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## **FIXED LINK ACROSS FEHMARNBELT**

**Prepared by Femern Bælt A/S**

**for**

**The Danish Ministry of Transport**



## **Financial analysis**

September 2008



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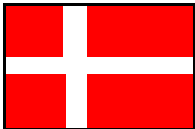
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## **PREFACE**

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The Danish Ministry of Transport, September 2008



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## INTRODUCTION

On 29 June 2007, a political agreement was signed between Denmark and Germany on the construction of a fixed link across Fehmarnbelt.

The agreement provides for, among others:

- the coast-to-coast link will consist of an electrified dual track railway and a four-lane motorway
- the preferred solution is a cable stayed bridge
- the goal is to open the fixed link across Fehmarnbelt in 2018
- the coast-to-coast link is owned by Denmark and financed via state-guaranteed loans and user payment
- Denmark will assume sole responsibility for the development and financing of the Danish landworks
- Denmark will reserve the right to finance the development of the Danish landworks via revenues generated by the coast-to-coast link
- the development of the Danish landworks will be finalized no later than at the opening of the coast-to-coast link
- Germany will assume sole responsibility for the development and financing of the German landworks
- construction of the German roads leading on to the fixed link across Fehmarnbelt and electrification of the existing railway Lübeck-Puttgarden is finalized no later than at the opening of the coast-to-coast link
- Germany commits itself to taking the necessary measures for ensuring sufficient railway capacity on the one-track railway between Bad Schwartau and Puttgarden no later than at the opening of the coast-to-coast link and to upgrade this stretch to an electrified dual track railway no later than seven years after the opening of the coast-to-coast link.

Furthermore, Denmark has undertaken to develop the Danish landworks in connection with the coast-to-coast link and reserves the possibility to finance this work via profits from the project company.

This report provides an outline of the results of a financial analysis of the Fehmarnbelt Fixed Link based on the political agreement signed on 29 June 2007. The analysis is based on the financial analysis "Fixed Link across Femern Belt, Financial Analysis", which was published by the Danish Ministry of Transport in June 2004.

We wish to point out that this report solely sets out a number of financial assumptions based on the political agreement signed on 29 June 2007. The final decision on the fixed link's organisation, financing and tolls will of course have to depend on political decisions.

## 1 SUMMARY

Compared to the financial analysis from June 2004, the assumptions of the new financial analyses are changed on the following points:

- The opening year has been changed from 2015 to 2018.
- The owner will make capital investments of EUR 67 million.
- TEN funds granted to the coast-to-coast link are assumed to account for 10% of construction costs and 50% of the costs for preliminary studies compared to the previously 10% of all costs. This means that the assumed TEN funds granted to the project have changed from 10% to 11%.
- The project company pays a guarantee premium of 0.15% of the debts guaranteed at any time instead of the previous loan establishment costs of 1.5% of the loans.
- Effective January 2007, the German VAT rate was changed from 16% to 19%. As it turns out, the new VAT regulations provide that no VAT is payable in the exclusive economic zone, EEZ (8 km) established in the middle of Fehmarnbelt. These two changed assumptions result in an average VAT rate for the entire Fehmarnbelt passage of 15.2%, as opposed to previous calculations which were set at 20.5%.
- It is assumed that dividends paid by the company behind the coast-to-coast link to the owner (the Danish state) are of such magnitude that it is possible to finance the development of the Danish landworks. The expenses for the development of the Danish landworks connecting to the Fehmarnbelt fixed link have so far been calculated at EUR 1.0 billion (2008 prices). The preliminary analysis has been made prior to the assessment of environmental impact and is therefore subjected to some uncertainty.
- The assumed payment from the railway has been adjusted downwards from EUR 58 million to EUR 47 million annually, one of the reasons being changed infrastructure expenses in Denmark and in Germany since the latest calculation in 2004.
- The corporate tax rate has changed from 25% (the current Danish rate) compared to the previous, average Danish and German corporate tax rates of 34%.

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**Fixed Link across Fehmarnbelt**

This analysis is solely made for the technical solution preferred in the political agreement, ie a cable stayed bridge with a four-lane motorway and dual track railway. The project is financed by the project company which obtains loans on the international loan market with a guarantee which is provided by the Danish state, ie a state guarantee model as the one applied in the financing of the Great Belt and the Øresund bridges.

The analysis shows that the debts of the coast-to-coast link across Fehmarnbelt are expected to be repaid within a period of approximately 23 years. If the Danish landworks are financed via the dividend payments from the coast-to-coast link, debts are expected to be repaid after approximately 26 years. The Danish landworks are expected to be clear of debts approximately 30 years after the opening, ie approximately 4 years after the coast-to-coast link is clear of all debts.

The changed assumptions mentioned above result in the following expected repayment periods for the Fixed Link across Fehmarnbelt.

*Table 1.1. Changes in the expected repayment period for the Fixed Link across Fehmarnbelt*

<b>Year</b>	<b>Change in relation to the 2004 analysis</b>	<b>Expected repayment periods</b>
<b>Financial calculation 2004 of the coast-to-coast link</b>		<b>25</b>
Opening year 2018	-1	24
TEN funds	-1	23
Capital investments made by the state	<-1	23
Changed finance expenditure	-	23
Changed VAT assumptions	-1	22
Changed railway payments	+1	23
Changed corporate tax rates	<-1	23
<b>Financial calculation 2008 of the coast-to-coast link</b>	<b>-2</b>	<b>23</b>
Assumed dividends paid to finance the Danish landworks	+3	26
<b>The Danish part of the Fehmarnbelt project</b>		<b>26</b>
Coast-to-coast link		<b>30</b>
Danish landworks		

The effects of each changed assumption in Table 1 are calculated in the listed sequence. They cannot be considered as partial effects compared to the 2004 calculations. This means that the total change of the repayment period is unchanged irrespective of the sequence of assumptions, but the individual change of assumption may have another effect if it is placed differently in the sequence.

In Table 1, the most significant change related to the expected repayment period for the coast-to-coast link appears to be an economy allowing for the development of the Danish landworks to be financed via revenues from the coast-to-coast link. This automatically leads to an extension of the repayment period for the coast-to-coast link by approximately 3 years from approximately 23 years to approximately 26 years. As regards the other changed assumptions, the slightly increased funds from EU's TEN programme, the changed opening year from 2015 to 2018, and the changed VAT assumptions lead to a reduction of the expected repayment period by approximately 1 year. The remaining factors appear only to have a minor impact on the expected repayment period.

In order to assess the project's financial ability to withstand changes in the key parameters, a number of sensitivity analyses have been made. These analyses show that the project is capable of withstanding changes in the key parameters.

Overall, the sensitivity analyses show that the economy of the total project is healthy.

## **2 BACKGROUND AND PURPOSE**

Based on the political agreement of 29 June 2007 on the construction of a fixed link across Fehmarnbelt, new financial calculations have been made on the project. These calculations have been made on the basis of the financial analysis of the project published in June 2004 with the following changes:

- The opening year has been changed from 2015 to 2018 in accordance with the political agreement of 29 June 2007.
- Capital investments in the amount of EUR 67 million are made by the owner.
- TEN funds granted to the coast-to-coast link are assumed to account for 10% of construction costs and 50% of the costs for preliminary studies compared to the

previously 10% of all costs. This means that the assumed TEN funds granted to the project have changed from 10% to 11%.

- The project company pays a guarantee premium to the Danish state of 0.15% of the debts guaranteed at any time against the previous loan establishment costs of 1.5% of the capital sum.
- Effective January 2007, the German VAT rate was changed from 16% to 19%. As it turns out, the new VAT regulations imply that no VAT is payable in the exclusive economic zone, EEZ (8 km) established in the middle of Fehmarnbelt. These two changed assumptions result in an average VAT rate for the entire Fehmarnbelt passage of 15.2%, as opposed to previous calculations which were set at 20.5%.
- It is assumed that dividends payable by the company behind the coast-to-coast link to the owner (the Danish state) are of such magnitude that it is possible to finance the development of the Danish landworks. The expenses for the development of the Danish landworks connecting to the Fehmarnbelt fixed link have so far been calculated at EUR 1.0 billion (2008 prices). The preliminary analysis has been made prior to the assessment of environmental impact and is therefore subject to some uncertainty.
- The assumed payment from the railway has been adjusted downwards from EUR 58 million to EUR 47 million annually, one of the reasons being changed infrastructure expenses in Denmark and in Germany since the latest calculation in 2004.
- The corporate tax rate has changed from 25% (the current Danish rate) compared to the previous, average Danish and German corporate tax rates of 34%.

Calculation of the funds granted by the EU's TEN programme has been specified to reflect more precisely the current funding rules providing up to 50% support to preliminary studies. The assumption of 10% financing of the construction works has been maintained.

Since 2004, new rules have been adopted for the allocation of TEN funds from the European Commission. These changes imply that prioritised projects (the Fehmarnbelt project is a prioritized project) crossing national boundaries and natural barriers may receive grants up to 30% of construction costs. Railway and road works included as a part of the trans-European network and as prioritized projects may be receive up to

20% grants, whereas other railway and roadworks may receive up to 10% grants. As the railway link via Fehmarnbelt is considered a prioritized project in the trans-European network, the development of the railway landworks connecting to the Fehmarnbelt link may receive grants up to 20% by the EU TEN-programme, whereas the development of the road landworks connecting to the Fehmarnbelt link may receive up to 10% TEN-grants.

In November 2007, the European Commission announced that the coast-to-coast link across Fehmarnbelt would receive funds of EUR 339 million for the period 2007-2013 corresponding to approximately 25 per cent of the expected expenditure during the period.

The assumptions applied in this analysis are thus stated in conservative terms as regards total funds received.

The Fixed Link across Fehmarnbelt is owned by Denmark via a Danish state-owned company. This company finances the investment in the coast-to-coast link by obtaining loans on the international capital markets. As the owner, the Danish state provides a guarantee for the loans obtained by the company to finance expenditure. This will render it possible for the company to finance the construction costs of the coast-to-coast link at low interest rates corresponding to the interest rate at which the Danish state would normally obtain a loan.

The analyses will solely be made on a cable stayed bridge with a four-lane motorway and a dual track railway, with finance being based on state-guaranteed loans obtained on the international loan market, ie a state-guarantee model similar to the one applied for the Great Belt and the Øresund bridges.

Basically, an annual guarantee premium will be paid to the state as compensation for the loan guarantee. The guarantee premium is 0.15% of outstanding debts.

Effective January 2007, the German VAT rate was changed from 16% to 19%. The current VAT regulations provide that VAT is not payable in the exclusive economic zone, EEZ (8 km) which is established in the middle of Fehmarnbelt. These two changed assumptions result in an average VAT rate for the entire Fehmarnbelt passage of 15.2%, which in previous calculations had been set at 20.5%. For passenger cars transported by ferry, the ferry fare is not subject to VAT, whereas passenger cars crossing a fixed link will have to pay VAT. As it is assumed that the price charged users crossing the Fehmarnbelt link matches the index-linked toll on the Rødby-Puttgarden ferry crossing in 2007, the crossing price is included minus the

applicable VAT rate (only relevant for passenger cars) in the financial calculations. As the average VAT rate has dropped, the overall result is a minor increase in the revenues payable to the coast-to-coast link. In this case, it means that the project company receives an income which is around EUR 2.5 higher per passenger car (corresponding to 6%) than previously assumed. Overall, the changed VAT assumptions mean a reduction in the repayment period of approximately 1 year.

Calculations include the assumption that dividends are paid by the project company to the owner (ie the Danish state) from the time when the company's equity capital has been restored. Due to the interest charged during the construction period, the company will have a negative equity capital when the coast-to-coast link opens. Consequently, a number of years will pass before the equity capital of slightly more than EUR 67 million has been restored. It is assumed that the project company pays one-third of the net profit to the owner in the form of dividends. This corresponds to the model used for the Øresund bridge.

The repayment period for the landworks is the time when the present value of dividends amount to EUR 1.0 billion. Thus, the calculations do not include operating and maintenance costs for the landworks.

The following sections provide an outline of the key assumptions and the results of the financial analyses. Section 3 specifies the construction budget. Sections 4 and 5 describe the assumed revenues, ie road traffic, tolls and railway payment. Section 6 deals with the expected operating and maintenance costs, and section 7 lists the remaining financial assumption. The results of the calculations are presented in section 8, and section 9 provides a number of sensitivity analyses. All conclusive comments are consolidated in section 10. Appendix 1 states the general assumptions, and Appendix 2 sets out the assumptions of real interest rates.

### **3 CONSTRUCTION COSTS**

The total estimate of constructions costs related to the coast-to-coast link has been made on the basis of comprehensive studies conducted by COWI-Lahmeyer and published in January 1999. The actual estimate of construction costs was prepared on the basis of information on the construction costs for the coast-to-coast link across the Øresund which is comparable in scope and nature to that of the Fehmarnbelt fixed link. The estimated construction costs were subsequently adjusted by Sund & Baelt based on the experience gained from the construction of the fixed links across the Great Belt and the Øresund.

The coast-to-coast link across Fehmarnbelt designed as a cable stayed bridge with a four-lane motorway and a dual track railway is estimated so far to amount to approximately EUR 4.4 billion (2008 prices). The estimate of construction costs has been made prior to the assessment of environmental impact and therefore subject to some uncertainty. Investments are expected to be made during the period 2010-2017. The items in the estimate of construction costs appear in Table 3.1.

Table 3.1. Estimated construction costs for the Danish part of the Fehmarnbelt project

EUR million	Current prices	Fixed 2008 prices
Construction costs	3,970	3,392
Design and supervision	210	179
Client organisation	178	155
Preparation of operations	51	41
Reserves	745	634
<b>Coast-to-coast link</b>	<b>5,154</b>	<b>4,400</b>
Landworks, railway	1,044	867
Landworks, road	116	96
<b>Landworks, total</b>	<b>1,160</b>	<b>964</b>
<b>Construction cost estimate, total</b>	<b>6,314</b>	<b>5,364</b>

The estimated construction costs of the coast-to-coast link allows for a total reserve of EUR 634 million (2008 prices). It is estimated that out of this amount, approximately EUR 27 million should be used for insurance during the construction period. This estimate thus contains approximately EUR 607 million in non-earmarked reserves. This means that the actual estimated construction costs include non-earmarked reserves of almost 16 per cent.

## 4 TRAFFIC

The estimated revenue from the coast-to-coast link has been calculated on the basis of the traffic forecasts prepared by FTC (Fehmarnbelt Traffic Consortium) and published in the report "Fehmarn Belt Forecast 2002, Final Report, April 2003".

The traffic forecast was prepared on the basis of an opening of the fixed link across Fehmarnbelt in 2015. Thus, it is not consistent with what is set out in the political

agreement of 29 June 2007 and the assumed opening year of 2018 mentioned in this analysis. During the period from 2015 to 2018, assumptions allow for an annual traffic growth of 1.7% corresponding to the assumed traffic growth after the opening of the fixed link.

This analysis assumes a conservative zero growth in traffic after 25 operating years.

This analysis also allows for the conservative assumption that the road traffic will be subjected to a 4-year ramp-up period. This means that 4 years will have to pass after the opening of the coast-to-coast link before the traffic is expected to reach the forecasted level, including the assumed road traffic growth of 1.7% a year. Calculations thus allow for the assumption that the traffic during the period 2018-2021 is 20%, 15%, 10% and 5% lower than could be expected at an assumed traffic growth of 1.7% annually after the opening of Fehmarnbelt.

Table 4.1 sets out the forecast with and without "ramp-up" stated for the opening year 2018.

*Table 4.1. Traffic forecast for the road traffic across the Fehmarnbelt link in 2018*

<b>Number of vehicles per day</b>	<b>Traffic forecast</b>	<b>Traffic forecast, including ramp-up</b>
Passenger cars	8,200	6,600
Lorries	1,300	1,000
Buses	100	100
<b>Total</b>	<b>9,600</b>	<b>7,700</b>

The numbers are rounded off to nearest hundred

Furthermore, it is assumed that the future traffic growth for the period 2018-2043 (ie 25 operating years) is 1.7% per year. After this period, traffic is assumed to be constant.

In a historical context, traffic growth on the ferry routes between Lolland-Falster and Germany has shown major fluctuations, however with the average traffic growth for passenger cars and lorries during the period 1970-2005 being approximately 3.6% per year. In this perspective the assumed traffic growth rate of 1.7% must be considered as very cautious.

The analysis below shows the expected traffic developments during the period 2018-2022, with the "ramp-up" period as well as the underlying traffic growth of 1.7% per year being included.

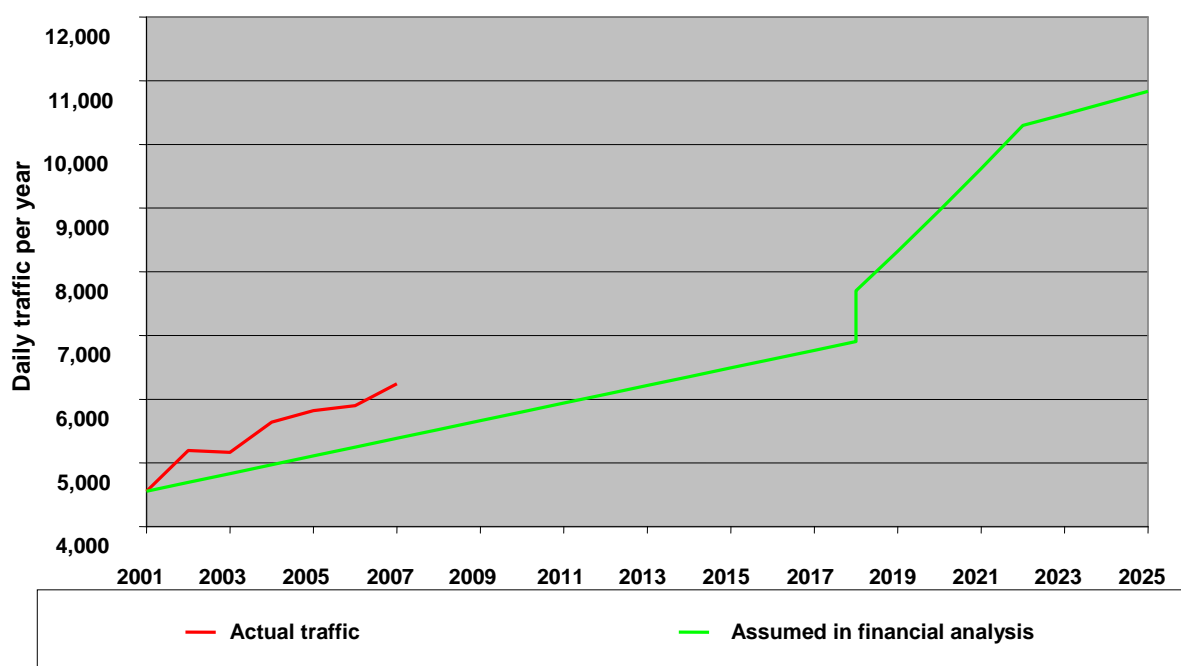
Table 4.2. Assumed traffic development for 2018-2022

	2018	2019	2020	2021	2022
Number of vehicles per day	7,700	8,300	9,000	9,600	10,300

Numbers are rounded off to nearest hundred

Given that this analysis takes on a conservative approach by assuming a "ramp-up" period of 4 years, traffic is expected to rise 7-8% per year during the first 5 years after the opening of the link. A similar pattern in traffic development was observed after the opening of the fixed link across the Øresund, where an annual traffic increase of 10-20% has been seen in recent years.

Figure 4.1. Assumed and actual traffic development on Fehmarnbelt



Since 2001, a drastic growth on the ferry crossing of Rødby-Puttgarden has been seen in road traffic. During the period from 2001 to 2007, the average traffic growth on the ferry crossing was 5.4% per year. This is illustrated in the figure above, where the actual traffic in 2007 was almost 6,250 vehicles per year. This equals the forecasted traffic volume in 2013. In 2007, road traffic between Rødby and Puttgarden was thus approximately 6 years ahead of the traffic forecast.

## 5 TOLLS, RAILWAY PAYMENT AND EXPECTED REVENUES

It is assumed that the toll for passing Fehmarnbelt after the opening of the fixed link will be similar to the ferry fares on Rødby-Puttgarden. The tolls for crossing the Fehmarnbelt coast-to-coast link are similar to the ones used on the preparation of the traffic forecast, ie the Rødby-Puttgarden ferry fares in 2002. As regards the passenger cars, a list price of EUR 46 incl of VAT has been used (2002-prices)<sup>1</sup>. The assumed toll for a passenger car equals EUR 54 (2008 prices) after adjustment for inflation based on the inflation of 2.5% per year assumed in this analysis. For lorries and buses, the tolls equal the average prices calculated in connection with the traffic forecast for the ferry fares at Rødby-Puttgarden in 2002, ie after deduction of discounts.

It should be noted that the ferry fare for passenger car transport according to EU's VAT directives is not subject to VAT, whereas passage on the fixed link is. The net result of this difference is reduced revenues (compared to ferry services) for the coast-to-coast link corresponding to the VAT on the coast-to-coast link's passenger car turnover. The average VAT-rate is calculated at 15.2%, under the assumption that German VAT is charged (19%) in German sea and land territory, and Danish VAT (25%) in Danish sea and land territory. As a result of this, revenues are likely to be reduced by approximately EUR 7 per passenger car (compared to ferry services). The coast-to-coast link is expected to obtain revenues of approximately EUR 47 per passenger car (2008 prices)

The table below states the assumed prices at a 2008 price level and an opening year price level. During the period 2002 to 2018, allowance is made for an annual inflation rate of 2.5%.

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<sup>1</sup> It is assumed that the discounts granted for short-term shopping trips today, are balanced by the surcharges imposed on vehicles with caravans and trailers.

Table 5.1. Tolls payable on the coast-to-coast link across Fehmarnbelt

EUR	2008 prices		2018 prices	
	Excl VAT	Incl VAT	Excl VAT	Incl VAT
Passenger cars	47	54	60	69
Lorries	218	252	280	322
Buses	241	278	309	356

As of 1 July 2008, the ordinary ferry fare for a passenger car, one-way, on the Rødby-Puttgarden line is EUR 64.

Apart from the revenues generated from road traffic, the railway running across Fehmarnbelt is also expected to provide a basis of income. Thus, the railway services are assumed to generate approximately EUR 47 million in revenues per year. The railway payments correspond to the direct economies in operating costs and infrastructure fees which they are likely to obtain in accordance with the traffic forecasts for the railway traffic across Fehmarnbelt. The time saved by passengers and freight by not having to drive the 160 km longer route via the Great Belt has not been priced and included in the calculations of railway payments. Estimated revenues from the railway are reduced in this analysis compared to the most recent calculation in 2004, due to, among others, changed infrastructure payments in Denmark and Germany.

Table 5.2. Estimated revenue in 2018 (first full operating year)

EUR million, 2008 prices	Expected revenues
Passenger cars	111
Lorries	83
Buses	10
<b>Revenue, road connection</b>	<b>204</b>
Revenue, railway connection	47
<b>Total</b>	<b>251</b>

The revenues from the coast-to-coast link are illustrated by the estimated revenues in the assumed opening year of 2018. During the first full operating year, it is expected that the Fehmarnbelt Link will generate total revenues of EUR 251 million (2008 prices).

The revenues from the road link are assumed to rise during the first 25 operating years as a result of the assumed traffic growth of 1.7% a year. Furthermore, revenues are assumed (in current prices) as a whole to rise by the assumed inflation rate of 2.5% per year, which means that railway payments remain the same measured in fixed prices.

## **6 OPERATING AND MAINTENANCE COSTS**

Based on the operational experience gained from the fixed links across the Great Belt and the Øresund until 2003 and the expectations of the two companies in terms of maintenance and extraordinary maintenance (re-investments), Femern Bælt A/S has calculated operating and maintenance costs for the first 40 operating years of the cable stayed bridge across Fehmarnbelt. Given that the two bridge companies do not have long-term experience in bridge operation and maintenance, Femern Bælt A/S has added a reserve of approximately 10%.

The assumptions therefore include a total amount of EUR 42 million (2008 prices) in annual basic operations and maintenance costs during the operating period on the coast-to-coast fixed link across Fehmarnbelt.

Øresundsbro Konsortiet has prepared a plan for the expected re-investments of the cable stayed bridge across the Øresund during the first 40 operating years. The expected re-investments have been scaled up to reflect the costs of the approximately 19 km long cable stayed bridge across Fehmarnbelt. The annual basic expenditure and the estimated re-investments thus make up the total operating and maintenance costs.

It is estimated that the average costs for operations and maintenance will run into approximately EUR 61 million annually in 2008 prices on average over a period of 40 years.

## **7 OTHER FINANCIAL ASSUMPTIONS**

### *Real interest rates*

Similarly to previous calculations, the long-term real interest rate has been set at 3.5% per year, and the average inflation rate during the entire project period at 2.5% per year. This results in a nominal interest rate of 6.1% per year. The assumption of a real interest rate of 3.5% per year is thus considered to be cautious, given that the Great Belt as well as the Øresund fixed links are financed at considerably lower interest rates, see Appendix 2.

*Corporate tax rates*

According to the political agreement of 29 June 2007, it is assumed that the project company owning the coast-to-coast link is Danish and therefore liable to pay Danish corporate tax. It is assumed that the current corporate tax rate of 25% will be applied throughout the entire project period. Allowance has not been made for any possible joint taxation with other companies. Tax payable by the owners of the landworks has not been included in the calculations.

*Dividends*

The calculations allow for the assumption that the project company pays dividends to the owner by one third of the annual profit from the time when the project company's equity capital has been restored. Once the project company's debts have been prepaid, the entire profit is allocated.

*TEN funds*

Since 2004, new rules have been in force for the allocation of TEN funds granted by the European Commission. The changes mean that priority projects crossing national boundaries and natural barriers may be granted funds of up to 30% of the construction costs. Railway and road construction works included in the trans-European network may be granted as much as 20% and 10%, respectively. The financial calculations include the assumption that the coast-to-coast link will receive funds worth 10% of construction costs and 50% of costs for preliminary studies. This equals total funding of 11%. As regards the Danish landworks, it is assumed that 10% funds will be granted for road as well as railway construction works

*Table 7.1. The assumed TEN-funding to the Fehmarnbelt link*

<b>EUR million in current prices</b>	<b>Coast-to-coast link</b>	<b>Danish landworks</b>	<b>Total</b>
TEN funds	584	116	700

In November 2007, the coast-to-coast link across Fehmarnbelt was granted funds in the amount of EUR 339 million by the European Commission for the period 2007-2013, corresponding to approximately 25% of the estimated expenditure during the period.

## 8 RESULTS OF CALCULATIONS

Based on the assumptions for this analysis, the repayment period for the coast-to-coast link has been calculated at approximately 23 years. This is approximately 2 years less than what was concluded in the 2004 analysis. The result appears in table 8.1, including the expected effects of the changed assumptions in relation to the 2004 analysis.

Table 8.1. Changes in the expected repayment period for the Fehmarnbelt link

Year	Change in relation to the 2004 analysis	Expected repayment period
<b>Financial calculation 2004 of the coast-to-coast link</b>		<b>25</b>
Opening year 2018	-1	24
TEN funds	-1	23
Capital investments made by the state	<-1	23
Changed financial costs	-	23
Changed VAT assumptions	-1	22
Changed railway payment	+1	23
Corporate tax	<-1	23
<b>Financial calculation 2008 of coast-to-coast link</b>	<b>-2</b>	<b>23</b>
Assumed dividends for financing of Danish landworks	+3	26
<b>The Danish part of the Fehmarnbelt project</b>		<b>26</b>
The coast-to-coast link		<b>30</b>
Danish landworks		

If the development of the Danish landworks is financed via dividends paid by the company behind the coast-to-coast link, the latter can be expected to be repaid after approximately 26 years, ie approximately 3 years later. Based on these dividends, the development of the Danish landworks can be expected to be repaid approximately 30 years after the opening, ie approximately 4 years after the coast-to-coast link is expected to be clear of debts.

From table 8.1 it appears that the change of the opening year means a reduction of 1 year in repayment period as the traffic is expected to be higher in 2018 than in the

previously expected opening year of 2015 and thus higher during the entire operating period. Also, the changed calculation of TEN funds means a reduction of 1 year in the expected repayment period. The reduction of railway payments will lead to an extension of the repayment period of 1 year. The other changed assumptions are only expected to influence the expected repayment period by less than +/- 1 year.

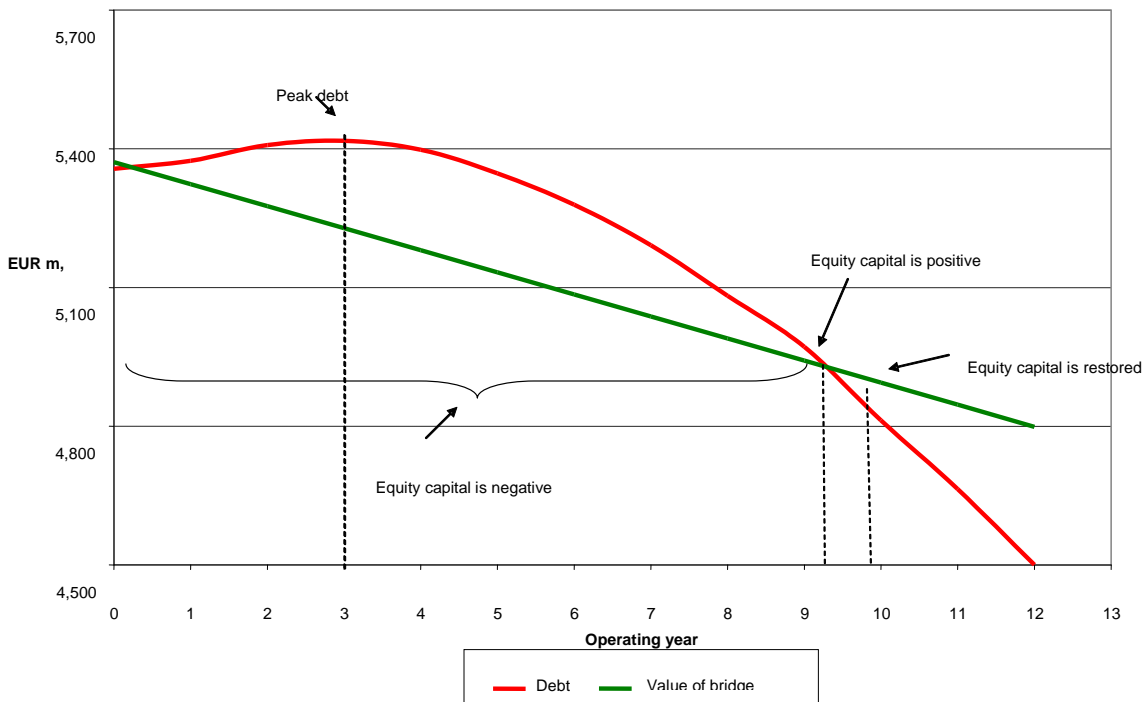
The effect of the changed assumptions in table 8.1 is calculated in the listed sequence and cannot be considered as partial effects compared to the 2004 analysis. This means that the overall change in repayment period is unchanged irrespective of the sequence of assumptions, but from an isolated perspective, the individual change in assumption may have another effect

The project company's debt is expected to reach its peak level in 2020, ie in the third operating year, when it is expected to amount to a little over EUR 5.4 billion.

Dividends paid by the project company are expected to start in 2027, ie in the 10th operating year when the company's equity capital has been restored.

The figure below illustrates the expected debt developments in the coast-to-coast link and i the company's equity capital

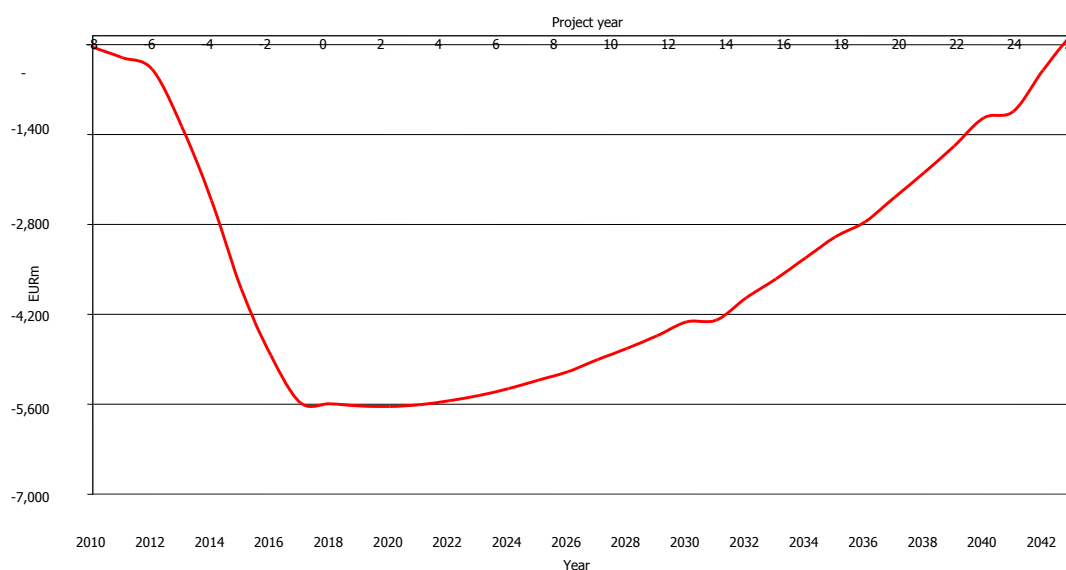
Figure 8.1. Debt developments and the value of the coast-to-coast link



Note: Value of the coast-to-coast link is depreciated on a straight-line basis by 1% annually.

Figure 8.1 illustrates that equity capital is expected to be positive at the beginning of operating year 9, and later that same year, equity capital will be restored. The assumption of dividend payments has thus been fulfilled, and dividends can be allocated on the approval of the accounts at the beginning of operating year 10. An illustration of the expected developments in debt for the entire project period in the coast-to-coast link appears from figure 8.2.

Figure 8.2. Expected debt developments in the coast-to-coast link



From figure 8.2 it appears that debts are expected to be largely unchanged for the first 5 operating years when it is expected to amount to approximately EUR 5.4 billion. After this, debts will be reduced year by year, and the coast-to-coast link is expected to be repaid after 26 years. The explanation for debts not being reduced every year is planned reinvestments.

## 9 SENSITIVITY ANALYSES

In order to assess the project's economic ability to withstand changes in key parameters, a number of sensitivity analyses have been made. The tables below show the repayment period expected for the coast-to-coast link and the development of the Danish landworks when changes are made to key parameters. The sensitivity analyses are based on the expectation that the coast-to-coast link will be clear of debts after

approximately 26 years and the Danish landworks after approximately 30 years, ie approximately 4 years after the coast-to-coast link is expected to be clear of debts.

The sensitivity analyses do not account for the probability of the actual development deviating from the key assumptions.

*Table 9.1: Sensitivity as a result of higher construction costs and changed real interest rates. (Repayment period stated in years for the coast-to-coast link and the Danish landworks)*

Assumptions in 2008 prices	TEN funds	Real interest rate		
		3 %	3.5 %	4 %
Construction costs (coast-to-coast):	10%/10%/10%	25/28	26/30	27/32
EUR 4.4 billion	15%/10%/10%	23/27	25/28	26/30
O & M costs: EUR 61 million annually	20%/20%/10%	22/25	23/26	25/28
Railway payments: EUR 47 million annually	25%/20%/10%	21/23	22/25	23/26

The above fund percentages indicate TEN funds granted to the coast-to-coast link, the Danish railway landworks and the Danish motorway landworks. The combination of TEN funds and real interest rates concur with the key assumptions.

The sensitivity analyses show that the expected repayment period for the coast-to-coast link is approximately 21 years when combining a low interest rate of 3% per year with high TEN funds of 25% to the coast-to-coast link, 20% to the railway landworks and 10% to the motorway landworks. The Danish landworks are expected to be repaid after 23 years, ie 2 years after the coast-to-coast link is expected to be clear of debts.

A combination of a high real interest rate of 4% per year and low TEN funds of 10% for all works results in an expected repayment period of 27 years for the coast-to-coast link and 32 years for the development of the Danish landworks.

The result of the calculated impact on the expected repayment period for the coast-to-coast link and the Danish landworks resulting from higher construction expenditure for the coast-to-coast link and changed real interest rates is shown in table 9.2.

Table 9.2: Sensitivity towards higher construction expenditure and changed real interest rate (Repayment period stated in years for the coast-to-coast link and the Danish landworks)

Assumptions in 2008 prices	Construction costs for the coast-to-coast link	Real interest rates		
		3 %	3.5 %	4 %
O & M costs.: EUR 61 million annually Railway payments: EUR 47 million annually	EUR 4.4 billion	25/28	26/30	27/32
	+ 15 %	28/32	30/36	32/40

The construction costs for the coast-to-coast link and real interest rates concur with the key assumptions. These assumptions include unaltered TEN funds in actual amounts, irrespective of construction costs.

If construction costs for the coast-to-coast link are 15% higher than the preliminary estimate of approximately EUR 4.4 billion (2008 prices), ie by EUR 5.1 billion, the expected repayment period for the coast-to-coast link at the assumed real interest rate of 3.5% per year will be prolonged by 4 years to 30 years, and as regards the development of the Danish landworks by 6 years to 36 years.

The result of the calculated impact on the expected repayment time for the coast-to-coast link and the Danish landworks resulting from lower revenues from the railway sector and a changed real interest rate is shown in table 9.3.

Table 9.3: Sensitivity towards reduced railway payments and changed real interest rates. (Repayment period stated in years for the coast-to-coast link and the Danish landworks)

Assumptions in 2008 prices	Annual railway payments	Real interest rates		
		3 %	3,5 %	4 %
Construction costs (coast-to-coast): EUR 4.4 billion O & M costs.: EUR 61 million annually	EUR 47 million	25/28	26/30	27/32
	- 25 %	26/30	27/32	29/35
	- 50 %	27/32	28/33	30/37

The combination of railway payments and real interest rates concur with the key assumptions.

If the coast-to-coast link receives less revenue from the railway than the assumed EUR 47 million annually (2008 prices), the expected repayment period for the coast to-coast link will be longer. If railway revenues are only half the amount of what was assumed,

ie EUR 23.5 million annually (2008 prices), the expected repayment period for the coast-to-coast link will be prolonged by 2 years up to 28 years, and for the Danish landworks by 3 years up to 33 years. Relatively speaking, the finances of the coast-to-coast link appear to be not particularly sensitive to changed railway payments.

The figures above only reflect sensitivity analyses for the coast-to-coast link, whereas the following sensitivity analyses show the repayment period for the project in the event that construction costs for the coast-to-coast link as well as for the Danish landworks are higher than expected.

*Table 9.4: Sensitivity towards higher construction costs for the coast-to-coast link and the Danish landworks and towards changed real interest rates (The repayment period stated in years for the coast-to-coast link and the Danish landworks)*

Construction costs for the coast-to-coast link 2008 prices	Construction costs for Danish landworks 2008 prices	Real interest rate		
		3 %	3.5 %	4 %
EUR 4.4 billion	EUR 1.0 billion	25/28	26/30	27/32
EUR 4.4 billion	EUR 1.4 billion	25/32	26/34	27/37
EUR 4.4 billion plus 15 %	EUR 1.0 billion	28/32	30/36	32/40
EUR 4.4 billion plus 15 %	EUR 1.4 billion	28/37	30/41	32/47

The combination of construction costs and real interest rates concur with the key assumptions.

Assumptions include unaltered TEN funds in actual amounts, irrespective of construction costs.

Table 9.4 shows that if the construction costs for the development of the Danish landworks increases from the estimated EUR 1.0 billion to EUR 1.4 billion, the expected repayment period will increase for the Danish landworks to 34 years at the key real interest rate assumptions.

If the construction costs for the coast-to-coast link increases by 15 % and the construction costs for the landworks rise by EUR 1.4 billion, the repayment time is expected to be 30 years for the coast-to-coast link and 41 years for the landworks. If the real interest rate is 4% per year for a 40-50-year-period, the expected repayment period is calculated to be 32 years for the coast-to-coast link and 47 years for the landworks.

## 10 CONCLUSION

Based on the assumptions of opening year, capital investments, corporate tax, VAT etc, the coast-to-coast link of the fixed link across Fehmarnbelt is expected to be clear of debts after approximately 23 years. If the development of the Danish landworks is financed via dividends paid by the company behind the coast-to-coast link, the link is expected to be clear of debts after approximately 26 years, and the Danish landworks after approximately 30 years, ie approximately 4 years after the coast-to-coast link is clear of its debts.

Compared to the financial analysis from 2004, the new calculations show a repayment period that has been reduced by 2 years for the coast-to-coast link. Furthermore, the new calculations show that if the development of the Danish landworks is financed via dividends paid by the company behind the coast-to-coast link, the expected repayment period for the coast-to-coast link will remain largely the same as set out in the 2004 analysis.

In summary, the sensitivity analyses show that the economy of the overall project is healthy.

## Appendix 1: General assumptions of the financial calculations

### *Construction costs (EUR million in fixed 2008 prices)*

Coast-to-coast link	4,400
Danish landworks	964

### *Construction costs (EUR million in current prices)*

Coast-to-coast link	5,154
Danish landworks	1,160

### Operating and maintenance costs.

Coast-to-coast link (EUR million in 2008 prices)	61
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Equity capital (EUR million 2008 prices)	67
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Real interest rate	3.5 % p.a.
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Inflation	2.5 % p.a.
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Discounting interest rate	6.1 % p.a.
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Depreciation: Historic acquisition cost depreciated on a straight-line basis over 100 yrs.

Repayment profile	Annuity
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Corporate tax (project company)	25 %
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Traffic growth rate for the first 25 operating years	1.7 % per year
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Guarantee commission	0.15 % p.a.
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"Ramp-up"-period – road traffic	4 yrs
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### *TEN funds (EUR million current prices)*

Coast-to-coast link	584 (11 %)
Danish landworks	116 (10 %)

Annual railway payment (EUR million in 2008 prices)	47
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Opening year	2018
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## Appendix 2: Assumptions of real interest rates

The calculations on a fixed link across Fehmarnbelt allow for assumptions of a real interest rate of 3.5 % per year. This is a considerably higher rate than the one realised by the existing bridge companies using the same financing model for the period 1988-2007. Below is a list of actual and budgeted real interest rates.

### A/S Øresund, Øresundsbro Konsortiet and A/S Storebælt; 1988-2007

	A/S Øresund		Øresundsbro Konsortiet		A/S Storebælt	
	<i>Actual real interest rate</i>	<i>Budgeted real interest rate</i>	<i>Actual real interest rate</i>	<i>Budgeted real interest rate</i>	<i>Actual real interest rate</i>	<i>Budgeted real interest rate</i>
	----- Pct. -----					
1988					2.9	5
1989					0.7	5
1990					5.5	5.5
1991	-	5	-	5	5.0	5
1992	-	5	-	5	6.0	5
1993	-	5	-	5	7.4	5
1994	4.4	4	3.9	4	5.5	5
1995	1.7	4	2.4	4	4.4	5
1996	-1.1	4	-1.8	4	0.5	4
1997	3.1	4	2.8	4	3.9	4
1998	2.6	4	2.1	4	3.6	4
1999	3.5	4	3.6	4	4.3	4
2000	2.1	4	1.7	4	2.3	4
2001	2.4	4	1.9	4	3.0	4
2002	1.6	4	1.7	4	1.6	4
2003	1.7	4	1.4	4	1.3	4
2004	2.2	4	1.8	4	2.4	4
2005	2.1	3.5	1.4	3.5	1.8	3.5
2006	2.1	3.5	1.9	3.5	2.0	3.5
2007	2.2	3.5	2.3	3.5	2.2	3.5
Avg.	2.1	n.a.	1.9	n.a.	3,0	n.a.

Source: Femern Bælt A/S

The average real interest rate in the existing bridge companies has not exceeded 3.0 % per year during the period up to 2007; ie for 20 years for A/S Storebælt, and 14 years for A/S Øresund and Øresundsbro Konsortiet. As the profitability analyses for the Fehmarnbelt fixed link stretch over a 30-40-year-period, the real interest rate is assumed to be 3.5 % per year.

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