

REPORT

The Danish State Guarantee Model

Working Principles and Experience with Large-scale Infrastructure Projects

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Executive Summary

This report elaborates on the nature and the implications of the Danish state guarantee model for financing large-scale transport infrastructure as well as on the experience Denmark has made with this instrument.

The state guarantee model was used for the development of the fixed links across Store-bælt (between the Danish islands of Fyn and Zealand) and Øresund (between the Danish capital Copenhagen and the city of Malmö in Sweden). The realisation of these two large-scale projects would not have been possible if they would have had to be financed from the public purse of Denmark (and for the Øresund link also of Sweden). Both projects stand on economically solid grounds today and remain within their loan repayment schedules.

The same state guarantee model will also be used for the upcoming Fehmarnbelt link (between the German town Puttgarden on Fehmarn and the Danish town Rødby on Lolland).

The model is characterised by transferring the responsibility to design, construct, finance – as well as operate and maintain the project – to a 100 per cent state-owned company with its own board of directors and management.

Funding is based on the company raising loans in financial markets or from the state. The state guarantees the loans through a guarantee commission. With the Danish state's high credit rating, therefore, favourable loan terms are obtained. Toll charges are collected, which, after covering operating and maintenance costs, are used to pay interest and loan instalments.

It is a key element of the state guarantee model that revenues from user payment repay the debt, which has arisen in connection with the planning and construction phase of the project. The project company will not receive government subsidies in addition to the value that lies in the guarantee – on the contrary, it must in most cases pay a guarantee fee to the state.

The main benefit of the state guarantee model – compared to the traditional Finance Act model – is its flexibility: it allows both full and partial user payment. This means that the project is not (or is to a lesser degree) a burden on public finances. This makes it possible to support and implement even mega-projects with good economics. In effect, it would otherwise be politically difficult to realise such projects in the first place, because they are both large in scale and span a large number of years, often exceeding a decade and thus put constraints on the public funds for infrastructure in general for many years and influence and limit the public prioritisation of public money over several election periods.

The repayment period is key in evaluating the project's financial strength. With regard to the adoption of the project, the expected repayment period is calculated based on e. g. anticipated costs for construction (including design etc.), operation, maintenance and interest as well as on the expected traffic revenue and EU support.

Since these factors are obviously subject to uncertainty, looking so many years into the future, there is of course also uncertainty over the repayment period. In order to use the state guarantee model for a given project, it is essential that the repayment period falls below the facility's useful economic life by a good margin. With Danish projects, the repayment period is typically

30-40 years, as opposed to facility lifetimes of over 100 years. If any of the parameters change, it follows that the repayment period either falls or lengthens. This means that changes in one or more parameters do not by themselves create a need for further public money, as long as the total repayment period remains acceptable.

The project's self-financing capacity is the key element in the state guarantee model: it means that even if certain parameters in the project should change for the worse – e.g. lower initial traffic volume or higher interest rates than anticipated in the original financial calculations – this does not require new policy decisions or mean the risk of ongoing capital injection by the owner. Such variations during the actual operation of the project can instead be absorbed in the form of adjustments to the repayment period – as long as the project does not reach a point where the net profit is not able to cover the year-to-year interest payment on the debt.

Another significant advantage of the state guarantee model is that it has low and stable finance costs – only marginally higher than the state's own finance costs and thus significantly lower than for private financing. Additionally, the state can maintain control of a number of strategic decisions in the project; for example the tender strategy and fixing toll charges.

The state continues to bear the residual risk in the project. If it turns out that the project does not live up to expectations, and that revenue from user payment is not sufficient to repay the debt, the state will ultimately have to cover the resulting shortfall. With private financing solutions that risk is transferred to private investors. Hence the higher finance costs of the private solution. Few or no private funding companies in the market have the size and strength to take on such mega-projects covering more than a decade of construction and several decades of repayment period.

The two existing and very successful fixed links across Storebælt and Øresund demonstrate that the state guarantee model can indeed be used for financing economically strong projects without this residual risk for the state becoming more than a residual factor.

Figure 1: Overview on main characteristics of the state guarantee model

- User-paid
- State guarantee on all loans
- Organised through a private company entity
- Full state ownership of that company entity
- Full state control and insight

1. Purpose

This report provides a detailed description of the Danish state guarantee model that over the past two decades has been successfully used for financing large-scale transport infrastructure projects in Denmark, such as the fixed links across the Storebælt and the Øresund. It will also be used for the Fehmarnbælt project. It specifies the working principles and relevant factors of the state guarantee model and includes references to the experiences Denmark has made with the Storebælt and the Øresund projects.

2. Description of organisational models

Before the state guarantee model is described in detail, it is necessary to clearly distinguish it from other organisational models for financing transport infrastructure. The table below therefore lists four pure models:

Table 1: Overview on four pure financing models for transport infrastructure

Model types	Financing	
	Public	Private
Tax payment	<ul style="list-style-type: none"> • Finance Act model 	<ul style="list-style-type: none"> • PPP model
User payment	<ul style="list-style-type: none"> • State guarantee model 	<ul style="list-style-type: none"> • Concession model

The reason for this simplified division should be viewed in light of the debate, which often mixes the models together, and therefore dilutes their concepts. For example, you often see a mix of PPP (Public Private Partnership) and user payment but, as the table shows, they are actually not identical.

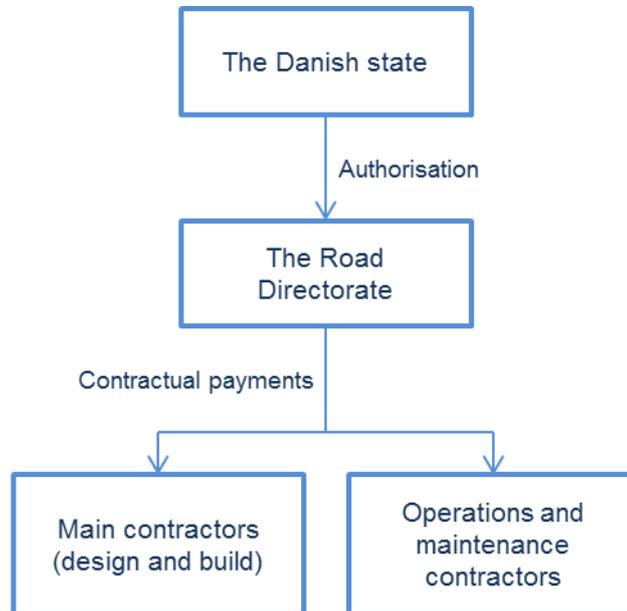
Another reason to keep the models separate is the ability to assess the characteristics of each. This is only possible if they are kept in their pure forms. It is possible to subsequently combine the models so as to achieve the best possible solution for each given project.

A brief description of each organisational form follows, after which the state guarantee model will be analysed in detail. The description is based on the Danish situation but can be applied to other countries with high credit ratings with little difficulty.

2.1. Finance Act model

In this model, the state offers the project as a turnkey contract following the adoption of a Construction Act in the Folketing (the Danish parliament). The construction costs are raised in the annual Finance Acts and settled with the contractor through milestones during the construction phase. After completion, the state is the owner of the facility with responsibility for its operation. In practice, however, this is undertaken by a private partner through fixed-term operational contracts. The pure model is illustrated in Figure 2, where a project run by the Danish Road Directorate (a state agency operating under the Ministry of Transport) is used as an example.

Figure 2: Finance Act model



The main advantage of this model is that it is relatively simple, with the costs of the contract preparation etc. being low as a consequence when compared to most PPP models. The model also offers the opportunity for economies of scale with regard to the operation of other publicly owned roads.

The fundamental challenge for the Finance Act Model is the fact, that the mega-infrastructure projects are both large in scale and span a large number of years, often exceeding a decade. Deciding such projects will put constraints on the public funds for infrastructure in general for many years and thus influence and limit the public prioritisation of public money over several election periods. This could lead to either “stop-go” decisions for the project or to political inability to cope with project changes along the way.

A disadvantage of this model may be that there can be a distinction between contracts for the construction works and the subsequent operations and maintenance phase. Thus there is no incentive for the contractor to view the project in the context of its entire life cycle. However, it would be possible to alleviate this issue if the contract covers both construction and the early years of operation. This is the case in Copenhagen’s Metro project, for example.

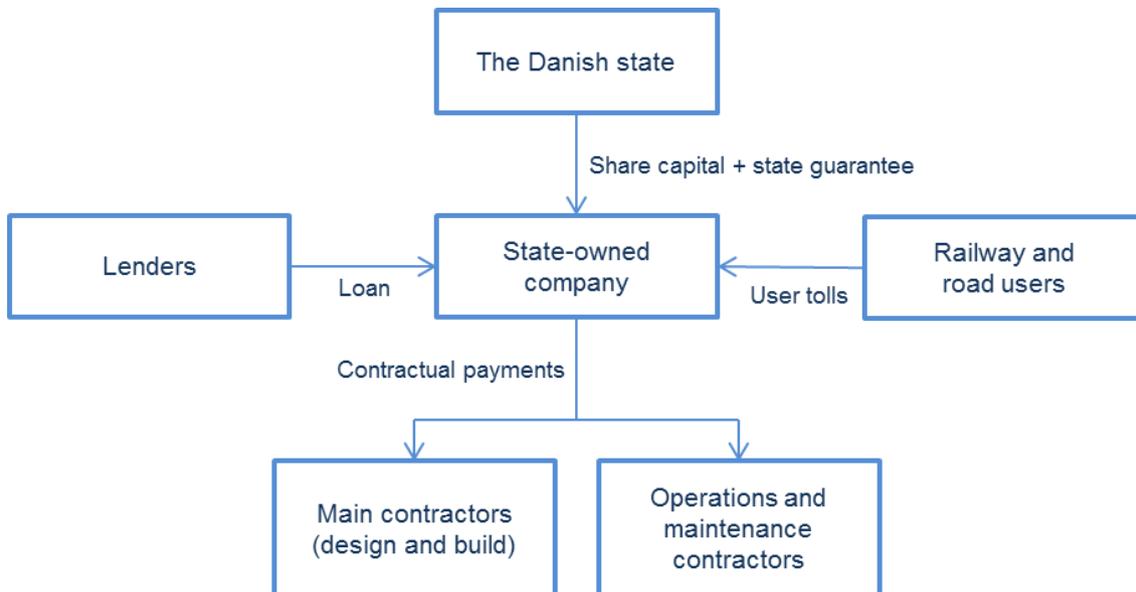
2.2. State guarantee model

This model was used for the development of the fixed links across Storebælt and Øresund and will also be used for the upcoming Fehmarnbælt link. It is characterised by transferring the responsibility to design, construct, finance – as well as operate and maintain the project – to a 100 per cent state-owned company with its own board of directors and management.

Funding is based on the company raising loans in financial markets or from the state. The state guarantees the loans through a guarantee commission. With the Danish state’s high credit rat-

ing, therefore, favourable loan terms are obtained. Toll charges are collected, which, after covering operating and maintenance costs, are used to pay interest and loan instalments. The model is illustrated in Figure 3.

Figure 3: State guarantee model



The main benefit of the state guarantee model – compared to the traditional Finance Act model – is that it allows both full and partial user payment. This means that the project is not (or is to a lesser degree) a burden on public finances.

As with the Finance Act model, the model is relatively simple, and the costs of legal preparation of financial contracts etc. are thus quite modest. For an infrastructure project with high capital costs and a long time frame, financing costs are very important for the economics of the project. The state guarantee model secures the lowest possible finance costs, which are only marginally higher than the state’s own finance costs, which, in turn, are significantly lower than for private financing.

The state continues to bear the residual risk in the project. If it turns out that the project does not live up to expectations, and that revenue from user payment is not sufficient to repay the debt, the state will ultimately have to cover the resulting shortfall. With private financing solutions that risk is transferred to private investors. Hence the higher finance costs of the private solution.

An advantage of the state guarantee model is that the state can maintain control of a number of strategic decisions in the project; for example the tender strategy and fixing toll charges. Meanwhile, the company can act more freely than a government agency; for example, in relation to the state authorisation procedures. The experience from the Storebælt and Øresund projects shows that an independent project company with its own financing is better placed to optimise operations and maintenance, including reinvestments, than is the case with a government body that is dependent on appropriations in the annual Finance Acts.

A disadvantage, compared with PPP models, can be the division of contracts between construction on the one hand and operations and maintenance on the other. In the same way as with the Finance Act model, however, it is possible to alleviate this problem if a contract is entered into that covers both construction and the early years of operation as will be the case on the Fehmarnbelt Project. Furthermore, the model offers good opportunities to integrate the construction and operation. For example, the design phase can take account of operational considerations, including experience drawn from equivalent facilities already in operation. In the case of Denmark, the Storebælt, Øresund and (future) Fehmarnbelt links are owned by the same group (Sund & Belt Holding), which in turn is owned by the Ministry of Transport (see below 3.1).

2.3. PPP model

There are many variations in the formulation of PPP projects internationally. The basic model is that the private PPP operator (possibly a consortium) has the contract to design, finance and construct the facility and subsequently operate and maintain it over the remaining life of the contract, which will typically be 25-30 years. The model is often referred to in writing as DBOF (Design, Build, Operate, Finance).

The payment from the state to the PPP operator will consist of an availability payment, which may be linked to compliance with certain requirements for maintenance standards and availability, etc.

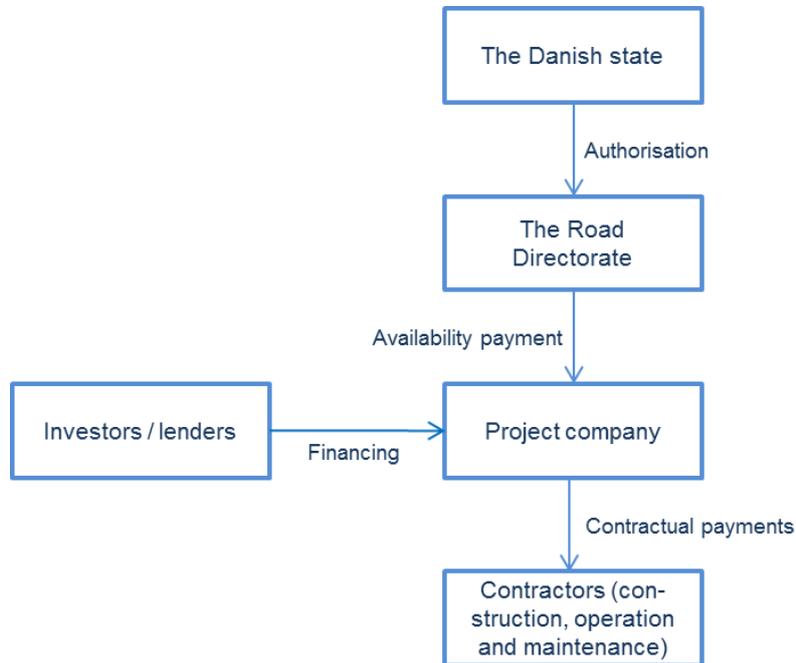
There are various means of regulating the conditions when the contract expires. The facility can be handed over to the public for a predetermined sum. In other cases, it is transferred free of charge to the public with the cost being included in the availability payments. There are also intermediate kinds where a portion of the payments are disbursed on a regular basis but an amount is withheld until the date of transfer as security against the facility being delivered in good condition.

The PPP model is illustrated in Figure 4 below, where the Danish Road Directorate is once again used as an intermediary by the state for a particular infrastructure project.

One advantage of this model is that it allows for a better long-term overall economy when the responsibility for the construction and operation are combined into one contract. The model can also help to promote innovation, and new thinking from the private partner. Finally, a PPP company will typically have a greater economic incentive to adhere to the overall timetable than is the case with a traditional public project. However, the private company has limited ability to handle political and authority matters compared with state-owned entities.

The main disadvantage of the model – in a Danish context – is that financing costs are high compared to state funding. Another major drawback is that the cost of contract preparation and negotiations etc. will be significantly greater than in both the Finance Act model and the state guarantee model.

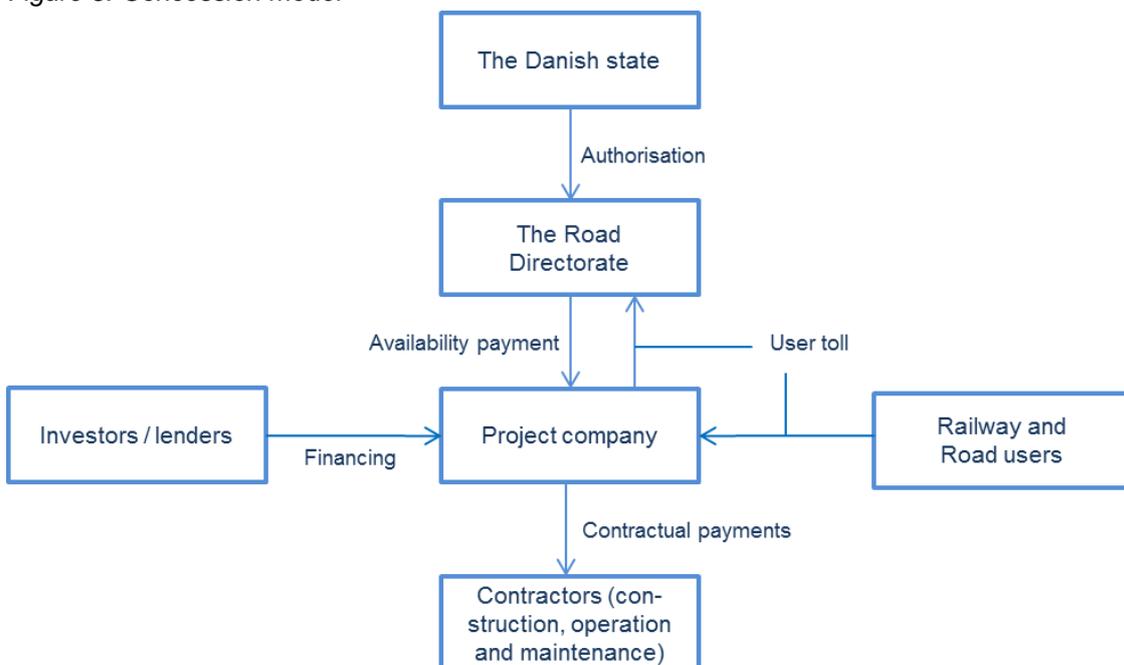
Figure 4: PPP model



2.4. Concession model

This model resembles the PPP in some ways. However, whereas user payments do not feature in the "pure" PPP model, they do in this one, which is also frequently referred to as PPP in discussion. Figure 5 illustrates the Concession model.

Figure 5: Concession model



The concession model essentially has the same features and advantages/disadvantages as PPP. In addition, the private investor in this model also bears a traffic risk.

Furthermore, it entails user tolls that the state can use to help finance the facility but, unlike the state guarantee model, the state does not have the same freedom to make changes to the user toll, as this will be part of the contract with the private party. All else being equal, there is less flexibility.

The concession model is widely used internationally. The best known is probably the Eurotunnel project between England and France, which was one of the first examples of a major infrastructure project using private finance. Much of the motorway system in southern Europe is also funded through the use of the concession model.

3. Detailed description of state guarantee model

This section describes the key elements of the state guarantee model in depth.

3.1. The company

The particular company that will be responsible for designing, constructing, financing, owning and operating the project is fundamental to the model. In Denmark this company is established under the authority of a special Construction Act that is adopted in the Folketing and is specific to that project. The company is set up as a private entity; for example, as a limited company but wholly owned by the Danish state. The Act is specific to the project and sets out a clear framework and restrictions on the company. Thus, it is only authorised to undertake the specific task, which ensures maximum control of the company.

The company is run by a board of directors and a management board under the auspices of common corporate legal standards. However, the Danish government (in practice, the Minister of Transport) has certain special instructional powers that go beyond the ordinary shareholders' powers. This ensures that certain strategic decisions, including, for example, tolls must be made by, or be approved by the Minister of Transport, who also appoints the company's board. Tolls will primarily be determined based on the requirement for repayment of the debt, cf. below. In addition, social considerations will play a role in setting the tolls.

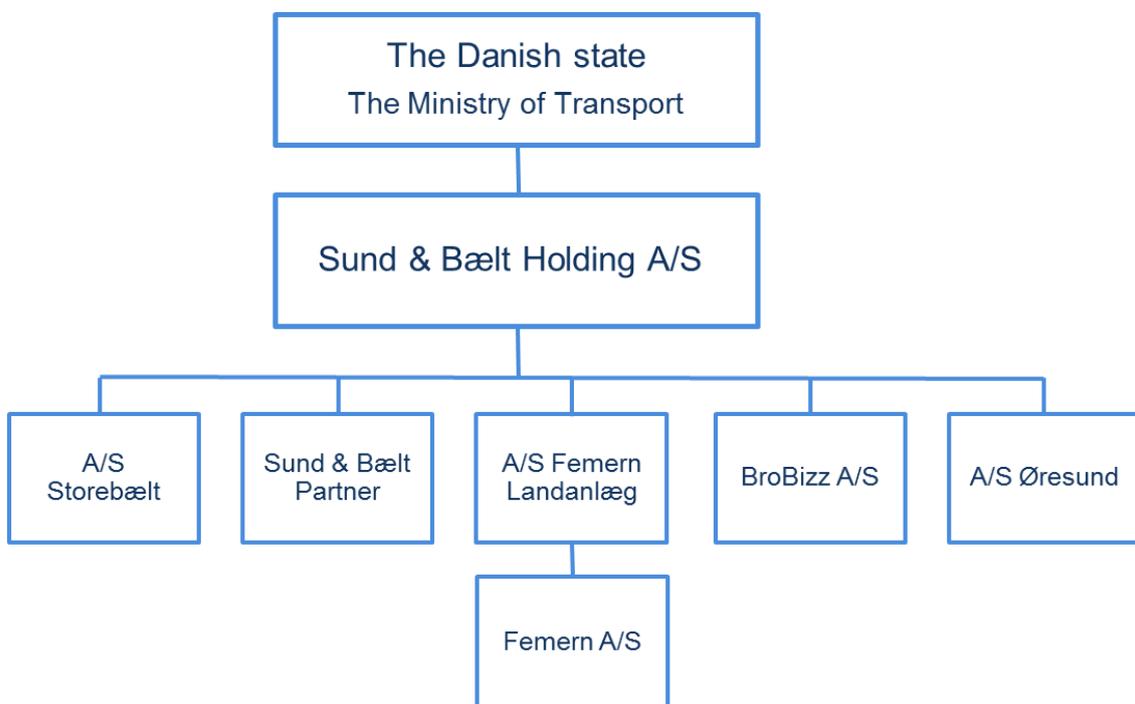
The company's finances are separate from the state's budget and authorisation procedure (Finance Act). Thus, it is the Board's responsibility to ensure appropriate and efficient use of its resources (cf. above about Transport Minister's special powers). The company's audit is carried out by a regular, private audit company. Denmark's National Audit Office, however, has also the opportunity to examine all aspects of the company's business. The project company is thus under double oversight and must report frequently and transparently to its public owners. Hence the public control in this model is strong and at the same time the company has a larger degree of freedom to act and optimise in the same way a private project company would do.

Per se, a state-owned project company does not necessarily have a private economic incentive to optimise the economics and ensure a robust risk assessment of the project. This, however, can largely be compensated for by an appropriate governance structure and an efficient organisational set-up.

The infrastructure projects organized after the Danish state guarantee model are part of the Sund & Bælt Holding. This is illustrated below in Figure 6. The holding company is wholly owned by the Danish State (Ministry of Transport). In turn it has full ownership of a number of subsidiaries, including Femern Landanlæg A/S and Femern A/S, the companies responsible for the Danish land works for the Fehmarnbelt tunnel and the tunnel itself respectively.

Each project company has its own board of directors, its own accounts and double oversight from its private auditor as well as the state auditor. Further money cannot be transferred between projects without a specific political decision to do so.

Figure 6: Holding structure Sund & Bælt



The organisational description above applies to 100 per cent Danish-owned companies. The situation is slightly different with regard to Øresundsbro Konsortiet, which owns and operates the fixed link across Øresund and is 50/50 owned by the Danish and Swedish states – and the Danish A/S Øresund as subsidiary of the Sund & Bælt Holding therefore only represents 50 per cent of the Øresundsbro Konsortiet and furthermore owns the Øresund Danish landworks). The two governments thus have no powers of direction and all decisions are left to the Board of Directors, which is appointed by them (four representatives from each country).

In addition, Sund & Bælt has two other subsidiaries, namely BroBizz A/S (issuer of on board units for toll payment) and Partner A/S (consultancy).

3.2. Construction and financing

The above Construction Act sets out the project's design in outline (such as a combined road and rail link with two railway tracks and 2x2 motorway lanes) and establishes certain general requirements, e.g. for environmental and safety considerations

Within this framework, the project company is responsible for implementing the project design, environmental and regulatory approvals, tender of construction contracts and performance of the client role during the construction process, etc. A crucial element in this process is the tender strategy, which includes the need to establish the allocation of risk between the contractor and client (the company).

Because of the size of the projects, and the company's publicly supported financing, the tender process is in accordance with the EU's public procurement directives.

The cost of all these activities is financed through borrowing. Normally, companies have some equity capital, invested by the state when the company is formed. In the case of Danish companies, however – including the Øresundsbro Konsortiet – this constitutes less than 1 per cent of the total capital requirement. The balance is loan financing through the capital markets, which of course is possible because of the state guarantees, cf. below.

The borrowing is typically undertaken by the company issuing bonds, which are purchased by pension funds or other investors. Both the Danish companies and Øresundsbro Konsortiet have special programmes for bond issues, often referred to as the EMTN (Euro Medium Term Note) Programme. Apart from short-term drawings on credit facilities, bank loans are not usually taken out. Banks have, however, another important role – as arranger of the bond issues and as a counterparty in the accompanying financial contracts.

3.3. Guarantees and loan terms

The state guarantees the company's borrowings, as mentioned, including any refinancing of previously raised loans. The state also guarantees the companies' other financial contracts used in connection with the financial management (such as swaps). Finally, the state guarantees (non-financial) obligations without further notification. It could, for instance, be fulfilment of the signed construction contracts.

Loans are raised as the liquidity need arises during the construction phase. There is a range of maturities in order to avoid too high a concentration of refinancing needs in certain years. The company's total debt comprises, therefore, a large number of loans with varying maturities and associated financial contracts.

The guarantees referred to are legally strong. They are, of course, irrevocable and ensure investors/lenders receive payment of all interest and instalments etc., which arise from the company's original obligation. It should be noted that investors/lenders cannot put the company into receivership or liquidation and thereby trigger an accelerated repayment of the debt.

The guarantees are issued by the Danish state (for Øresundsbro Konsortiet by the Danish and Swedish states with joint and several liability). This means that the companies have the same credit rating as the state, which in Denmark's (and Sweden's) case is an AAA rating from the

international rating agencies. Companies can therefore obtain virtually the same loan terms as the state itself. Since the companies' bonds are less liquid than government bonds, however, a small liquidity premium accrues to the investor.

The Danish companies pay a guarantee premium of 15 basis points per annum to the state. Øresundsbro Konsortiet pays no guarantee premium.

3.4. Operational phase

When the fixed link opens to commercial traffic, the project moves to the operational phase. However, the original project company still owns it and remains responsible for operation, although many of the actual tasks can be outsourced to private companies. Again, the EU procurement directives apply, which in practice means that a number of major operational tasks are put to tender under them.

The company's revenues comprise user payment for passage across the fixed link. The above mentioned Construction Act will usually regulate this. With the Storebælt link, it is the Minister of Transport, who sets tolls on the recommendation of the company, while the toll rates on the Øresund link are left to the Board of Directors.

Toll setting will primarily be driven by the need to ensure an appropriate repayment of the company's debt, cf. below. In this context, consideration of price elasticity and possible competition from alternative routes (with or without user payment) will be central. In any case, it will of course comply with the EU and the country's own competition rules.

Revenues from user payment are used primarily for operation, maintenance and reinvestment of the fixed link. The company is responsible for organising a strategy for these tasks, which ensures the lowest possible cost in the long term. This will have already begun during the construction phase, with the design of the actual facility attending to these issues in order to ensure the lowest possible cost over the project's life (life cycle cost).

Revenues from user payment will additionally cover the interest costs of the debt, which have accumulated during the construction phase. During the project's first year of operation, it is not unusual for it to be impossible to cover the entire interest cost. This means that the debt increases over the early years of operation. The state guarantee model typically takes this into account by allowing a certain level of net borrowing during the operational phase.

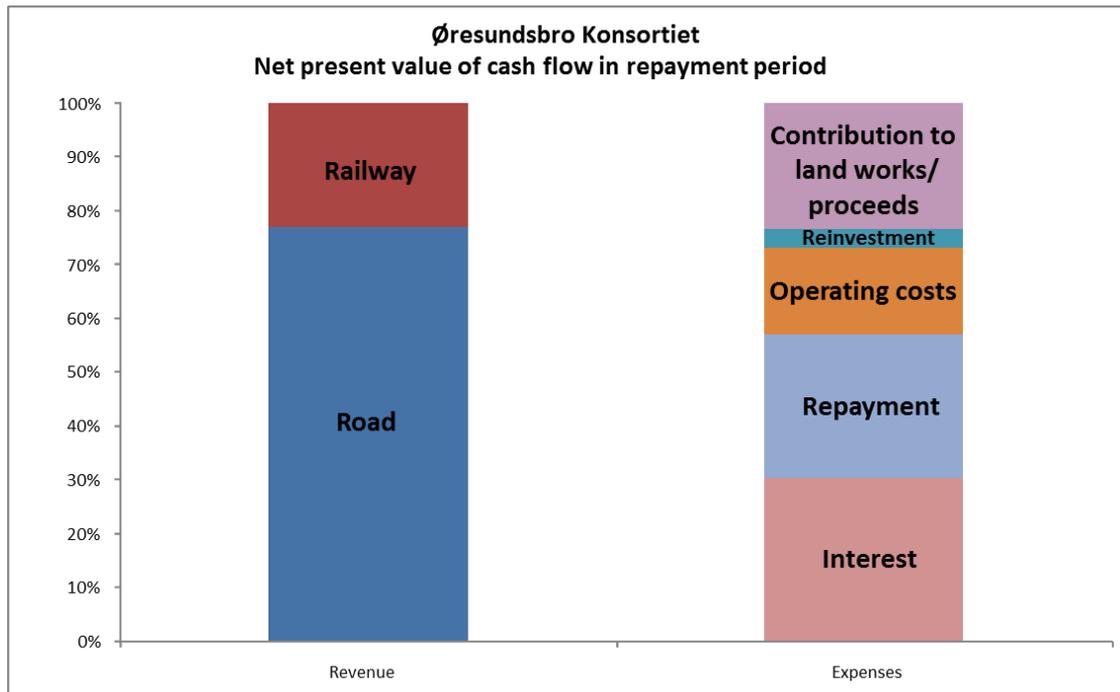
When cash flow from user payment exceeds the total of the operating, maintenance and reinvestment costs as well as interest expenses, the debt is amortised. In practice, the debt – as previously mentioned – comprises many individual loans, so that there is some refinancing each year. This refinancing is adjusted to the free cash flow, so the total debt reduces line with this.

3.5. Self-financing

The project's self-financing capacity is the key element in the state guarantee model, i.e. that revenues from user payment repay the debt, which has arisen in connection with the construction phase of the project. In the Danish context, this is expressed by the fact that the company will not receive government subsidies in addition to the value that lies in the guarantee.

This self-financing capacity is reflected in the repayment period and is illustrated in Figure 7 below: It shows the breakdown of total revenue and expenses in the Øresund Fixed Link project, from day of opening to when the debt is repaid. The left column shows the revenue and the right column shows the cost of the project. All amounts are calculated as the current value across the project's repayment period, so the columns are, by definition, the same size.

Figure 7: Net present value of cash flow in repayment period Øresund Fixed Link



It can be seen that approximately 75 per cent of the revenue comes from road traffic, while the railway contributes around 25 per cent of total revenue.

On the cost side, it shows that capital costs (interest and repayment) amount to half the cost, but the operation, maintenance and reinvestments account for only about one quarter of the overall costs. The remaining quarter is dividend payments to fund the Danish and Swedish landworks for the Øresund project.

If desired, the flexibility of the state guarantee model also allows for a combined financing model, after which user payment covers only a part of the repayment, with the remainder delivered through state funding. In Denmark, the Folketing in 2014 is expected to adopt a Construction Act for a new link across Roskilde Fjord, where the state will contribute around DKK 650 million (approximately EUR 87 million) out of a construction budget totalling DKK 2,000 million (approximately EUR 268 million) with the balance being accounted for through user payment. In other words, a public payment of approximately one-third and a user payment of approximately two-thirds of the construction costs.

3.6. Repayment period

The repayment period is key in evaluating the project's financial strength. With regard to the adoption of the project, the expected repayment period is calculated based on e. g. anticipated costs for construction (including design etc.), operation, maintenance and interest as well as on the expected traffic revenue and EU support. Since especially factors such as construction costs, traffic revenues and interest costs are subject to uncertainty, there is of course also a certain level of uncertainty over the repayment period.

This is why, already at the outset of the political decision making process meticulous forecasts and sensitivity calculations are made to secure that there will not be needed new policy decisions.

In order to use the state guarantee model for a given project, it is essential that the repayment period falls below the facility's useful economic life by a good margin. With Danish projects, the repayment period is typically 30-40 years, as opposed to facility lifetimes of over 100 years.

If any of the parameters change, it follows that the repayment period either falls or lengthens. Variations during the actual operation of the project are absorbed in the form of adjustments to the repayment period. Thus they do not require new policy decisions or risk ongoing capital injection by the owner.

Experience shows that if the repayment period exceeds approximately 50 years, the risk in the project increases significantly, i.e. that a given change in conditions will have an increasing impact on the repayment period as this grows. In order to evaluate the uncertainties in the project, a number of sensitivity analyses are conducted, in which the effect of changes in one or more of the above parameters is highlighted. This may be supplemented by more advanced risk calculations.

The greatest single risk factor is typically traffic revenue, which is determined by the volume of traffic and the toll per vehicle. These elements depend on a wide range of social factors such as economic growth, demographics, car ownership, fuel prices, competition from alternative routes and modes of transport etc. They need additional forecasts over a very long period (40-50 years). It is therefore not surprising that traffic revenue is associated with a particularly high degree of uncertainty. This uncertainty reduces after a few years of operation, when traffic levels are known; but it does not disappear completely.

3.6.1. Fixed Link across Storebælt

On the Storebælt link, traffic volumes proved to be significantly higher than the forecasts prior to the political adoption of the Construction Act. When the Storebælt link opened in 1998 (the rail part in 1997) the expected repayment period was 37 years. A decade later in 2008, the greater traffic level and lower interest rates resulted in a reduction in the repayment period to 25 years.

The Storebælt fixed link is a success both in terms of benefits to society due to improved infrastructure, more interaction between western and eastern Denmark and seen from an economic and financial perspective. The use of the state guaranteed model has meant that the link could be built without involving tax revenues.

3.6.2. Fixed Link across Øresund

After opening of the combined Øresund bridge and tunnel link between Copenhagen and Malmö, road traffic was initially below forecasts, but in the following years traffic rose strongly until 2008 when just over 7 million vehicles used the link. Since then this level was largely maintained. The train service has been a particularly great success – in 2010 it carried 10.6 million passengers. On the Øresund tunnel and bridge, the estimated repayment period varied between 30 and 36 years after commencing operation. This was primarily due to changes in traffic expectations. On current assumptions the debt of the consortium can be repaid 34 years after the opening, i.e. by 2034.

The Øresund fixed link has lived up to its purpose to serve to integrate the two large urban centres in Denmark and Sweden across the frontier. Therefore the EU Commission also hails the project as a model for removing barriers between countries. This would not have been possible without the use of the state guarantee model since it is unlikely that the two governments would have been able to agree to finance the link through tax revenues.