demand with higher toll rates alone do not close the public co-funding gap.

4.1.5 The Improved Scenario

The Improved scenario assumes major improvements in both funding and revenue inputs shifting the project into a more favourable footing across every dimension. The risk reserve is reduced to 30%, construction period shortened to 7 years, OpEx decreased to 15 million euros, the project discount rate reduced to 2%, 10% grant funding, 15% state equity, and materially higher traffic and toll assumptions.

PROJECT NPV | -531 MEUR

CAPEX = 6,370 MEUR

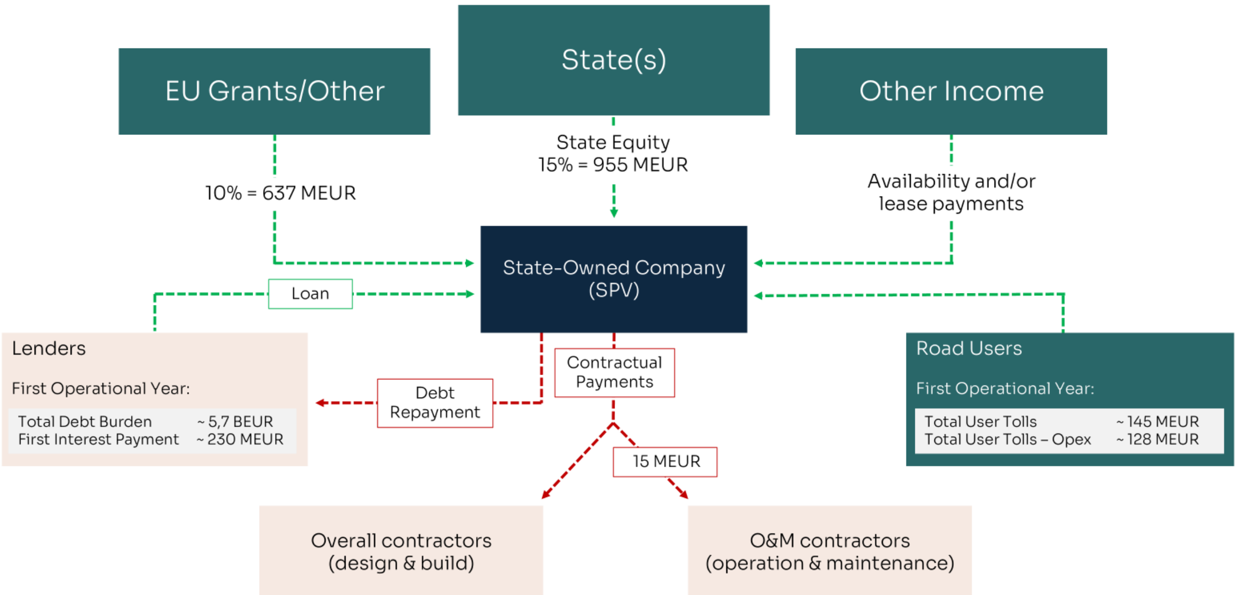

Figure 8. *Project structure of the Improved scenario.*

By the start of operations in 2037, capitalized interest has lifted the debt balance to approximately 5,7 billion euros. Year-one net operating cashflows reach 128 million euros, covering roughly 55% of the 230 million euro first-year debt interest. The project NPV is negative 531 million euros.

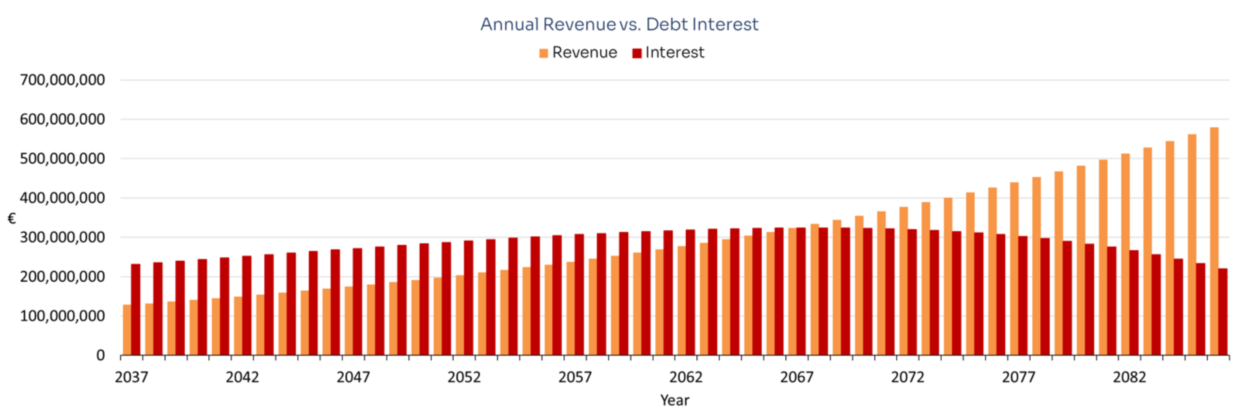

Figure 9. *Project revenues exceed interest requirements during the later stage of the project.*

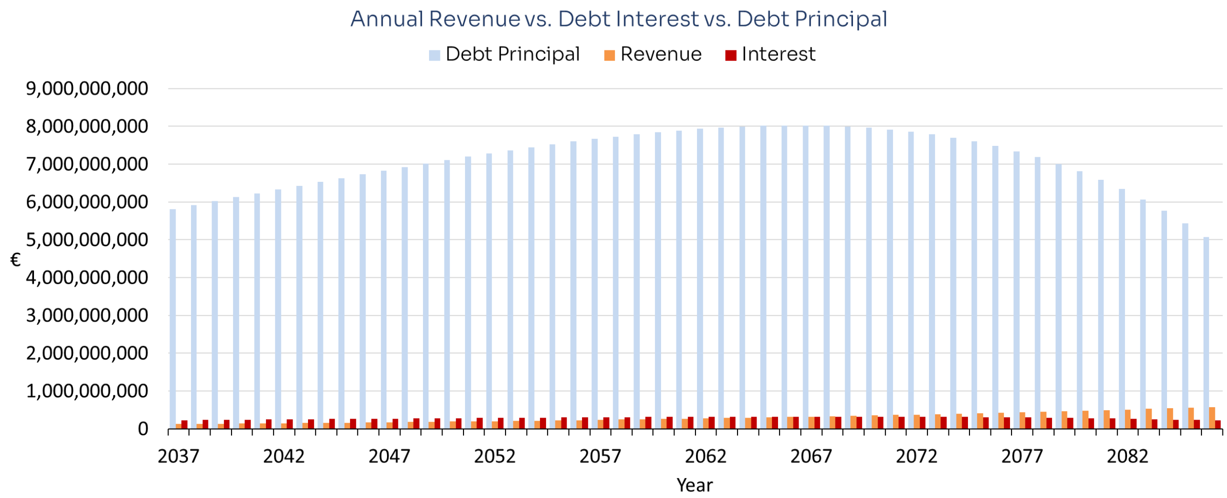

Figure 10. *The project lifetime is not sufficient to repay the debt principal fully.*

The results suggest that although the project's revenue profile is significantly improved, the outstanding senior debt increases for many years after the start of the operational phase, reflecting the accumulation of interest when revenues fall short of total debt-service requirements. An increase in grant or state equity contribution is still required to achieve a bankable project structure.

4.1.6 The Favourable Scenario

The Favourable scenario combines a substantially de-risked project structure with strong demand and pricing assumptions: an 20% CapEx risk reserve, a 7-year construction period, 15 million euro OpEx, a low 1,5% project discount rate, 18 % grant funding, 10% state equity, and highest assumed traffic and toll estimates.

PROJECT NPV | +2,126 MEUR
CAPEX = 5,880 MEUR

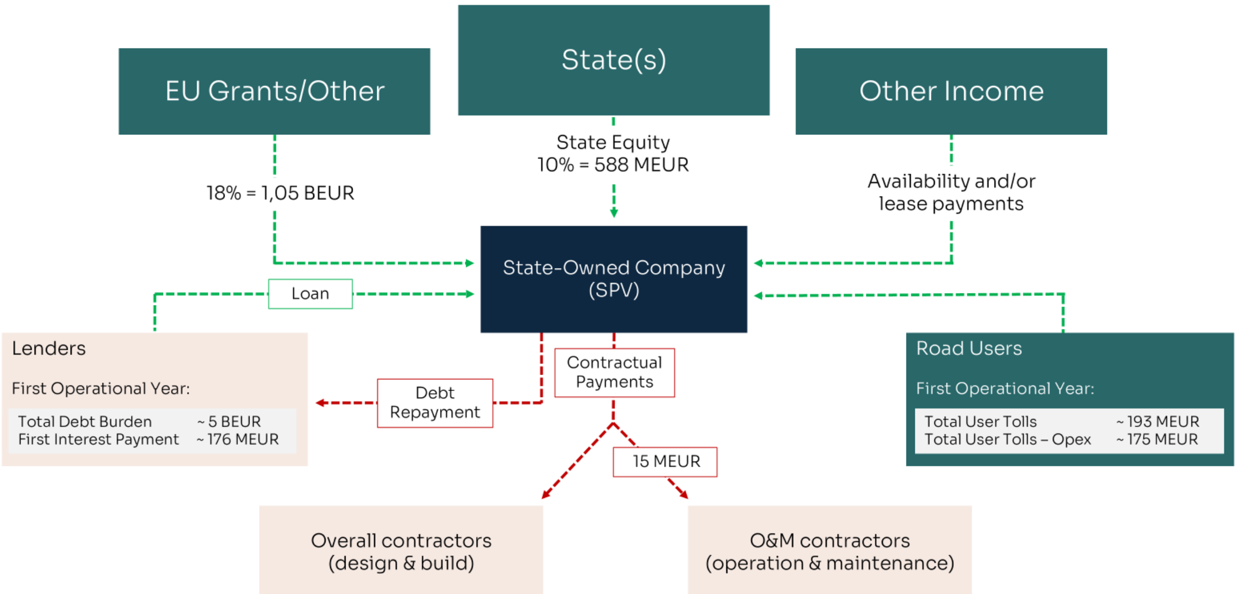

Figure 11. *Project structure of the Favourable scenario.*

By the start of operations in 2037, capitalized interest has lifted the debt balance to approximately 5 billion euros. Net operating cashflows nearly cover the first interest payment in year one and exceed it in year two, allowing debt principal amortization to begin early in the operational phase.

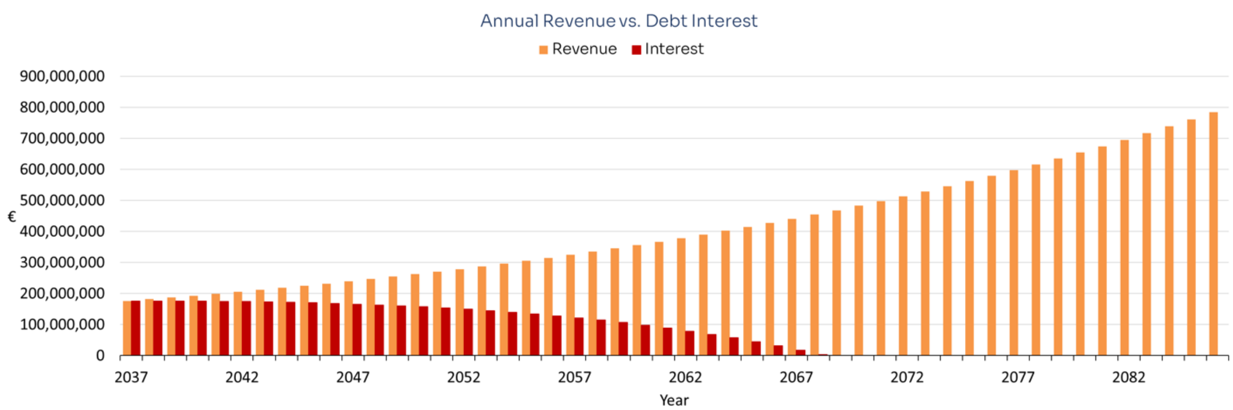

Figure 12. *Debt payback schedule under the Favourable scenario assumptions.*

The project NPV is positive 2,1 billion euros, with the outstanding senior debt repaid after 31 years into the operating period. The Favourable scenario therefore represents a bankable configuration, in which the combined effect of meaningful grant and equity support, low financing costs, and strong traffic demand makes the project financially feasible.

4.1.7 The Optimistic Scenario

The Optimistic scenario assumes that every value driver moves in the project's favour: a fully eliminated CapEx risk reserve, a 7-year construction period, 10 million euro OpEx, a 1,5% project discount rate, 18% grant funding, 20% state equity contribution, alongside the strong traffic demand carried over from the previous scenario.

PROJECT NPV	+3,385 MEUR
CAPEX = 4,900 MEUR	

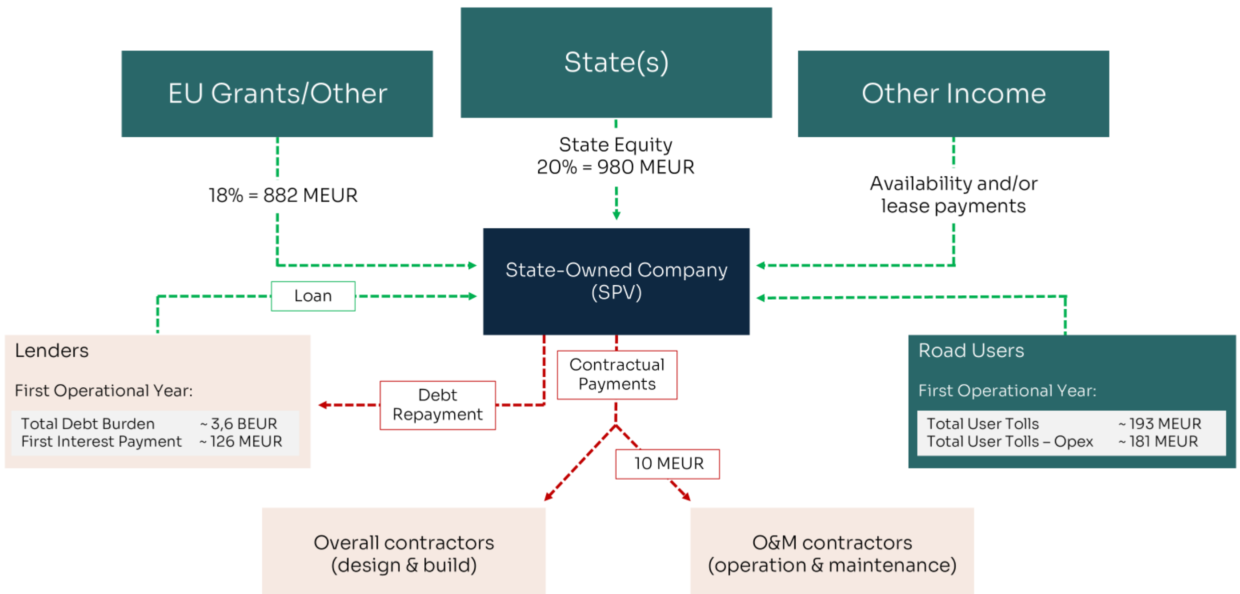

Figure 13. *Project structure of the Optimistic scenario.*

This is the only scenario where year-one net cashflows cover the year-one interest payment, successfully managing the debt service schedule from the first operational year. The project NPV is positive 3,4 billion euros and the outstanding senior debt is fully repaid in 21 years. The Optimistic scenario uplift is supported by the zero percent risk reserve assumption, lower annual OpEx, 18% grant and 20% state equity portion.

4.2 Conclusions on financial modelling

The scenario analysis demonstrates that the financial feasibility and bankability of the project is highly sensitive to capital expenditure, financing costs, and traffic demand as summarized in Table 5. No single parameter change is sufficient to ensure financial sustainability. Instead, the analysis indicates that financial bankability depends on a combination of:

- a reduction in effective CapEx through cost and scope optimisation, use of well-proven technical standards to reduce contingencies.
- successful grant applications (e.g. EU grants)

- higher realised traffic demand than currently projected in FTIA's feasibility study. Long-term traffic forecasts for cross-border transport infrastructure are subject to significant uncertainty, and realized volumes may exceed or fall short of projections. As an example, traffic development for the Öresund fixed link has significantly exceeded early forecasts, with volumes increasing from approximately 7,000–8,000 vehicles per day at opening to over 20,000 vehicles per day in recent years[9]. Similar patterns of underestimated demand in major infrastructure projects are discussed in Knudsen & Rich (2013)[10].

- stable and favourable financing conditions

Inputs / Scenarios	Conservative	Moderate	Improved	Favourable	Optimistic
CapEx Risk Reserve	+70%	+50%	+30%	+20%	0%
Project Capex (BEUR)	8.3	7.35	6.37	5.88	4.9
Project Annual Opex (MEUR)	30	20	15	15	10
Project Discount Rate (REAL)	3.5%	3.5%	2%	1.5%	1.5%
Construction Time (YEARS)	10	10	7	7	7
Project Grant Connecting Europe Facility/Military Mobility	0%	0%	10%	18%	18%
State Equity	10%	10%	15%	10%	20%
Number of Passenger Cars / day	2000	2700	3105	3510	3510
Toll per Passenger Car (EUR)	37€	60€	70€	85€	85€
Number of Heavy Vehicles/day	200	500	575	650	650
Toll per Heavy Vehicle (EUR)	93€	200€	225€	250€	250€
Net Present Value (BEUR)	**-5.9**	**-3.8**	**-0.53**	**+2.1**	**+3.4**

Table 5 *Net Present Value for the five scenarios analysed.*

Overall, the results indicate that the project's feasibility relies on a combined approach involving cost reduction, demand realization, and public support, and that financial performance should be assessed alongside wider strategic and societal objectives. This is discussed further in the following chapter.

[9] Øresundsbro Konsortiet (2023). *Annual Report* 2023. Available at: https://www.oresundsbron.com/en/about-the-bridge/annual-reports

[10] Knudsen, M.A. and Rich, J. (2013). *Cross-border transport infrastructure investment: The impact of the Öresund Bridge on labour market outcomes*. Transport Policy.

5 Wider Economic Impacts, Security benefits and their connection to the financing model and feasibility

Both WEI and security aspects strengthen the overall socio-economic case for transport infrastructure investments. Wider Economic Impacts (WEI) analysis within FLINC Work Package 2 identifies the potential long-term economic effects of the Nordic Connector[11]. FLINC Work Package 3, again, assesses the need for military mobility, security of supply and preparedness in the Kvarken region. Both Work Package 2 and 3 are ongoing and results were not available at the time of completing the report at hand.

WEI do not automatically translate into direct revenue streams that can be used to repay debt by the SPV. In practice, only a limited share of WEIs can be converted into direct project revenues. The WEIs that can generate tangible cash flows are primarily:

- user payments (such as bridge tolls) and,
- increases in land or real estate values that can be captured through planning instruments, development agreements or other land value capture mechanisms[12]. Real estate development is, however, not initially the primary task of the SPV as outlined in Figure 4.

From a financing perspective, it is important to distinguish between bankability and societal value. Bankability refers to the project's ability to generate sufficient and predictable cash flows to support debt financing, while societal value reflects the broader economic and strategic benefits generated by an infrastructure investment.

Large-scale transport infrastructure is rarely self-financing through direct user charges (the Öresund bridge being an 'outlier' in this sense). For the Nordic Connector, the analysis in Chapter 4 shows that the project is not bankable under conservative and moderate scenarios based on user revenues alone but becomes bankable under more optimistic scenarios.

Investments of the scale required for the Nordic Connector are therefore primarily justified by their contribution to wider European socio-economic and strategic objectives, including enhanced productivity and competitiveness, cohesion and regional development. Russia's war on Ukraine has made resilience, security of supply and strengthening of military mobility within the TEN-T network crucial drivers for improved cross-border, east-west connections.

Overall, the **key question is not whether the Nordic Connector project is commercially self-financing based on user tolls, but whether the combined societal value, identified**

[12] Haapamäki, Väänänen, Kantala, Wikström, Jungar, Spohr, Falkenbach, Laakso, Ekroos. *Utilizing the effects of transport projects as part of their financing*, Publications of the Government´s analysis, assessment and research activities 2021:16.

through CBA, WEI analysis and security benefits, justifies the required level of public funding. This is particularly true in the more conservative scenarios.

6 Funding strategy and possibility for EU grants

As shown in previous chapters, the Nordic Connector ("bare bridge" including shoreside connecting infrastructure) will, based on current CapEx and traffic volume estimates, require substantial public funding and grants in most scenarios. **Public funding, particularly from EU instruments, will be a critical component of the financing strategy for the Nordic Connector.** Among the available instruments, CEF Transport and Military Mobility funding are assessed as the most relevant and realistic sources of external funding (see Table 6 below). Competition for these funds is high, and successful applications require strong alignment with TEN-T priorities and demonstrated cross-border and dual-use benefits.

Instrument	Relevance	Likelihood	Potential contribution
CEF (Transport)	High	Medium–High*	10–20% CAPEX
CEF/ Military Mobility	High	Medium	Studies up to 50% 30-50% of CapEx (eligible parts of investment with clear military mobility benefits)
NATO 1.5%	Medium	Medium	Indirect (national budgets)
Interreg, regional funds	Low	High	Minor

Table 6 *Initial assessment of potential funding instruments/grants for Nordic Connector. *CEF funding assumed to require formal TEN-T status, which is currently lacking for the Nordic Connector.*

NATO Defense- and security-related expenditure

At the NATO Summit in 2025, allies including Finland and Sweden, agreed on an updated defense spending framework. The new target foresees total defense-related spending of up to 5% of GDP by 2035. Of this, up to 1.5% of GDP may cover broader defense- and security-related investments, including critical infrastructure, resilience and military mobility. In 2024, Finland's GDP was EUR 276 billion[13]. 1.5% of GDP would represent ~ 4,1 billion euro per year for Finland. Sweden's GDP was ~EUR 600 billion in 2025. 1.5% correspond to roughly EUR 8–9 billion per year for Sweden. In total, this means 12-13 billion EUR / year for Finland and Sweden combined.

[13] Statistics Finland

If the Nordic Connector can demonstrate to contribute to military mobility, supply security and regional resilience[14], parts of the investment may be justified as part of this 1,5% GDP spending. Finland's and Sweden's governments will decide, as part of their annual budget processes, what qualifies but within NATO's agreed reporting framework and subject to NATO review.

NATO considers only the *net* national cost of such investments. Consequently, EU grants (e.g. CEF grants) reduce the amount of expenditure that can be reported under the 1.5% category. PBI's current assumption is that Finland and Sweden have no difficulty in identifying investments (incl. digital infrastructure, cyber security) that qualify under the 1.5% framework, given existing expenditure portfolios. Nordic Connector hereby "competes" with other infrastructure investments.

Connecting Europe Facility (CEF)

CEF is the EU's main fund for transport infrastructure on the TEN-T network. Cross-border projects are especially favored in the EU Commissions proposed CEF III for 2028-2034. The proposal suggests an allocation of EUR 51.5 billion toward transport, with EUR 17.5 billion specifically earmarked for military mobility. Military Mobility funding can typically cover up to 30% of eligible construction costs, and in some cases up to 50% for highly relevant dual-use parts of the investment. Eligibility requires that the project is part of the TEN-T network, demonstrates clear dual-use functionality, and meets defined military transport requirements. As a reference point, EU CEF grants cover roughly 15–18% of the Fehmarn Belt's total CapEx[15].

The route across the Kvarken strait itself is part of the international E-road network (European route E12), and Port of Umeå part is part of comprehensive TEN-T network. This means the fixed link connection may be eligible for TEN-T related planning and funding. Eligibility of EU-grants for Nordic Connector should be verified with CINEA[16].

Securing and strengthening TEN-T status for key nodes (e.g. port of Vaasa) along the Nordic Connector is crucial. This is a prerequisite for accessing CEF Transport.

Interreg, Nordic and regional funds and/or contributions

These are smaller and usually for planning or soft measures. FLINC itself is Interreg-funded. For construction, Interreg will not cover billions. The Nordic Council or some Nordic development funds could provide small amounts for cross-border cohesion and further studies. The regions and cities of Vaasa and Umeå could allocate some capital such

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[14] Analysed within ongoing FLINC Work Package 3

[15] Fehmarnbelt tunnel homepage

[16] The CEF program is managed by the European Climate, Infrastructure and Environment Executive Agency (CINEA)

as ancillary road improvements or land acquisition. Typically, this would be minor relative to the total CapEx.

Norway could benefit from the Nordic Connector e.g. through increase traffic through the port in Mo i Rana. Private equity investments from major export companies (like industrial players in the regions) who benefit might invest a minor share for strategic reasons.

7 Risk Assessment and Bankability Considerations

Large-scale infrastructure projects inherently carry a variety of risks that can affect both their delivery and their financing. In this chapter, key risks specific to the Nordic Connector are identified and how these risks would impact bankability. Identified risks are based on FTIA's Needs assessment study for Nordic Connector[17] and PBI's own analysis.

Risk Category	Identified Risk	Description of risk	Bankability & Financing Assessment
Demand / Revenue Risk	Moderate transport demand	Forecast demand relatively limited compared to investment size.	**High impact on bankability.** Weak revenues reduce debt capacity and make private financing difficult without state guarantees.
	Impact of user charges	Too high tolls may significantly reduce demand.	**Medium impact.** Revenue sensitivity increases lender risk and makes concession models unattractive.
	Uncertain synergies from energy/data transmission lines	Electricity/hydrogen benefits depend on future markets.	**Low impact.** Potential upside uncertain; cannot be relied upon for financing.
Cost & Construction Risk	High construction costs	Very large CapEx.	**High impact.** Larger funding gap and higher debt requirement increase reliance on public backing.
	Cost estimation uncertainty	Long planning horizon increases uncertainty.	**High impact.** Cost overruns are a key lender concern; may

[17] FTIA Feasibility study, 2025

			require contingency buffers or guarantees.
	Long implementation timeline	Multi-year project exposure.	**Medium–High impact.** Increases inflation, interest rate and refinancing risks.
Financial & Funding Risk	Dependence on external funding	Requires substantial public and EU funding/grants.	**Critical impact.** Without confirmed long-term public support, project is not financeable.
	Insufficient socio-economic benefit	Weak Cost-Benefit ratio even including WEI[18].	**Indirect impact.** Reduces political willingness to provide guarantees or grants. May reduce access to loans from e.g. EIB?
Environmental & Permitting Risk	Environmental impacts	Sensitive marine environment/UNESCO World Heritage status	**High impact.** Delays increase cost and financing risk; lenders require permitting certainty.
	Construction emissions	Major emissions from steel and concrete during construction phase.	**Medium impact.** May affect ESG assessments and eligibility for green financing.
	Permitting complexity	Risk of delays in approvals.	**High impact.** Delays increase financing costs and uncertainty.
Technical & Operational Risk	Complex marine conditions	Arctic conditions	**Medium impact.** Operating and maintenance costs of cross-border fixed link in arctic conditions.
Political Risk	Shifts in political support	Multi-year, bi-national projects face political risk and changes in	**Critical impact.** One country might face budget pressures and hesitate on their

[18] Wider Economic Impacts are separately analysed in FLINC Work Package 2 (analysis ongoing, status April 2026)

		government could lead to shifts in support.	share. A formal Government-to-Government Agreement between Finland and Sweden will be key.

Table 7 *Assessment of risks and their impact on financial feasibility and bankability in Nordic Connector.*

In summary, **the most critical risks from a *bankability* point of view are**:

- Dependence on confirmed national (FIN, SWE) and EU funding/grants.
- Political risk – can political support on highest national level in both Sweden and Finland be established and maintained?
- Demand/revenue risk, dependent on how traffic flows eventually will develop.
- Permitting delays due to e.g. environmental concerns.
- Construction cost overrun risk.

8 Transferability and wider applicability of the methodology

The methodology and financing model demonstrated within FLINC Work Package 1, using the Nordic Connector as a case study, are transferable and applicable to other large-scale, cross-border infrastructure projects in less densely populated areas in the Nordics.

The methodology combines three complementary dimensions:

1. Financial feasibility and bankability analysis, focusing on cash-flow based modelling, risk allocation, and funding gaps under realistic assumptions, coupled with scenario analysis; Key is having relevant input data for the financial modelling (CapEx, traffic estimates etc).
2. CBA and Wider Economic Impacts (WEI) analysis based on EU and national guidelines[19] [20]
3. Resilience, military mobility, and security of supply considerations.

This **allows to distinguish clearly between financial viability and broader socio-economic value, and to assess under what conditions public support is justified**. The

[19] See e.g. Swedish Transport Administration (Trafikverket), Samhällsekonomisk analys

[20] See e.g. Ministry of Transport and Communications (2020): *Framework for examining wider economic impacts of transport system development* (in Finnish). https://julkaisut.valtioneuvosto.fi/items/79ef58bf-9c57-4511-8a91-39458bee3366

same logic is applicable to other Nordic cross-border infrastructure projects where direct user revenues from e.g. tolls alone are insufficient to ensure bankability.

Applicability of the hybrid financing model

The hybrid financing model identified in FLINC Work Package 1, based on a publicly owned Special Purpose Vehicle (SPV), addresses challenges that are common to many cross-border infrastructure projects:

- High upfront CapEx relative to estimated traffic demand,
- Long construction and repayment periods,
- Strategic, societal importance exceeding pure financing/bankability considerations.

This model enables public ownership and strategic control of critical infrastructure, while leveraging private-sector competence. By concentrating risks with the parties best able to manage them, and by diversifying revenue streams to finance the investment, the structure improves bankability without requiring demand risk transfer to the private sector.

The model is particularly relevant for projects where:

- Mega-class projects that cannot be implemented using states' annual budget allocations for transport infrastructure,
- Cross-border coordination between states is required,
- EU grants/co-financing (e.g. CEF, Military Mobility) is a key enabler,
- Strategic or resilience benefits may justify long-term public involvement, and
- Private capital will not accept (traffic) demand risk.

Role of Wider Economic Impacts and security benefits

Wider Economic Impacts (WEI) rarely translate directly into project revenues, but they play a role in justifying public funding, state guarantees, and EU grants. This distinction is critical when applying the methodology elsewhere.

Scalability and adaptability

The methodology used in FLINC is scalable and adaptable. It can be applied at different stages of infrastructure project maturity—from early concept screening to pre-investment decision support. The methodology provides a replicable decision-support framework for evaluating and structuring large, cross-border infrastructure investments that are not commercially self-financing but deliver significant strategic and societal value.

9 Summary and Recommendations

This study has examined how the Nordic Connector could be financed, with a particular focus on financial feasibility, bankability, and risk allocation under different financing structures.

It is important to note that large-scale transport infrastructure is rarely fully self-financing through user charges (Öresund bridge being an outlier in this regard). This is also the case for Nordic Connector. In many cases, traffic estimates have been underestimated. Investments of this scale are typically justified by broader socio-economic effects and strategic value rather than direct financial returns alone. The financial analysis shows that the Nordic Connector is not financially self-sustaining based on user revenues alone under conservative assumptions. Forecast traffic volumes and toll income are insufficient to cover capital expenditure and debt service over the project lifecycle. Under more optimistic scenarios, bankability and financial feasibility becomes viable.

The results from the ongoing analysis of Wider Economic Impacts (WEI), analysed within FLINC Work Package2, play a central role in the overall assessment of Nordic Connector. In addition, strategic benefits such as improved resilience, security of supply and military mobility further strengthen the project's relevance. These are analysed in FLINC Work Package 3.

While WEIs typically do not generate direct revenues for the SPV/project company, they represent real economic value at the regional and national level and form a key justification for long-term public funding and EU grants. The distinction between public value and bankability is therefore critical for understanding the project's financing requirements.

Among the assessed alternatives, a hybrid financing model based on a publicly owned special purpose vehicle (SPV, similar to the one used for the Öresund bridge) complemented by EU grants is considered the most viable structure. This model allows the public sector to retain strategic control of a critical cross-border infrastructure asset. An SPV with full performance responsibility creates incentives to deliver on time and on budget, ensures clear accountability, and enables cost efficiency across the entire lifecycle by optimizing design based on total cost of ownership (TCO). Packaging the project as a larger investment can increase market interest, allows alternative financing outside the national transport plans, enables EU co-financing through a single funding application, and allows delivery based on the required completion date rather than the 12-year planning framework.

Financial modelling shows that bankability under the hybrid model is highly sensitive to capital expenditure, traffic demand forecasts, and the availability of EU grants. Without cost optimisation and significant public spending, the project remains dependent on state guarantees throughout a large part of its operating period.

From a financing perspective, the Nordic Connector should therefore be understood as a long-term strategic infrastructure investment, where public funding and risk sharing are preconditions for bankability. Whether these conditions are acceptable ultimately depends on broader political priorities and assessments of societal value. External funding, particularly from EU instruments such as the Connecting Europe Facility and Military Mobility funding, will play a critical role in reducing the funding gap and improving financial feasibility.

The **decision to proceed should therefore not be based solely on financial feasibility, but on a comprehensive assessment of long-term economic, strategic and societal value,**

Recommended next steps from a *financing* perspective are to:

- Clarify eligibility and potential scale of EU funding, particularly under CEF and Military Mobility instruments, in dialogue with CINEA.
- Secure that the Nordic Connector, including its nodes (e.g. Port of Vaasa) are added to the TEN-T network.
- Advance bilateral discussions between Finland and Sweden on governance, risk sharing, and long-term commitment to the Nordic Connector and a joint SPV structure.

10 Terminology and abbreviations

Term	Abbreviation	Description
Bankability	-	An infrastructure project is structured in such a way that lenders are willing to provide long-term debt on acceptable terms, based on predictable cash flows, appropriate risk allocation, and sufficient security. Bankability does not mean "commercial profitability". It means the financing structure must compensate for any insufficient revenue through public support.
Cost-Benefit Analysis	CBA	The Cost-Benefit Analysis assesses the change in the net benefits resulting from the construction costs of the project and the implementation of the projects. The calculation takes into account, for example, impacts on travel time, accidents, noise, emissions and the operating costs of the vehicle, vessel and train[21]. CBAs typically do not take into account WEIs.
Financial feasibility	-	Financial feasibility means that an infrastructure project can cover its financial costs over time and sustain its financing structure without running into insolvency. Financial feasibility is not the same as socio-economic viability. A project may generate strong wider economic impacts but still lack sufficient revenues to finance itself. Conversely, a project may be financially feasible but provide limited broader societal value.
Special Purpose Vehicle	SPV	An SPV is a legally independent project company established solely to develop, finance, build, own and/or operate a specific infrastructure project.
Wider Economic Impacts	WEI	Broader economic effects of an infrastructure project that go beyond the direct user benefits normally captured in a standard cost–benefit analysis (CBA)[22].

[21] FTIA

[22] See e.g. Ministry of Transport and Communications, Finland (in Finnish), *Liikennejärjestelmän kehittämisen laajempien taloudellisten vaikutusten tarkastelukehikko*, Liikenne- ja viestintäministeriön julkaisuja|2020:5