

February 2016

**Financial analysis of
the Fehmarnbelt Fixed Link
including Danish landworks**

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1. Introduction and summary

In connection with the introduction of a bill on construction and operation of a fixed link across the Fehmarnbelt and associated landworks in Denmark in February 2015, Femern A/S presented a construction budget for the fixed link across the Fehmarnbelt of DKK 55.1 billion (2015 prices), including reserves of DKK 3.7 billion, equivalent to 7 per cent. A financial estimate based on that construction budget showed that the repayment time amounted to 39 years for the overall project.

The Construction Act was passed by the Danish Parliament on 28 April 2015. According to the legislative history of the Construction Act, a process to reduce construction costs had to be initiated to enable Femern A/S to present a re-evaluation of the overall project finances in the autumn of 2015. Against that background, Femern A/S undertook a new round of dialogue with the contractors for the four major construction contracts within the framework of the competitive dialogue to create a well-founded basis for reducing total construction costs and thus increasing reserves in the construction budget.

During the dialogue process with the bidding contractors stipulated in the Construction Act, a large number of technical and legal budgetary improvement measures were identified, discussed and priced. The analysis of the preliminary bids of 22 December 2014 and the subsequent dialogue with the contractors indicated that the earlier assumption of a 6½ year construction period was ambitious and in itself a contributory factor to the high cost of the bids. As a major element of reducing the bid prices, the construction period was therefore extended to 8½ years.

On 15 September 2015, as a result of the tender process, Femern A/S received the contractors' final and binding bids based on a construction period of 8½ years. This has made it possible to significantly increase the reserves in the construction budget if the best bids are accepted.

Femern A/S has performed a review of all major items in the construction budget. This comprises the four major construction contracts, for which the company has received final prices, and the contracts for electrical and mechanical installations as well as the railway in the tunnel. In addition, there are a number of minor contracts and the budget for the company's internal client organisation during the construction phase. This, in combination with the final and binding bids for the four major construction contracts, has created a high level of budgetary certainty in terms of the construction budget.

Subsequently, Femern A/S also performed analyses of the other parameters of the financial calculations other than the construction budget as such, which led to a number of assumptions in the analysis being updated.

The updates comprise:

- An updated construction budget for the coast-to-coast section, including the reserves
- An updated construction estimate for the Danish landworks
- An updated estimate of costs of operation, maintenance and reinvestment for the coast-to-coast section
- Revision of the assumptions concerning the timetable for the project
- Adjusting traffic revenue due to a revised timetable
- An updated estimate of the scale of EU funding
- Updating a number of technical assumptions

The key baseline assumptions in the financial analysis appear from Table 1 below.

Table 1: Baseline assumptions and repayment time for the overall Fehmarnbelt project (2015 prices)			
	Basis in the Construction Act, February 2015	Financial analysis, February 2016, on commencement of construction at the beginning of 2018 and opening in mid-2026	Financial analysis, February 2016, on commencement of construction at the beginning of 2020 and opening in mid-2028
Construction sum, coast-to-coast section	DKK 55.1 billion	DKK 52.2 billion	DKK 52.6 billion
- of which total reserve framework	DKK 3.7 billion	DKK 7.3 billion	DKK 7.3 billion
Construction sum, Danish landworks	DKK 9.5 billion	DKK 9.5 billion	DKK 9.5 billion
- of which total reserve framework	DKK 2.2 billion	DKK 2.2 billion	DKK 2.2 billion
Operation, maintenance and re-investment, coast-to-coast section	DKK 549 million p.a.	DKK 468 million p.a.	DKK 468 million p.a.
Operation, maintenance and re-investment, Danish landworks	DKK 239 million p.a.	DKK 239 million p.a.	DKK 239 million p.a.
Rail infrastructure payment	DKK 400 million p.a.	DKK 400 million p.a.	DKK 400 million p.a.
Traffic forecast	Fehmarnbelt Forecast 2014	Fehmarnbelt Forecast 2014	Fehmarnbelt Forecast 2014
Passenger car rates	DKK 494, including VAT	DKK 494, including VAT	DKK 494, including VAT
EU funding during the construction phase	18 per cent	10 per cent	10 per cent
- the coast-to-coast section	10 per cent	10 per cent	10 per cent
- Danish landworks			
Real interest rate	3.0 per cent p.a.	3.0 per cent p.a.	3.0 per cent p.a.
Commencement of construction ¹	Mid-2015	Beginning of 2018	Beginning of 2020
Construction period, coast-to-coast section	6½ years	8½ years	8½ years

¹ Construction work on the Danish landworks will commence in 2016.

Opening date ²	End of 2021	Mid-2026	Mid-2028
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On 2 October 2015, Reinhard Meyer, Minister of Transport for Schleswig-Holstein, announced that a final German plan approval can be expected in 2017 after a new full public hearing. To this should be added the risk of a judicial review with potential suspensive effect, which, according to Reinhard Meyer, may postpone the final approval until 2019. Given the status of the German plan approval procedure, the overall timetable for the Fehmarnbelt project is thus subject to uncertainty. The calculation is therefore based on the technical assumption of two different scenarios in the current situation: one in which construction commences at the beginning of 2018 and one in which it commences at the beginning of 2020. For both scenarios, the construction period is 8½ years. A sensitivity calculation has also been performed of the consequences of further delays due to the German plan approval procedure resulting in the final approval not being granted until 2022, cf. chapter 11.

On behalf of the Danish Ministry of Transport and Building, the professional services firm EY has performed external quality assurance of reserves and risks associated with the coast-to-coast section of the Fehmarnbelt project, including a review of the risk registers. According to EY's assessment, the reserve requirement for the coast-to-coast section should constitute DKK 7.3 billion. This estimate is assumed by the financial analysis. The reserves for the Danish landworks are stipulated at a total of DKK 2.2 billion, cf. Table 2 below.

The financial calculations show that the repayment time for the overall Fehmarnbelt project can be estimated at 36 years.

Table 2: Construction budget and reserves (2015 prices)			
	Basis in the Construction Act, February 2015	Financial analysis, February 2016, on commencement of construction at the beginning of 2018 and opening in mid-2026	Financial analysis, February 2016, on commencement of construction at the beginning of 2020 and opening in mid-2028
The coast-to-coast section			
- Baseline budget	DKK 51.4 billion	DKK 44.9 billion	DKK 45.3 billion
- Reserves	DKK 3.7 billion	DKK 7.3 billion	DKK 7.3 billion
Overall construction budget, coast-to-coast section ³	DKK 55.1 billion	DKK 52.2 billion	DKK 52.6 billion
Danish landworks			
- Baseline budget	DKK 7.3 billion	DKK 7.3 billion	DKK 7.3 billion
- Reserves	DKK 2.2 billion	DKK 2.2 billion	DKK 2.2 billion

² The Danish landworks will be completed on the Ringsted-Nykøbing Falster section in 2021, except for electrification, which will be completed in 2024. The Nykøbing Falster-Holeby section will be completed at the same time as the coast-to-coast section.

³ As a consequence of the baseline budget and reserve estimates, the financial analysis assumes that the full construction budget of DKK 55.1 billion in the Construction Act will not be fully used.

Overall construction budget, Danish landworks	DKK 9.5 billion	DKK 9.5 billion	DKK 9.5 billion
Repayment time⁴	39 years	36 years	36 years

The repayment time of 36 years includes repayment of all loans for the investment in both the coast-to-coast section (the tunnel) and the Danish landworks between Ringsted and Holeby near Rødby as well as the full operation and maintenance costs for the coast-to-coast section throughout this period and DKK 239 million per year for the operation and maintenance costs for the Danish landworks, which are assumed to be financed by the coast-to-coast section. The isolated repayment time for the coast-to-coast section without the Danish landworks can be estimated at between 25 and 26 years, depending on the assumed opening year.

⁴ Because of the higher baseline budget for the coast-to-coast section on commencement of construction in 2020, the repayment time in this scenario is higher than if construction commences in 2018, but when the figures are rounded, the repayment time will be 36 years in both scenarios.

2. Status of the project

2.1. Status of the tender process

On 22 December 2014, Femern A/S received provisional bids for the four major coast-to-coast tunnel contracts from the bidding contractor consortia that were previously prequalified to submit tenders for those contracts. The four major tunnel contracts comprise:

- Production, shipping, immersion and anchoring of Tunnel North
- Production, shipping, immersion and anchoring of Tunnel South
- Excavation of work harbours, the tunnel trench and land reclamation works
- Portal buildings, cut & cover tunnels and ramp structures for the road/railway on land

The priced provisional bids of 22 December 2014 were approx. DKK 8.9 billion higher than assumed in the company's previous construction estimate. On this basis, Femern A/S initiated an action plan to reduce the construction costs:⁵

- Conducting renewed dialogue negotiations with the contractors for the four major tunnel contracts with a view to finding improvements in the construction budget in relation to the bids received.
- Conducting an external review of budgetary certainty of the contracts for electrical and mechanical installations as well as the rail part, including the organisation and timetables of the contracts.
- Conducting a new review of all other significant budget items in the company, including its running costs and a number of major items of expenditure, such as VTS, environmental monitoring, etc.
- Adjustment of staff requirements in the client organisation.

In the first half of 2015, the company thus conducted a new round of dialogue with the bidders for the four major tunnel contracts with a view to identifying cost savings within the frameworks for the project, including the functionality of the tunnel as stipulated in the Construction Act for the Fehmarnbelt project. The dialogue round showed that it was possible to achieve budget improvements on the construction costs for the four major tunnel contracts without changing the basic functionality of the tunnel, including by the following measures in particular:

- Extending the construction period by 2 years from 6½ to 8½ years and thus being able to e.g. reduce the production apparatus during the construction period, including especially the tunnel element factory, and enabling the contractors to plan the different stages of the construction period more flexibly. The construction period was extended in view of the delay in the German railway landworks.
- Managing the risk of delays in the German plan approval through a combination of acceptance, suspension, postponement and cancellation.

⁵ Cf. press release of 17 February 2015 from the Danish Ministry of Transport: "Nyt anlægsbudget for Femern Bælt-projektet" (New construction budget for the Fehmarnbelt project).

Source: <http://www.trm.dk/da/nyheder/2015/nyt-anlaegsbudget-for-femern-baeltprojektet>

- New critical review of all technical requirements together with the contractors in the renewed dialogue phase in the spring of 2015, including e.g. regarding materials selection, the handling of large rocks, the working area at sea, the specific requirements for the workers' camps, etc.
- Division of the contract for excavation into operations before and after construction of the tunnel, respectively, and separation of the toll plaza from the four major contracts with a view to subsequent optimisation in line with technological advances in the area. Naturally, the estimated costs of the various components are in any case included in the calculations of the overall construction budget.
- New review of the risk distribution between the client and the contractor in collaboration with the company's legal advisers with a view to ensuring that the risk distribution is always clear and in compliance with common and known practice for major construction projects.
- It is not unusual for contractors to leave the keenest and most competitive bids for last in the competitive dialogue when final and binding prices are to be submitted. Hence, inviting final bids and final prices is a prerequisite for getting an accurate price estimate.

In May 2015, the political parties backing the project accepted a recommendation from Femern A/S to terminate the dialogue and request the contractors to submit their final bids. Accordingly, the company issued new instructions to the bidders on 15 June 2015, requesting the contractors to submit their final and binding bids to the company on 31 August 2015. In August 2015, the deadline for submission was extended to 15 September 2015.

The bid acceptance period for bids for the four major tunnel contracts was initially set to 6 months from receipt of the final bids. Given the latest information on the status of the German procedure known at the time, the company extended, for risk management purposes, the bid acceptance period by a further 2 months to a total of 8 months from receipt of the bids. The bid acceptance period will thus run until mid-May 2016, after which time the bids will expire, unless the contracts are signed or an extension of the period is otherwise ensured, cf. chapter 3 below.

On 15 September 2015, Femern A/S received the final bids for the four major tunnel contracts. All the prequalified bidding consortia submitted final bids, so the process has not so far caused any bidders to withdraw. The bids are currently being evaluated by Femern A/S and the company's advisers according to the chosen evaluation model in which price and quality (robustness) each has a weighting of 50 per cent.

The technical assessment is based on comprehensive and detailed tender documents from the bidders. Therefore, it is not currently possible to definitively identify the most favourable bids.

The preliminary assessment of the bids shows that it is possible to achieve considerable price reductions relative to the preliminary prices of 22 December 2014 on the four contracts. If the bids received for the four major tunnel contracts are accepted, it will be possible to increase the total reserve for the coast-to-coast section to approx. DKK 10 billion relative to the budget framework of the Construction Act. However, a more detailed assessment of the risks associated with the project shows that a reserve of DKK 7.3 billion is required, cf. EY's external quality assurance of reserves and risk distribution. Realisation of the above prices generally assumes that the best bids are accepted and that agreements can be concluded with the winning contractors for the individual main contracts before the bid acceptance period of the bids expires in mid-May 2016.

2.2. Status of German plan approval

After close consultation with the German authorities since the state treaty was signed in 2008, the overall application for German plan approval was submitted to LBV Kiel, the hearing and plan approval authority in Schleswig-Holstein, in October 2013. LBV Kiel then took over responsibility for the remaining plan approval procedure. At that time, the Ministry of Transport in Schleswig-Holstein estimated that the plan approval procedure would require a period of 1½ to 2 years with a view to granting the final plan approval in the summer of 2015 and commencing construction work immediately thereafter.⁶

When the plan approval authority had conducted a consistency and feasibility check, the application material was made publicly available in Schleswig-Holstein in the spring of 2014.

Around 3,100 objections and statements were submitted to the German hearing and plan approval authority LBV Kiel in connection with the public hearing in Schleswig-Holstein. The total number was lower than expected, but several of the objections turned out to be more complicated and comprehensive than expected. Femern A/S was able to submit draft responses totalling approx. 10,000 pages to all 3,100 objections and statements to LBV Kiel on 22 May 2015. The draft responses were prepared on the basis of continuous dialogue with LBV Kiel since the summer of 2014.

Based on the company's written responses to the objections, LBV Kiel held closed hearing meetings (Erörterungstermine) with the parties entitled to take part in the hearings in the period from July to November 2015. After completion of the closed hearing process, Femern A/S will be required to update the application material. LBV Kiel has stated that based on the adjustments and additions to the application material they will decide whether conducting a new full public hearing regarding the project application will be required or whether a limited hearing process will be sufficient.

⁶ Cf. press release of 18 October 2013 from the German Ministerium für Wirtschaft, Arbeit, Verkehr und Technologie: "Feste Fehmarn-beltquerung: Startschuss für das Planfeststellungsverfahren" (Fehmarnbelt Fixed Link: Launch of the German plan approval procedure). Source: http://www.schleswig-holstein.de/DE/Landesregierung/VI/Presse/PI/2013/131018_FBQ_Planfeststellungsverfahren.html

Facts: Nature of the German plan approval in relation to the Danish Construction Act

The German plan approval is granted by Landesbetrieb Straßenbau und Verkehr (LBV) in Kiel and constitutes a single, consolidated approval of the road and railway projects pursuant to the consolidation principles of relevant German legislation, since, pursuant to the provisions of the German Administrative Procedure Act, a client is not obliged under sectoral legislation to subsequently apply for multiple permits under separate cover.

This means that once the plan approval has gained legal force, and provided that no appeals concerning the final plan approval have been filed with LBV Kiel by the expiry of the appeal period (one month), construction work can commence.

The plan approval (construction permit) is equally an environmental approval, since the EIA, Natura 2000 impact assessments, assessments pertaining to the Water Framework Directive, and the assessment of strictly protected species, etc. will be sanctioned by granting of the construction permit.

The plan approval also comprises approval of the project's alignment on German territory, land use, the design of the immersed tunnel (cross section and longitudinal section), the design of road and railway infrastructure on land, worksite location and design, etc.

Where a Danish construction act usually requires a number of supplementary approvals and permits to be obtained pursuant to other Danish legislation (sectoral legislation), this is not required to the same extent in Germany. The German plan approval is thus in many respects more detailed and therefore also more comprehensive than the Danish Construction Act and the related EIA.

However, certain separate approvals will have to be obtained under German building legislation, e.g. of static calculations and the use of technical equipment and components that are not pre-approved according to German industry standards (DIN). As in Denmark, separate agreements will have to be concluded for navigational safety purposes, e.g. with navigation authorities on the marking of work sites at sea by buoys, before construction work at sea can commence. Femern A/S is in dialogue with the relevant German authorities about this, and these issues are not expected to cause delays to the process.

At a meeting on 2 October 2015 in Copenhagen with Hans Christian Schmidt, Danish Minister for Transport and Building, and the political parties behind the Fehmarnbelt project, Reinhard Meyer, Minister of Transport for Schleswig-Holstein, stated that the German plan approval is not expected to be granted until 2017.⁷ The approval may subsequently become the subject of legal proceedings, which may, according to Reinhard Meyer, postpone the final approval for another two years, if a German court decides that construction work must await the decision of the court.

On conclusion of a new process to involve the public, LBV Kiel will be able to make a decision on approval of the project, before granting the plan approval. The company is not aware of any major uncertainty as to whether plan approval for the project can be obtained, but solely as to the *timing* of the issue of approval.

The timetable for the German plan approval procedure is subject to uncertainty. Femern A/S is in dialogue with the relevant German authorities with a view to establishing a specific plan for the remaining part of the plan approval procedure, including the specific steps towards granting the approval in 2017.

⁷ Cf. press release of 2 October 2015 from the Danish Ministry of Transport and Building: "Reinhard Meyer orienterede Femern-forligskredsen om tysk myndighedsgodkendelse" (Reinhard Meyer briefed the political parties backing the Fehmarnbelt project about the German plan approval). Source: <http://www.trm.dk/da/nyheder/2015/reinhard-meyer-orienterede-femern-forligskredsen-om-tysk-myndighedsgodkendelse>

2.3. Status of the timetable

The final timetable for the Fehmarnbelt project depends primarily on the German plan approval procedure and the derived implications for the tender processes. In the light of Reinhard Meyer's announcements and the company's assessments, the financial analysis is based on the assumption that the final approval will be granted in the course of 2017. Calculations in this financial analysis are technically based on two different scenarios:

- If potential legal proceedings are not granted suspensive effect, construction work can commence at the beginning of 2018. Followed by a construction period of 8½ years, the fixed link can then be opened for traffic in mid-2026.
- If potential legal proceedings are granted suspensive effect, construction work cannot commence until the legal proceedings are resolved. It is assumed that the legal proceedings will be decided in 2019, and, if so, that construction work can commence at the beginning of 2020. Followed by a construction period of 8½ years, the fixed link can then be opened for traffic in mid-2028.

Management of the tender process and the Danish landworks is also considered in connection with determining the overall timetable, but this is also highly dependent on the duration of the German plan approval procedure.

At the current stage of the project it is not possible to determine a final and detailed timetable for the further course of the project. The above scenarios are not necessarily exhaustive. As part of risk limitation and as a precaution, a sensitivity calculation has been performed of the consequences for the repayment time in case of a further delay of the German plan approval until after 2020, cf. chapter 11.

3. Construction costs

3.1. The coast-to-coast section

Based on the bids received on 15 September 2015, Femern A/S has prepared an updated construction budget for the coast-to-coast section. In the table, the coast-to-coast project reserve is stipulated at the estimated DKK 7.3 billion, which is approx. DKK 3 billion below the overall budget framework in the Construction Act. The individual main items of the updated construction budget are outlined in Table 4 below.

Table 4: Updated construction budget for the coast-to-coast section, January 2016 (2015 prices)			
	Basis in the Construction Act, February 2015	Financial analysis, February 2016, on commencement of construction at the beginning of 2018 and opening in mid-2026	Financial analysis, February 2016, on commencement of construction at the beginning of 2020 and opening in mid-2028
Construction costs (major contracts) - the four major tunnel contracts - electrical and mechanical installations - the railway	DKK 42.0 billion	DKK 35.1 billion	DKK 35.1 billion
Minor contracts	DKK 3.8 billion	DKK 3.8 billion	DKK 3.8 billion
Consolidated construction costs	DKK 45.8 billion	DKK 38.9 billion	DKK 38.9 billion
Project preparation and client organisation 2009-2015/2017/2019	DKK 5.6 billion	DKK 6.0 billion	DKK 6.4 billion
Reserves	DKK 3.7 billion	DKK 7.3 billion	DKK 7.3 billion
Total costs	DKK 55.1 billion	DKK 52.2 billion	DKK 52.6 billion

Construction costs (major contracts) include the costs payable by the company to the contractors on the four major tunnel contracts and on the contracts for electrical and mechanical installations as well as the railway for building an immersed tunnel beneath the Fehmarnbelt. Minor contracts comprise a number of other construction activities coming under the client's responsibility, and activities that are the basis for execution of the major construction contracts and the project in general, cf. chapter 3.1.3 below. The budget for project preparation and client organisation comprises costs for own organisation and project preparation, cf. chapter 3.1.4 below, and is thus dependent on the total duration of the planning phase. The main part of the costs stated concern activities completed in the period 2009-2015.

In view of the uncertainty associated with the timetable, Femern A/S adjusted its workforce in September 2015, until more clarity can be gained regarding the timetable for the German procedure and commencement of the actual construction phase. The company shed 20 jobs and imposed a freeze on hiring, meaning that the recruitment of another 20 employees planned for the second half of 2015 was suspended. Overall, as a result of these measures, the number of employees in Femern A/S at the beginning of 2016

was reduced from the previously projected level of around 140 persons to a level of just over 100 persons. The reductions were implemented on the assumption that Femern A/S has the necessary capacity to perform the tasks projected with particular focus on the primary tasks concerning the tender processes and the German plan approval.

At the same time, Femern A/S launched a number of further measures to reduce the total costs of the company in the extended planning phase, including the sale or letting of properties and significant restriction of the use of external consultants in particular. The company's management monitors and assesses the use of resources on an ongoing basis in order to be able to make the necessary adjustments.

For the four major tunnel contracts, the construction cost budget is based on the final and binding bids received on 15 September 2015. For the other contracts, the budgetary basis is quality assured through a number of external reviews and – as regards the main contract for electrical and mechanical installations – an assessment of indicative bids. The client organisation costs and the company's running costs were analysed and quality assured by external consultants in the first half of 2015.

The construction budget is essentially based on extensive technical planning carried out over a number of years in collaboration with Danish and international experts and continuously optimised through reviews, dialogue with the bidding contractors and input from the Danish and German plan approval procedures, etc. The various main processes were completed in parallel to ensure the necessary coordination. Hence, the technical project that is to be carried out was carefully prepared. Furthermore, receipt of the final and binding bids on 15 September 2015 has established a high level of certainty regarding the price of most of the construction costs.

Accordingly, the overall construction budget of DKK 52.2-52.6 billion, including reserves of DKK 7.3 billion, is deemed to constitute a robust estimate.

3.1.1. The four major construction contracts

Given the process risk surrounding the German plan approval in particular, in the spring of 2015 Femern A/S sought to incorporate flexibility into the process for concluding the invitations to tender and into the four major construction contracts.

In collaboration with its legal advisers Kammeradvokaten (Legal Adviser to the Danish Government) and Plesner, and its engineering consultant Rambøll-Arup-TEC (RAT), Femern A/S has looked into whether clear legal guidelines can be introduced into the contracts for dealing with timescale uncertainties etc. in the German procedure as a basis for the tender documents submitted to the bidders on 15 June 2015. The objective was to find a model that gives Femern A/S a high level of flexibility with regard to the German plan approval procedure, while not leading to unnecessary price increases for the contractors that might be passed on to the bids and thus to Femern A/S.

Against this background, Femern A/S introduced a number of mechanisms to handle possible delays of the German plan approval procedure in the four major construction contracts based on the company's assessment of the expectations and the risk associated with the German procedure in the spring of 2015:

- Firstly, according to the tender conditions, the bidders must stand by their bids for eight months, i.e. until mid-May 2016.

- Secondly, Femern A/S is entitled under the contracts to postpone the start of construction by a year after signing of the contracts, in exchange for a fixed compensation of DKK 0.4 billion (in total for the four contracts).
- Thirdly, Femern A/S is entitled to suspend the works for another 365 days in exchange for compensating the contractors for documented costs incurred thereby.

By implication, the tender conditions of June 2015 are based on a timetable according to which work commences at the beginning of 2016, i.e. eight months from receipt of the bids in mid-September. It is not unusual that the bid acceptance period exceeds the assumed start date.

According to the contracts, the suspension may be "added" in terms of time to Femern A/S' right to postpone the start of the contracts by one year. Hence, if the right to postpone and the suspension option are both fully utilised, it is possible to postpone the start of the contract until 2018. Moreover, the timetable is structured such that the physical construction activities will start on the Danish side and not commence on the German side until about a year later. Accordingly, it will be possible to delay commencement of the construction activities on the German side until the first half of 2019 at the latest. But such a postponement will involve costs, cf. below.

But because of the continued uncertainty as to the date of the final German plan approval and Reinhard Meyer's announcements in particular, before a decision is made to sign the major tunnel contracts, it must be carefully considered whether the contracts' existing mechanisms to handle a delay of the German plan approval procedure are adequate, including whether commencement of construction can be postponed in a less expensive way.

In the autumn of 2015, Femern A/S therefore consulted with its legal advisers to identify a number of alternative models to retain the current bids for a longer period in a financially appropriate way, given the delays in Germany.

The following solution models have been identified for the work:

- Option to make an agreement with the bidders to extend the bid acceptance period for a longer period before the contracts have to be signed
- Option to make the contracts conditional so that they will not come into effect until the final German plan approval is expected to be available
- Option to make a contract with staggered start

In the assessment of the company's legal advisers, there are no legal obstacles preventing the solution models stated, as long as the relevant agreement with the bidders complies with the basic principles on equal treatment etc. under public procurement law. In any event, this will require that agreements on this can be made with the contractors before expiry of the current bid acceptance period in mid-May 2016, and there will also be a limit as to how long the current bids can be extended in a financially appropriate way. The option of cancelling the tender process and resuming it later is also analysed.

On 21 October 2015, the political parties backing the project authorised the company to begin discussions with the bidding consortia with a view to preparing an overall assessment of the costs, risk profile and timetable associated with the alternative models and recommending on that basis a specific model for the

continued handling of the bids. The cost estimate for the alternative models will include the direct compensation in connection with the making of an agreement as well as estimates of the amount of current compensation for any consequences of e.g. index adjustments.

Femern A/S works closely with the company's legal advisers at the individual stages of the tender process in order to ensure that there will be no subsequent basis for one or more bidders to raise claims against the company on grounds of procedure. But in general it cannot be ruled out that this may happen. It should be noted that until now none of the bidders on the four major tunnel contracts have chosen to withdraw from the process.

3.1.2. Electrical and mechanical installations and railway

As part of the company's action plan, both internal and external reviews of the contracts for electrical and mechanical installations as well as the railway contracts were conducted in the first half of 2015. The review of the contracts for electrical and mechanical installations was conducted by the German consultancy Maidl Tunnelconsultants, while the review of the railway contracts was conducted by the Swedish consultancy WSP.

Both reviews were basically conducted as expert rule of thumb reviews, in which the consultants initially assessed the technical design in the contracts and then went on to analyse whether the prices calculated by Femern A/S' consultants seem well-founded. The consultants also analysed the estimated prices in relation to known benchmark projects. Data concerning deliveries from subcontractors was also included in the analysis whenever significant and relevant.

As regards the railway contracts, a minor downward adjustment of the budgeted construction costs was made on the basis of the external review. Furthermore, minor additional costs were identified in connection with the extension of the construction phase to 8½ years, which may however be offset by adjustments and potential savings elsewhere in the contracts, meaning that the existing budget framework for the railway contracts can be kept.

As regards the electrical and mechanical installations, the external review led to a minor adjustment of the budgeted construction costs within the existing framework. Femern A/S also received indicative bids for the main contract for electrical and mechanical installations on 28 August 2015. Based on an analysis of the indicative bids, the company and its consultants believe that the construction estimate for the electrical and mechanical installations can be maintained.

For both contracts, a reserve will be required in view of the uncertainty, cf. the total reserves in Table 4.

3.1.3. Minor contracts

In addition to the four major tunnel contracts and the contracts for electrical and mechanical installations as well as the railway, the overall project comprises a number of other construction activities coming under the client's responsibility, and activities that are the basis for execution of the major construction contracts and the project in general. This includes e.g. insurance, certain preparatory work such as support and guard ships, the establishment of toll plazas, electricity and water supplies, facilities for customs and border control, safety systems, environmental monitoring, etc.

During the first half of 2015, Femern A/S, with contributions from the professional services firm EY, conducted a budget analysis of these cost groups, which are included in the construction budget with a total contract sum of DKK 3.8 billion (2015 prices).

The review of the budget items focused on analysing and testing the assumptions of the price estimates concerned to identify any special attention points. The review was based on the assumption that the project will be implemented in accordance with the present timetable with completion in December 2021. The budget items were subsequently reassessed based on a construction period of 8½ years.

The analysis concluded that, overall, the cost estimates were to budget. Some budget items were adjusted upwards in follow-up to the analysis, while others were adjusted downwards, leaving the total framework unchanged. Obviously, budgetary certainty in relation to the total framework will increase as the individual contracts are being concluded.

For those contracts, reserves will be required in view of the uncertainty, cf. the total reserves in Table 4.

3.1.4. Project preparation and client organisation

The budget for project preparation and client organisation primarily covers costs for the very extensive preparatory work, such as environmental investigations, geotechnical investigations, preparation of tender processes, drawing up of conceptual designs and application material for the authorities, etc., the majority of which have been incurred.

Looking forward, this budget item also includes costs for the tasks to be carried out by Femern A/S in the construction phase. This applies in particular to management and control of the contractors based on the specifications, conditions, environmental requirements, social clauses and milestones included in the tendered contracts. Furthermore, the organisation must be able to handle the implementation of comprehensive monitoring during the construction phase. Finally, costs of external client consultation and supervision during the construction phase are also included.

As part of the preparation of the company's expected transition from planning organisation to client organisation, a budget analysis of the internal organisation was conducted in terms of tasks, manpower and the use of consultants. The analysis was conducted by the Struensee & Co. consultancy in the first half of 2015 with particular focus on ensuring effective use of all resources over the construction period, given its extension from 6½ to 8½ years.

The company's operating budget was initially prepared on the assumption that the planning phase would last until 2016, followed by a construction phase of 6½ years. Based on the external analysis, a specific and substantiated assessment was conducted as regards the previous estimates of costs for the internal client organisation, external consultants and other major operating costs in an extended construction phase of 8½ years. Significant possibilities for optimisation and their assumptions were analysed and described with due regard to the fact that the company must provide efficient project management throughout the construction phase. This work also helps ensure that the funds added to the reserves from the four major contracts are not inadvertently offset by operating costs for a prolonged construction phase.

To this should be added costs for the company's client organisation in the extended planning and approval phase, which are currently estimated at approx. DKK 200 million per year, given the tasks the company is currently expecting to be required to perform over the next years. If construction work commences at the

beginning of 2018 or at the beginning of 2020, it is assumed that costs for the company's client organisation in the extended planning phase will be financed via the reserves. The company's management continuously assesses the possibilities of further streamlining operations in the extended planning phase, given the tasks the organisation has to perform.

In view of the uncertainty associated with the timetable, Femern A/S adjusted its workforce in September 2015, until more clarity can be gained regarding the timetable for the German procedure and commencement of the actual construction phase. In this connection, the company shed around 20 jobs and imposed a freeze on hiring, meaning that the recruitment of another 20 employees planned for the second half of 2015 was suspended. Overall, as a result of these measures, the number of employees in Femern A/S at the beginning of 2016 was reduced from the previously projected level of around 140 persons to a level of just over 100 persons. The reductions were implemented on the assumption that Femern A/S has the necessary capacity to implement the project with particular focus on the primary tasks concerning the tender processes and the German plan approval. At the same time, Femern A/S has launched a number of cost-containment measures, including the sale or letting of properties and significant restriction of the use of external consultants in particular.

Further organisational measures may be needed to ensure the necessary flexibility.

3.1.5. Reserves

The construction budget of DKK 55.1 billion (2015 prices) stipulated in the Construction Act comprised reserves totalling DKK 3.7 billion, corresponding to approx. 7 per cent. Receipt of the final bids for the four major tunnel contracts from the contractors makes it possible to increase these reserves to up to approx. DKK 10 billion, if the future work is based on the most competitive bids.

In October 2015, the political parties backing the Fehmarnbelt project decided to initiate external quality assurance of the construction risks and reserves of the Fehmarnbelt project, cf. the guidelines for "new construction budgeting for construction projects". The quality assurance was performed by the professional services firm EY on behalf of the Danish Ministry of Transport and Building when Femern A/S had received final bids for the major tunnel contracts from the bidding consortia.

The external quality assurance focused on four main questions. In the box below, the overall conclusion of EY's main report to the Ministry of Transport and Building is stated for each main question. Reference is made to www.trm.dk.

Facts: External quality assurance of reserves and risk	
Questions	Answers
1. How are the risks currently distributed among the client and the bidding consortia, and how were they distributed in connection with the tendering process at the end of 2014?	<p>112 risks were identified in the four major construction contracts (TUN, TUS, TDR and TPR) in August 2015.</p> <ul style="list-style-type: none"> • Nine of the 112 risks led to changes in the risk allocation between Femern A/S and the construction consortia from October 2014 to August 2015. • 12 of the 112 risks led to changes in Femern A/S' risk exposure, but without the risk being fully transferred from the consortia to Femern A/S or from Femern A/S to the contractor from October 2014 to August 2015. <p>In view of this assessment, it should be taken into account that only 10-15 per cent of the announced savings from October 2014 to August 2015 were due to changes in the risk distribution. The majority, corresponding to 85-90 per cent, of the announced savings were due to changes in the scope of the contract (fewer tasks) and in its timetable (delivery period extended by 2 years).</p>
2. Is the risk distribution equivalent to what is usual in construction contracts for major projects?	<p>The current risk distribution is recognisable in terms of both international standards (FIDIC) and other major international projects.</p> <p>In view of this assessment, it should be taken into account that the risk distribution in the future should be supported by an improved risk management process to ensure systematic coordination between contract management, the risk management of the project and its management and reporting processes.</p>
3. What risks will be associated with covering and are sufficient reserves available to cover additional costs arising from the German plan approval procedure and special conditions of the approval that may trigger additional costs, delays, etc. in the construction phase?	<p>Based on the weighting of the risks identified in connection with the German plan approval procedure, in EY's assessment it is highly likely that construction work can commence between mid-2018 and mid-2020.</p> <p>The analysis of the German plan approval procedure also shows the following:</p> <ul style="list-style-type: none"> • A considerable part (approx. 25 per cent) of Femern A/S' current reserves are linked to the German plan approval procedure. EY believes that as matters now stand it is not possible to identify significant new factors that are not already included in Femern A/S' current risk register. • The German plan approval procedure is still associated with a number of unknown factors, which impacts EY's estimate of the expected reserve requirement, cf. question 4.
4. What amount of reserves should the construction budget include based on the final bids?	<p>In view of the current stage of the Fehmarnbelt project, including, in particular, the fact that binding bids have been submitted for 75-80 per cent of the total construction sum, EY believes that:</p> <ul style="list-style-type: none"> • A reserve of minimum 15-20 per cent and using a P value of P80 will provide greater assurance that the reserve will be sufficient.

	<ul style="list-style-type: none">• A comparison with other benchmark projects indicates a reserve level in the range of 10-30 per cent. <p>The calculated reserve requirement is estimated at DKK 7.3 billion using the P80 value described. In popular terms, a reserve of the size stated will be sufficient in four out of five cases.</p> <p>In view of this assessment, it should be taken into account that a substantial part of the reserves derive specifically from the German plan approval procedure. The amount of reserves available for this is deemed to be adequate given the continued uncertainty surrounding the timescale until final approval.</p>
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Against the background of the external quality assurance of the reserve requirement performed by EY, Femern A/S has based the basic estimates in the financial analysis on a calculated reserve framework of DKK 7.3 billion.

Use of the reserve

The reserve comprises various risk groups that are determined individually, including:

- Client risks, i.e. typical execution risks in the construction phase, for which it would be more costly to let the contractors be liable. This applies to the risk of the contractors raising claims and e.g. the risk of severe frost causing the Fehmarnbelt to freeze over and construction work to be suspended. The risk of budget overruns on the contracts for which tenders have not yet been invited are also included in the list of client risks.
- The risk that unexpected claims for higher compensation, e.g. for the environmental impacts of the construction of the fixed link, will be raised in connection with the German plan approval procedure.
- Costs of the mechanisms to postpone commencement of construction work (the postponement and suspension mechanisms) that are included in the four major contracts.
- Costs of retaining the bids for the four major contracts as a result of the most recent information about the duration of the German plan approval procedure.

The basic method of determining the amount required to cover classic client risks in the construction phase consists in the company identifying and describing potential risks and their correlations, assessing the probability of each individual risk occurring and calculating the likely financial consequences thereof.

As part of the dialogue process with the contractors, which took place in the first half of 2015, a number of technical and legal optimisation measures were introduced in the four major tunnel contracts. Together with an extension of the construction phase from 6½ to 8½ years, in particular, these measures contributed to the bidding consortia's final and binding bids for the four major tunnel contracts being significantly below the price level stipulated in the Construction Act, cf. chapter 2.1. The technical measures include materials selection, the handling of large rocks, the working area at sea, the specific requirements for the camps for the workers, etc. The legal measures comprise adjustments to the risk distribution between the client and the contractor to ensure that this distribution is always clear and in compliance with common and known

practice for major construction projects. The company worked closely with its legal advisers in this process.

In connection with its external quality assurance of the risk distribution and reserves of the project, EY specifically investigated how the risks were distributed between the contractor and the client in relation to the first priced bids of 22 December 2014, how they were distributed in relation to the final bids of 15 September 2015, and whether such risk distribution is equivalent to what is usual in construction contracts for major projects. EY concluded that only 10-15 per cent of the overall reduction of the bid prices was due to changes in the risk distribution, and that the current risk distribution is recognisable in terms of both international standards (FIDIC) and other major international projects. Consequently, the bid price reduction was not achieved at the expense of Femern A/S assuming disproportionately great risks.

In addition to contributing to reducing the bid prices, the dialogue with the contractors and the optimisation measures introduced also resulted in a need to reassess the classic client risks in the construction phase and the allocation of reserves to cover those risks. Concurrently with the dialogue process, Femern A/S thus updated the company's risk register.

When calculating the amount required to cover client risks in the construction phase, the overall, updated risk register is quantified using so-called Monte Carlo simulations, which calculate, on the basis of probabilities and consequences, the total amount of reserves that should be set aside to handle such risks.

The amount set aside to cover client risks in the construction phase is a calculated framework amount indicating an average probability assessment of the amount of reserves the company can be expected to use. However, this does not necessarily mean that the framework amount calculated will be fully used.

Based on the Monte Carlo simulation, the reserve requirement within the construction budget to cover the risks identified by the company is estimated at DKK 7.3 billion at a confidence level of 80 per cent. A confidence level of 80 per cent in this context means that the probability that the final consumption of reserves will be within the framework of DKK 7.3 billion can be estimated at 80 per cent. In comparison, the estimated reserve requirement amounts to DKK 6.3 billion at a confidence level of 50 per cent.

Reserves for the Danish landworks

In addition to the reserves for the coast-to-coast section, the construction budget for the Danish landworks also includes reserves of DKK 2.2 billion.

Table 5 below shows the total reserves of the entire Fehmarnbelt project, including the Danish landworks.

Table 5: Total reserves of the Fehmarnbelt project (2015 prices)	
Overall reserves, coast-to-coast section	DKK 7.3 billion
Overall reserves, Danish landworks	DKK 2.2 billion
Total reserve framework for the Fehmarnbelt project	DKK 9.5 billion

3.2. The Danish landworks

On 21 March 2013, the government then in office (consisting of the Danish Social Democrats, the Danish Social-Liberal Party and the Socialist People's Party), the Liberal Party of Denmark, the Danish People's Party, Liberal Alliance and the Conservative People's Party concluded an agreement on a number of new initiatives in the transport area. In that connection it was decided e.g. to upgrade the railway landworks of the Fehmarnbelt Fixed Link by upgrading the Ringsted-Storstrøm Bridge and Orehoved railway section to south of Holeby to allow passenger trains to travel at 200 km/h on that section, with the exception of Næstved, Vordingborg and Nykøbing F stations. In connection with a new Storstrøm Bridge, train speeds of 200 km/h will thus be possible on the entire section between Copenhagen and Germany and 250 km/h between Copenhagen and Ringsted. It was also decided to establish a new dual-track bridge across Masnedsund east of the existing bridge, a passing track for 1,000 m long freight trains and a passenger station south of Holeby.

As regards the upgrading of the Danish road landworks, the agreement stipulated that the necessary environmental measures in terms of the fauna would only be implemented along motorway E47 between Sakskøbing and Rødbyhavn. The costs are estimated at just under DKK 10 million, including EIAs.

In a written briefing of the Transport Committee on 11 March 2015, the Danish Minister for Transport then in office informed the Committee about the decision to postpone the Ringsted-Femern railway project by minimum 1 year. As a result, the project has extended the six ongoing invitations to tender so that the awarding of contracts can be postponed until the spring of 2016, after which construction work can commence. In terms of time, the postponement means that with this rollout plan, construction can be completed in 2024, and everything except electrification in 2020.

This analysis is based on a variation of that plan. The upgrading of the Danish railway installations on the Ringsted to Nykøbing Falster section will be completed in 2021, except for electrification, which will be completed in 2024. The upgrading of the Nykøbing Falster to Holeby section will be established so that it is completed when the coast-to-coast section is opened in either 2026 or 2028. This rollout plan is referred to as the baseline scenario below.

The baseline scenario will reduce the travel time between Ringsted and Nykøbing Falster, partly as a result of the railway speed upgrade to 200 km/h, and may reduce the travel time to approx. 1 hour between Copenhagen and Nykøbing Falster when a new dual-track Storstrøm section has been established.

The Construction Act includes an estimate of the total construction costs for the Danish landworks of DKK 9.5 billion in 2015 prices. Banedanmark has subsequently made a number of programme adjustments and concluded an agreement on electrification of the section under the electrification programme. This has resulted in net savings relative to the overall construction budget of DKK 250 million.

On the other hand, this scenario entails additional costs, as the ongoing invitations to tender must be restructured and the project organisation must be maintained for more years, etc. Banedanmark has estimated the additional costs at DKK 236 million (excluding reserves) if the coast-to-coast section opens in 2026, and DKK 268 million (excluding reserves) if it opens in 2028.

As is the case for the coast-to-coast project, any additional costs are expected to be financed using the reserves. But as the additional costs of the landworks more or less offset the savings mentioned above,

Unofficial translation of the Danish version; "Finansiell analyse af Femern Bælt-forbindelsen inkl. danske land-anlæg, februar 2016"

30 per cent reserves will be left, whether the upgrade of the Nykøbing Falster to Holeby section is completed in 2026 or 2028.⁸

⁸ The exact figures are 30.2 per cent reserves on completion in 2026 and 29.7 per cent on completion in 2028.

4. Operation, maintenance and reinvestment

4.1. The coast-to-coast section

The annual costs of operation, maintenance and reinvestment after the opening of the fixed link make up a significant part of the overall project finances, including, in particular, the repayment time for the project.

In the financial analysis of November 2014, Femern A/S presented an estimate of the total annual costs of operation, maintenance and reinvestment for the coast-to-coast section of DKK 540 million (2014 prices), calculated as an annual average over the section's first 40 years of service. In 2015 prices, this corresponds to DKK 549 million per year, which amount was also included in the financial calculations as the basis for the Construction Act in February 2015.

The financial analysis of November 2014 shows that Femern A/S would review the anticipated costs, as a result of which adjustments might be made to the estimates provided. Accordingly, in the first half of 2015, Femern A/S analysed the expected maintenance and reinvestment costs. In collaboration with its engineering consultants Rambøll-Arup-TEC JV (RAT), Femern A/S conducted an analysis of the 25 largest items of the maintenance and reinvestment programmes, which make up around half of the total programme costs.

Based on the analysis, adjustments were made to the anticipated service life of a number of components. The reason is that according to experience from a number of other tunnels, including the Great Belt tunnel and the Limfjorden tunnel, due to technological advances, those components can be expected to have a longer service life before they need repairing or replacing. At the same time, the costs of several planned maintenance and reinvestment activities were updated following further analyses and comparisons with relevant benchmarks. In the future, the total estimate for operation, maintenance and reinvestment will be subjected to a new review, including of the interfaces between the individual items, which may lead to adjustments.

Table 6 below shows the estimated average annual costs of operation, maintenance and reinvestment, respectively, in the financial calculation in connection with the Construction Act of February 2015 and the updated estimate following the conducted analysis, respectively.

Table 6: Average annual costs of operation, maintenance and reinvestment (2015 prices)		
Estimated annual average in the link's first 40 years of service		
	Financial calculation as the basis for the Construction Act, February 2015	Financial analysis 2016, February 2016
Operation	DKK 249 million	DKK 249 million
Maintenance	DKK 131 million	DKK 116 million
Reinvestment	DKK 118 million	DKK 88 million
Unallocated budget	DKK 51 million	DKK 15 million
Total	DKK 549 million	DKK 468 million

Note: There will also be costs of operation, maintenance and reinvestment after the first 40 years of service. These costs will not affect the repayment time, but will be included in calculations of the annual surplus generated by the link once the debts have been cleared.

In accordance with the analysis conducted in 2015, the annual maintenance cost estimate was reduced from DKK 131 million to DKK 116 million, and the reinvestment costs were reduced from DKK 118 million to DKK 88 million. Because of the significantly higher level of accuracy achieved in the budget of anticipated costs, the added unallocated amount was reduced by DKK 36 million per year to a total of DKK 15 million per year.⁹ The company will conduct analyses of the maintenance activities on a continuous basis to ensure further budget certainty.

Femern A/S has started working on further clarifying and optimising its operating activity plans with a view to implementing the activities as cost-efficiently as possible after the opening of the link, including in the light of technological advances, practical operating experience from the fixed links across the Øresund and the Great Belt and the synergy potential, cf. the financial analysis of November 2014.

4.2. The Danish landworks

A separate operation and maintenance cost estimate was not prepared as part of the financial analyses of 2008 and 2011 and the construction estimate for the Danish landworks used in the analysis. The reason is that, at the time, it was assumed that ownership of the landworks would be transferred to Banedanmark on completion and that the costs of operation and maintenance as well as reinvestment in terms of the landworks would thus not have to be financed through traffic revenue from the coast-to-coast section.

An ownership model was subsequently drafted for the Danish railway landworks, which constituted the calculation basis for operation and maintenance. The model is based on divided ownership (exchange of real estate) with A/S Femern Landanlæg and Banedanmark each owning their own structures (railway line, including associated structures). Based on Banedanmark's and A/S Femern Landanlæg's contributions in the form of existing and new structures, respectively, ownership of the railway line will be defined for each party, reflecting the value of their respective contributions.

For now, it is assumed that Banedanmark's share will be approx. 20 per cent, while A/S Femern Landanlæg's share will be approx. 80 per cent. In view of this, Banedanmark will own 23 km of the section from Ringsted towards Rødby, while A/S Femern Landanlæg will own the remaining 92 km to Rødby – except for the Storstrøm Bridge. The final division of ownership will be determined when construction work is completed.

As infrastructure manager of the railway, Banedanmark will be responsible for all costs related to ordinary traffic operations, including costs related to capacity allocation and overall supervision, for the entire railway line. As regards maintenance and reinvestment, A/S Femern Landanlæg and Banedanmark are each obliged to pay costs for the part of the railway line under their ownership.

In 2014, Banedanmark conducted an analysis of the costs of maintenance and reinvestment for the entire Ringsted-Rødby section according to a 100 year scenario based on new signal technology, electrification,

⁹ In the financial calculations, reinvestment from the 40th year of operation onwards is evenly distributed over the period in terms of e.g. the uncertainty about the exact service life of the individual components, particularly in the light of expected technological advances, and the need to keep the tunnel open during replacement of major components and systems.

speed upgrading and service life of bridges. Based on this analysis, average annual costs were estimated at DKK 292 million (2014 prices) for the entire section. In reality, the costs will not be evenly distributed, as installations are often renewed e.g. every 10 years.

The costs will be distributed according to the exchange of real estate model of an estimated 80-20 per cent. This means that A/S Femern Landanlæg will pay an estimated share of 80 per cent of the costs, and Banedanmark will pay the remaining share. Thus, new costs of DKK 234 million per year (2014 prices) were included in the financial calculations of November 2014 for the Fehmarnbelt project. In connection with the updated financial calculations assumed in the Construction Act of February 2015, the costs were revalued to 2015 prices, amounting to DKK 239 million per year. There are no grounds for revising this amount.

As parts of the railway landworks will be completed some years before the coast-to-coast section, cf. the baseline scenario described in chapter 3.2, costs of operation and maintenance in the first year must be added for A/S Femern Landanlæg's section. It is assumed that no reinvestment is needed in the first years after completion of the new structure. For the period 2022-2024, i.e. before the Ringsted-Nykøbing Falster section has been electrified, the annual costs are estimated at DKK 50 million, and at DKK 66 million in the subsequent years when electrification has been completed. This means that additional costs of DKK 282 million will be incurred when the remaining structures are completed in 2026, compared to an amount of DKK 414 million, if they are completed in 2028.

Table 7: Costs of operation, maintenance and reinvestment, Danish landworks (2015 prices)

	Financial calculation as the basis for the Construction Act, February 2015	Financial analysis 2016, February 2016
Operation, maintenance and reinvestment	DKK 239 million p.a.	DKK 239 million p.a. ¹⁰

¹⁰ As described above, costs of operation and maintenance will be incurred in the period up until the opening of the coast-to-coast section in 2026/2028. These costs will amount to DKK 50 million per year in 2022-2024 and DKK 66 million per year in 2025-2026/2028.

5. Traffic revenue

5.1. Road revenue

Femern A/S presented a comprehensive traffic forecast for the fixed link across the Fehmarnbelt in November 2014.¹¹ The traffic forecast is based on the following data and body of knowledge:

- 1) Forecast for traffic trends for a fixed link across the Fehmarnbelt based on the FTC model, which is tailored to describe traffic trends in the Fehmarnbelt corridor. Calculated on the basis of two different scenarios.¹²
- 2) Forecast for traffic trends between Scandinavia and Continental Europe and specifically in the Fehmarnbelt corridor, prepared on the basis of the European Trans-Tools model.¹³
- 3) Analysis of the correlation between economic growth, trade, consumption and traffic growth, focusing on the key macroeconomic determinants of long-term traffic trends.¹⁴

The main forecast is the FTC forecast prepared by the German consultancy firms Intraplan and BVU. The FTC model was developed for the specific purpose of describing traffic on the Fehmarnbelt Fixed Link and is recognised by the Danish and German authorities. The FTC model represents the best traffic model available to describe traffic trends on a fixed link across the Fehmarnbelt at the time of preparing the forecast, while the purpose of the Trans-Tools model, which is the European Commission's traffic planning model, is to describe cross-border traffic trends in the EU. The Trans-Tools forecast report was prepared by Danish Tetraplan based on the Trans-Tools-model.

The analysis of the correlation between economic growth and traffic growth was prepared by the Centre for Economic and Business Research (CEBR) at Copenhagen Business School. The analysis assesses trends in key macroeconomic factors of significance to traffic trends for the Fehmarnbelt Fixed Link.

The Trans-Tools forecast indicates somewhat higher growth than the FTC forecast. However, the purpose of the Trans-Tools forecast and the CEBR report is to support and render probable the results of the FTC forecast rather than to underlie assessments of the project's financial robustness. The choice of the FTC forecast as the basis for the financial calculations indicates that Femern A/S has taken a conservative approach to traffic expectations for the fixed link by taking the most conservative analysis approach.

¹¹ "Trafikprognose for Femern Bælt-forbindelsen" (Traffic forecast for the Fehmarnbelt Fixed Link), Femern A/S, November 2014. Source: <http://www.femern.dk/material-folder/documents/2014-publikationer/trafikprognose-for-en-fast-forbindelse-over-femern-balt-2014.pdf>

¹² "Fehmarnbelt Forecast 2014 – update of the FTC-study of 2002", Intraplan Consult GmbH and BVU Beratergruppe Verkehr + Umwelt GmbH, November 2014. Source: <http://www.femern.dk/material-folder/documents/2014-publikationer/feh-marnbelt-forecast-2014.pdf>

¹³ "Forventet trafikudvikling i Femern-korridoren" (Expected traffic trends in the Fehmarnbelt corridor), Tetraplan, November 2014. Source: <http://www.femern.dk/material-folder/documents/2014-publikationer/tetra-plan-trans-tools-trafikudvikling-samt-appendix-1.pdf>

¹⁴ "Sammenhængen mellem økonomisk vækst og trafikvækst – en undersøgelse af mulige ændringer i fremtiden" (The relationship between economic growth and traffic growth – a study of possible changes in the future), Centre for Economic and Business Research, CBS, November 2014. Source: <http://www.femern.dk/material-folder/documents/2014-publikationer/sammenhengen-mellem-okonomisk-vakst-og-trafikvakst.pdf>

The FTC model includes two different scenarios based on two different sets of assumptions about future trends. One scenario is based on the assumptions used by the Danish Ministry of Transport about factors such as transport prices, socio-economic factors and infrastructure development. The other scenario is based on the assumptions used in the Bundesverkehrswegeplan (BVWP), which is the German government's official traffic plan.

The growth expectations of the German forecasts are slightly lower than the Danish expectations. On the other hand, the German forecasts assume slightly higher rates for lorries. The net financial impact of this is that the scenario based on the German forecasts results in higher revenue from the Fehmarnbelt Fixed Link. As a precautionary measure, the scenario based on the Danish forecasts is used as the baseline scenario in the traffic forecast.

Given the public debate in connection with public hearings, etc., Intraplan and BVU, the German experts behind the FTC forecast, prepared an addendum to the main forecast in February 2015, analysing a number of objections to the methodology as well as the assumptions of the analysis.¹⁵ The conclusion of the addendum is that there are no grounds for changing the FTC forecast of 2014.

In the autumn of 2015, the forecast was subjected to external quality assurance by the COWI consultancy group for the Danish Ministry of Transport and Building. COWI concludes that the traffic forecast provides a realistic road traffic assessment, that the assumptions are reasonable and that the models are on a par with professional traffic forecasting practice.

Facts: External quality assurance of the traffic forecast by the COWI consultancy group

The traffic forecast is a key element of the basis for decision for the Fehmarnbelt project. Therefore, in the autumn of 2015, COWI conducted external quality assurance of the traffic forecast for the Ministry of Transport and Building.

The quality assurance focuses on road traffic, as the revenue from that constitutes the main part of the future revenue following the opening of the link.

COWI's conclusions include the following:

- The traffic forecast provides a realistic assessment of the road traffic.
- The assumptions of the forecasts are reasonable.
- The forecast models are on a par with professional traffic forecasting practice.

Source: <http://www.trm.dk/da/nyheder/2015/trafikprognose-giver-et-realistisk-bud>

As a whole, the facts of the traffic forecast have been thoroughly checked and reviewed by independent bodies. Against that background, the forecast is deemed to constitute a reliable basis for assessments of future traffic on the fixed link across the Fehmarnbelt and therefore also of the traffic revenue that is a precondition of the profitability of the project. As far as possible, the forecast is based on a conservative

¹⁵ "Fehmarn Belt Forecast 2014 – Addendum", Intraplan Consult GmbH and BVU Beratergruppe Verkehr + Umwelt GmbH, February 2015. Source: <http://www.femern.com/material-folder/documents/2015-publications/fehmarbelt-forecast-2014addendum.pdf>

approach and the dynamic effects, i.e. traffic ensuing from the new opportunities offered by a fixed link, have consequently been factored into the forecast to a limited extent only. Hence, the estimated increase in traffic via the Fehmarnbelt, also referred to as the jump in traffic, does not include decidedly dynamic effects, but mainly consists in passenger car traffic redistributed from other routes and modes of transport.

Facts: Professor Wichmann Matthiessen's analysis of dynamic effects on the Fehmarnbelt Fixed Link

Infrastructure has the ability to create a new stage on which the development of society can take place. In the group covering the three southern Scandinavian links, the scene change involves potential dynamic effects. These effects are everything that happens around the link itself when the market and society change and adapt to new improved conditions.

The dynamic effects of the tunnel under the Fehmarnbelt will enhance the potential of cities on the international stage. This is about the development of functional, cross-border urban regions where new economies of scale can be established and new specialisations developed, with all that this implies in terms of new value growth.

The major cities in the Fehmarnbelt region are competing with strong regions, and it is important that we are well placed in the competition. When the distance between the big cities changes so dramatically as will be the case in connection with the construction of the tunnel under the Baltic Sea, new opportunities arise. The link entails the ability and opportunity to transform cities in the region and give them a stronger position on the world map.

With the tunnel under the Fehmarnbelt and the infrastructure upgrade on both sides of the link, the Nordic countries' main hub will be strengthened – specifically where European and the Scandinavian road and rail systems meet. In addition to a number of important ports, there is also Scandinavia's largest airport and international hub, Copenhagen Airport. The airport offers international accessibility to and from the area. When the tunnel opens, and the railway through eastern Denmark is upgraded, the airport's catchment area will be expanded. A larger catchment area brings the opportunity to expand the route network, so access to global markets and international destinations will increase further for the benefit of business and the public.

Northern Germany and the Øresund Region have a total of 8-10 million inhabitants, and building stronger links between the areas is certainly realistic. Reduced travel times between the metropolitan areas of Copenhagen-Malmö and Hamburg-Lübeck-Kiel offer great opportunities to develop and innovate in science and business collaborations, to exploit new economies of scale and ensure new specialisations.

As mentioned above, a successful project is not only about the new mega construction, but about everything that can happen around the link, about the new synergies and about capitalising on the new opportunities. In short, about optimising the dynamic effects.

"The Femarnbelt link will be a growth dynamo for the Baltic Sea Region", professor Christian Wichmann Matthiessen, University of Copenhagen, April 2015. Source: <http://www.femern.dk/material-folder/documents/2015-publikationer/notat-af-professor-christian-wichmann-matthiessen.pdf>

In connection with its external quality assurance of the traffic forecast, COWI noted that it is difficult to document the potential redistribution from the Great Belt to the Fehmarnbelt Fixed Link. Intraplan, which is one of the two German consultancy firms behind the traffic forecast, believes that the forecast redistri-

buton estimate is determined conservatively. Based on the uncertainty associated with the actual redistribution, sensitivity calculations were performed of the effect of higher and lower redistribution, respectively, than estimated in the forecast, cf. chapter 11.

Facts: Jump in traffic and ramp-up period

WHAT IS A JUMP IN TRAFFIC?

A jump in traffic is an increase in traffic on a given route/section as a result of new infrastructure or new transport options. A jump in traffic may arise, for example, if a fixed link replaces a ferry service, and it is attributable to two different dynamics¹⁶:

Redistributed traffic

The establishment of fixed links alters existing traffic patterns. Improved infrastructure and new fixed links in particular increase the accessibility of the route, causing some travellers, who previously opted for an alternative route, to opt for the fixed link. This means that a certain volume of the existing traffic will in effect be redistributed from other routes and other modes of traffic to the fixed link. In the analysis of traffic on the Fehmarnbelt Fixed Link, the traffic jump consists mainly of redistributed traffic. The Fehmarnbelt Fixed Link is expected to absorb some of the transit traffic between Scandinavia/eastern Denmark and Germany, which currently transits via the Great Belt Bridge, together with some of the traffic on the ferries in the western Baltic Sea, because some of the travellers will find it more attractive to use the fixed link. The prediction is thus that the link will relieve both the roads and the railways of the east-west traffic transiting Denmark.

New traffic

The establishment of fixed links also serves to generate new traffic because they extend the capacity of the transport system, reduce travel times and help to relieve any bottlenecks, among other factors. Studies of both the Great Belt and Øresund reveal that, overall, the opportunities afforded by fixed links lead to greater mobility. The reason for this is that individuals and companies undertake more journeys because it is easier, faster or more affordable to travel. This results in net traffic growth in the transport system as a whole. The Fehmarnbelt Fixed Link will have the immediate effect of causing the volume of traffic across the Fehmarnbelt to increase. For passenger traffic, the effect can be attributed mainly to a changed choice of route (90 per cent), changed transport mode, for passenger traffic mainly in relation to air traffic (7 per cent) and finally to new traffic, which constitutes about 3 per cent of the jump in traffic on the Fehmarnbelt Fixed Link.¹⁷ In its external quality assurance of the traffic forecast, COWI points out that gains from new traffic and the dynamic effects achieved after the opening of the Fehmarnbelt Fixed Link may have been underestimated. A new fixed link may thus have some positive dynamic effects on mobility in society in the long term. Such effects are rarely included in mathematical traffic models, and they have consequently been estimated conservatively.

WHAT IS A RAMP-UP PERIOD?

When new infrastructure opens, it may take time before traffic patterns adapt to the new transport options. The FTC model therefore works on the assumption of a phase-in period of three years for the Fehmarnbelt Fixed Link, meaning that the jump in traffic will not be fully phased in until the fourth year of operation. This allows for the fact that travellers may need to get used to using the new option. These three years are thus regarded as a transitional – or ramp-up – period. Hence, the financial analysis anticipates that the jump in traffic will not take full effect immediately after the link opens, but that traffic will gradually adapt to the new transport options. It is assumed that the jump in traffic for cars will be realised by approx. 70 per cent in the first year, 85 per cent in the second year and 95 per

¹⁶ "Trafiksprung" (Jump in traffic), article in the periodical Trafik & veje (Traffic and roads) – August 2013, research assistant Christian Twitchett and postdoc Morten Skou Nicolaisen, Department of Development and Planning, Aalborg University. Source: <http://asp.vejtid.dk/Artikler/2013/08%5C6664.pdf>

¹⁷"Fehmarnbelt Forecast 2014", ITP and BVU, November 2014, page 140

cent in the third year. For lorries, the jump in traffic will be realised by 90 per cent in the first year, 93.4 per cent in the next year and 96.7 per cent in the third year. It is assumed that the jump in traffic will be fully phased in for both cars and lorries as from the fourth year of operation. There is no ramp-up effect for buses and trains.

A significantly lower jump in traffic is expected for lorry traffic than for passenger cars. As the rate for lorries to use the fixed link will be about four times higher, cf. below, even a limited increase in the jump in traffic for lorries may cause the expected revenue to exceed the projected level by a significant amount.

Consequences of a change in the opening date

The traffic forecast of November 2014 was based on the assumption that the first full year of operation of the fixed link would be 2022. Given the uncertainty associated with the final timetable for the Fehmarnbelt project, calculations were made of the traffic impact of postponing the opening to mid-2026 and mid-2028, respectively. Hence, all calculations are still based on the same traffic forecast, except that the opening date has been adjusted.

In connection with the adjustment of the opening date, all input parameters of the traffic forecast, i.e. assumptions concerning economic growth, car ownership, choice of route, etc. remain unchanged, while the increase in traffic via the Fehmarnbelt and the associated phasing-in period has been postponed to the new opening date in mid-2026/mid-2028.

The calculated traffic impact of postponing the opening year is shown in Tables 8 and 9 below.

Table 8: Road traffic when opening in mid-2026					
Annual daily traffic	2013 ¹⁾	2027 ²⁾	2030 ³⁾	2040	2051 ⁴⁾
Passenger cars	4,216	9,304	10,321	11,863	13,214
<i>Compared with opening at the beginning of 2022</i>	0	-441	0	0	+438
Lorries	1,102	1,663	1,737	1,953	2,186
<i>Compared with opening at the beginning of 2022</i>	0	-8	0	0	+82

1) The traffic volume stated is the actual traffic volume on the Rødby-Puttgarden ferry service as compiled and published by Statistics Denmark.

2) First full year of operation, in which the full traffic impact of the Fehmarnbelt Fixed Link is not factored in due to the ramp-up effect.

3) First year after full phasing-in of the calculated jump in traffic.

4) As a precautionary measure, the analysis assumes zero growth in traffic after the 25th year of operation. After 2051, road traffic is thus assumed to be unchanged.

Table 9: Road traffic when opening in mid-2028					
Annual daily traffic	2013 ¹⁾	2029 ²⁾	2032 ³⁾	2042	2053 ⁴⁾
Passenger cars	4,216	9,682	10,633	12,140	13,386
<i>Compared with opening at the beginning of 2022</i>	0	-447	0	0	+611
Lorries	1,102	1,710	1,778	1,995	2,219

<i>Compared with opening at the beginning of 2022</i>	0	-5	0	0	+115
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1) The traffic volume stated is the actual traffic volume on the Rødby-Puttgarden ferry service as compiled and published by Statistics Denmark.

2) First full year of operation, in which the full traffic impact of the Fehmarnbelt Fixed Link is not factored in due to the ramp-up effect.

3) First year after full phasing-in of the calculated jump in traffic.

4) As a precautionary measure, the analysis assumes zero growth in traffic after the 25th year of operation. After 2053, road traffic is thus assumed to be unchanged.

The same traffic forecast is used as the basis for the 2022, 2026 and 2028 opening scenarios. Tables 8 and 9 show that road traffic in both the 2026 and 2028 scenarios is lower in the first full year of operation (2027 and 2029) compared with the same year in the scenario where the opening is at the beginning of 2022. This is because 2027 and 2029 are the sixth and eighth full year of operation, respectively, in the 2022 scenario. Accordingly, traffic volumes in the individual years are not directly comparable across the scenarios.

In the first year after full phasing-in of the calculated traffic increase via the Fehmarnbelt, the traffic volume in both scenarios is at the same level as in the 2022 scenario. The same applies for the next 25 years up until 2051 and 2053, respectively, after which the analysis assumes zero growth in traffic as a precautionary measure. Accordingly, traffic volumes in the intervening years are identical across the scenarios. This means that following the ramp-up period, the forecasts for e.g. the 6th or 15th year of operation show exactly the same volume of traffic. Hence, the traffic forecast is generally unaffected by the year of opening.

As a precautionary measure, however, the analysis assumes zero growth in traffic after the 25th year of operation. As the 26th year of operation in the scenarios with the opening in 2026/2028 is 4/6 years later than assumed in the previous financial calculations, traffic volumes in the later opening scenarios at that time are higher. The reason is that traffic growth in the 2026 and 2028 scenarios are assumed to stop 4 and 6 years later, respectively, than in the 2022 scenario. This increased volume later in the period more than offsets the lower traffic volumes at the beginning of the period. Accordingly, the postponement of the opening year has an overall positive effect on traffic volumes for the period as a whole, thereby increasing revenue and, viewed in isolation, reducing the repayment time.

5.2. Assumed rates for road traffic

Table 10 below indicates the rates assumed in the financial analysis for using the fixed link. The Danish Minister for Transport and Building is expected to determine the final rates just before the opening of the fixed link. Therefore, the rates indicated are technical assumptions.

In connection with the financial calculation assumed in the Construction Act, the basis for rates was extrapolated to 2015 prices, as indicated in Table 10 below.

Table 10: Assumed rates for road traffic			
<i>Rates including VAT</i>	Financial analysis 2014, November 2014 (2014 prices)	Financial calculation as the basis for the Construction Act, February 2015 (2015 prices)	Financial analysis 2016, February 2016 (2015 prices)
Passenger cars	DKK 484	DKK 494	DKK 494

Lorries	DKK 2,059	DKK 2,092	DKK 2,092
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If the rates set are lower than indicated in Table 10, this would, all things being equal, lead to more traffic on the fixed link than assumed in the financial calculations, while higher rates, all things being equal, would lead to less traffic than anticipated, cf. the traffic forecast.

As a precautionary measure, one common rate is assumed for all passenger cars without any of the commercial discount schemes that are provided by other operators, including on the fixed links across the Great Belt and Øresund. Hence, the impact of special discount schemes for passenger cars such as one-day tickets, weekend tickets, commuter discounts, etc. are not factored in. Similarly, the normally higher rates for caravans, trailers and mobile homes are not factored in.

The financial analysis assumes that rates will be constant measured in fixed prices, meaning that rates will only be adjusted with inflation, and thus follow the general movement of prices in society.

Reference is made to chapter 11 on sensitivity calculations with calculations of e.g. the impact of introducing a more differentiated rate structure on the fixed link, as exemplified by the Great Belt and Øresund links. Furthermore, a scenario has been analysed in which the Rødby-Puttgarden ferry service continues with departures every half hour, combined with offering of shopping tickets at a 25 per cent discount for both the ferry service and the fixed link between Rødby and Puttgarden.

For lorries, the scenario assumes an average rate of DKK 2,092 (2015 prices), including VAT.

The assumed average lorry rate is based on Scandlines' list prices for various lorry types for the Rødby-Puttgarden ferry service in 2014, extrapolated to 2015 price level. In addition to the list price itself, a number of discounts and variable additional charges are also available, including e.g. a fuel adjustment factor, so Scandlines' list prices are not directly comparable with the fixed link rates.

In order to calculate an average rate for using the fixed link, knowing the distribution of traffic on lorry types is necessary, but Statistics Denmark's compilation of traffic on the Rødby-Puttgarden ferry service only breaks down the data on lorry types up to and including June 2002. The distribution in 2014 was estimated on the basis of traffic distribution trends up to June 2002 as well as consultations with the market and selected hauliers.

Given the estimated distribution, an average crossing price has been calculated, amounting to EUR 267 (2014 prices), including the fuel adjustment factor and excluding VAT, or DKK 1,989, excluding VAT. VAT of 19.0 per cent has then been added to this average rate, while a discount of 13 per cent has been deducted, which is the maximum discount permitted within the framework of the Eurovignette Directive.¹⁸

The average VAT rate is assumed to be 19,0 per cent, as it is technically assumed that Danish VAT (25 per cent) will be charged in Danish territory and waters and in the Danish Exclusive Economic Zone, that

¹⁸ The rate for lorries to use the fixed link is subject to the Eurovignette Directive, so the maximum discount that can be given is 13 per cent. As a precautionary measure, the analysis assumes that the discount is given to all lorries using the fixed link. The Eurovignette Directive does not cover ferries, which is why ferry companies can set their own discounts for hauliers.

German VAT (19 per cent) will be charged in German territory and waters and that no VAT will be charged in the German Exclusive Economic Zone.

The financial analysis assumes that rates will be constant measured in fixed prices, i.e. the rates will only be adjusted with inflation, and thus follow the general movement of prices in society.

5.3. Railway revenue

The specific rate model for the collection of infrastructure charges in connection with the rail operators' use of the Fehmarnbelt Fixed Link will be determined by the Danish Minister for Transport and Building. Revenue from the railway part of the fixed link was previously calculated on the basis of the value of rail operators' direct savings from using the Fehmarnbelt Fixed Link rather than the approx. 160 km longer route via the fixed link across the Great Belt. These savings consist in time savings, saved infrastructure charges and lower operating costs as a result of fewer kilometres travelled. The value of time savings for passengers and freight is not included in the rail infrastructure payment, which could thus be higher than by solely including the rail operators' direct savings from using the Fehmarnbelt Fixed Link rather than the 160 km longer route via the fixed link across the Great Belt.

Against this background, a rail infrastructure payment of around DKK 400 million per year (2015 prices) is assumed. The specific rate model is to be determined before the opening of the fixed link.

6. EU funding

6.1. The coast-to-coast section

As of 31 July 2015, the EU Connecting Europe Facility (CEF) granted funding of EUR 589 million, corresponding to approx. DKK 4.4 billion, to the coast-to-coast section of the Fehmarnbelt Fixed Link for the period 2016-2019. The financial calculations forming the basis for the Construction Act in February 2015, assumed that the coast-to-coast section would receive a total of DKK 9.5 billion over the entire construction period. Consequently, prior to the implementation of the next round of funding in the current funding period, with effect for 2020, and the establishment of a new funding programme for the coming EU budget period 2021-2027, there is a shortfall of just over DKK 5 billion compared with the previously assumed total funding level. The funding granted is based on the previous assumption that construction would commence in 2015 and that the construction period would be 6½ years, cf. the Danish Ministry of Transport's application for EU funding of February 2015.

The funding to the Fehmarnbelt Fixed Link was granted according to guidelines from the European Commission stipulating that the project would be granted the maximum funding of 40 per cent of the costs of railway-related construction facilities (which constitute 51 per cent of the total construction costs), and no funding would be granted for the road-related costs (49 per cent of the construction costs), corresponding to an average of around 20 per cent of the construction costs in the funding period 2016-2019. The financial calculations forming the basis for the Construction Act assumed funding in the amount of 18 per cent of the total costs throughout the construction period.

The principle of the funding decision is that the amount of approx. DKK 4.4 billion is set aside for the Fehmarnbelt Fixed Link in the period 2016-2019, but that the funds will not be paid out until the company is able to document that costs eligible for funding have been incurred and a number of milestones achieved. Hence, payment of the funding is linked to project progress.

Following submission of the application for EU funding, it was decided to extend the construction period to 8½ years. The financial analysis assumes that the capital expenditure and thus the construction period of 8½ years are postponed for commencement at the beginning of either 2018, with the fixed link opening in mid-2026, or at the beginning of 2020, with the fixed link opening in mid-2028, cf. chapter 2.3.

The uncertainty about the timetable will affect project progress and thereby the proportion of the funding granted for the period 2016-2019 that may be used. The Danish Ministry of Transport and Building is in close and constructive dialogue with the European Commission regarding the handling of the issue. In connection with the drafting of the formal Grant Agreement, the estimated level of eligible costs in the period 2016-2019 was structured so as to ensure that the current funding commitment may be fully used. An outlet profile was prepared for the construction costs in the Grant Agreement on the technical assumption that construction will commence in 2017. The Grant Agreement assumes that no eligible costs will be incurred in 2016. Under those assumptions, a calculation can be made to the effect that for the period 2017-2019, eligible costs may be incurred for railway-related activities in the amount of approx. DKK 11.2 billion and funding of approx. DKK 4.4 billion may be obtained (both figures are in current prices). The calculations are based on the company's current expectations in terms of the actual expenditure cycle year by year in the construction period. The Grant Agreement was officially concluded on 30 November 2015.

At the present time, there is some uncertainty about when the construction period may actually start and whether cycles other than the currently known expenditure cycle may occur in the construction phase, including e.g. advanced start of certain activities. Furthermore, there is the question of whether the funding allocation period will be extended, as has been the case in connection with previous agreements on EU funding. Against this backdrop, the calculation is deemed to be a broad forecast capable of dealing with any changes.

Femern A/S and the Danish Ministry of Transport and Building are in ongoing dialogue with the Commission concerning the specific use of the funding granted, including the construction work timetable and the funding opportunities for 2020 onwards.

Danish Minister for Transport and Building Hans Christian Schmidt met EU Transport Commissioner Violeta Bulc on 10 September 2015 to discuss EU funding for the Fehmarnbelt project, among other subjects. At the meeting, the Commissioner affirmed that the project is among the most important European infrastructure projects and stated that she was ready to make a written declaration about the prospects for further funding.¹⁹

In her letter of 16 October 2015, Commissioner Bulc pointed out that as one of five major cross-border projects in the European TEN-T network the Fehmarnbelt Fixed Link is considered a top priority project. The Commissioner also stated that the Commission expects to launch a new application round in 2018, focusing on the top priority projects, and that the Fehmarnbelt Fixed Link is definitely among the projects that will be eligible to receive further funding in that connection.

The European Commission has stated its intention to implement a mid-term evaluation of the projects receiving funding by the end of 2017. In the previous funding periods, it was probably more the rule than the exception that less money than assumed was paid due to delays in the projects eligible for funding. With the return of unused funds after the mid-term evaluation, the framework for the expected allocation of funding later in the period may thus well be significant.

In relation to the construction costs that are assumed to be incurred from 2021 onwards according to the revised plans for the construction phase, applications for funding must be submitted in connection with the next EU budget period (2021-2027). So far, the Commission has not announced any financial frameworks or similar concerning future funding periods. The primary aim of the Commission's objectives of upgrading the trans-European transport network is that it should be upgraded by 2030, so it is highly likely that a future funding programme will be launched for the period from 2021 onwards. Femern A/S still believes that in the period to come, the project will also be eligible for funding of the same order of magnitude as before, and there are no indications from official sources to suggest otherwise. But in view of the basic uncertainty about the overall financial framework for a coming funding period, caution was exercised when estimating the funding allocation for that period.

Given the uncertainty about the total funding allocated on the one hand, and the Commission's positive statements about the possibilities of obtaining further funding for the project on the other, the financial calculations assume that the coast-to-coast section will receive EU funding corresponding to 10 per cent

¹⁹ Cf. press release of 10 September 2015 from the Danish Ministry of Transport and Building: "Hans Christian Schmidt mødte konstruktiv EU-kommissær" (Hans Christian Schmidt in constructive meeting with EU Commissioner). Source: <http://www.trm.dk/da/nyheder/2015/hans-christian-schmidt-mdte-konstruktiv-eukommissr>

of the construction costs throughout the construction period rather than the previously assumed 18 per cent. The funding allocated for 2016-19 constitutes approx. 20 per cent of the eligible costs in the allocation period 2016-2019.

As a precautionary measure, the assumed funding of 10 per cent in the construction phase is applied in the financial analysis, but applications for future EU funding for the project will seek to ensure maximum funding.

6.2. The Danish landworks

In line with the application for funding for the coast-to-coast section, applications for funding for the construction of the Danish landworks were also submitted. Thus, in February 2015, an application was submitted for the maximum funding of 30 per cent of the construction costs, equivalent to approx. DKK 2.1 billion. However, no funding was allocated to the Danish landworks in connection with the distribution of funding for the period 2016-2019.

The European Commission has given a positive evaluation of the application for funding for the Danish landworks, but informal statements indicate that for practical reasons, the Commission has initially chosen to focus on the coast-to-coast section and therefore not to allocate funding for the landworks. Consequently, it does not seem unlikely that the landworks may receive funding in one or more later application rounds. Against this background, the financial analysis continues to assume that the Danish landworks will receive EU funding in the amount of 10 per cent of the construction costs over the entire construction period.

6.3. Assumptions concerning EU funding in the construction phase

Table 11.1 below indicates the total assumed EU funding in the construction phase.

Table 11.1: Assumed EU funding in the construction phase (per cent of the total costs)			
	Financial analysis 2014, November 2014	Financial calculation as the basis for the Construction Act, February 2015	Financial analysis 2016, February 2016
The coast-to-coast section	18 per cent	18 per cent	10 per cent
The Danish railway landworks	10 per cent	10 per cent	10 per cent

Table 11.1 shows that as a precautionary measure, the assumptions concerning total EU funding in the construction period have been adjusted downwards since the previous financial analysis. However, applications for maximum funding will continue to be submitted in connection with future funding rounds.

The calculation of the scale of total EU funding is based on the assumption that drawdown on the reserves set aside for both the coast-to-coast section and the Danish landworks will constitute eligible costs that will receive the same funding as other costs.

In case of a full drawdown on the reserves set aside for the coast-to-coast section of DKK 7.3 billion, total funding of approx. DKK 5.0 billion is assumed.

In case of a full drawdown on the reserves set aside for the Danish landworks, utilising the total reserve framework of DKK 2.2 billion, total funding of approx. DKK 0.9 billion is assumed.

In addition, the coast-to-coast section received EU funding of around DKK 1.5 billion in the planning phase and for the preparatory construction activities. The Danish landworks previously received funding of approx. 0.3 billion for the planning phase.

Table 11.2: Assumed EU funding in the construction phase (2015 prices)		
	Financial analysis, February 2016, on commencement of construction at the beginning of 2018 and opening in mid-2026	Financial analysis, February 2016, on commencement of construction at the beginning of 2020 and opening in mid-2028
The coast-to-coast section - full drawdown on reserves	DKK 5.0 billion	DKK 5.0 billion
The Danish landworks - full drawdown on reserves	DKK 0.9 billion	DKK 0.9 billion
Total EU funding during the construction phase - full drawdown on reserves	DKK 5.8 billion	DKK 5.8 billion

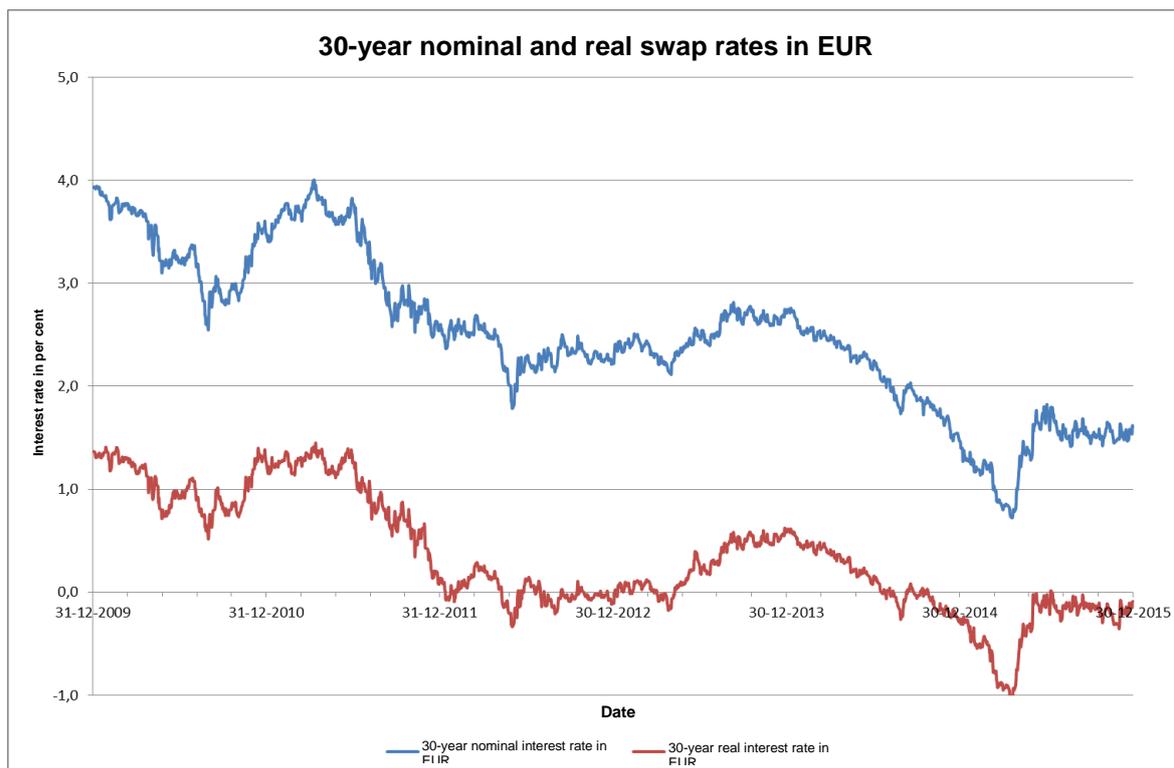
Note: There is some variation in the exact funding amounts between the time scenarios. However, this variation is quite limited and, when rounded, the figures are the same in each time scenario. Inconsistencies between figures in the table are due to rounding.

7. Financing costs and real interest rate

As loans are the primary financing source in relation to the state guarantee model, the real interest rate is an important factor in relation to the project's overall finances and thus to its repayment time. The real interest rate expresses the nominal interest rate, i.e. the nominal interest rate paid by the company on its loans, adjusted for inflation, i.e. the general movement of prices, which reduces the value of the debt.

In the financial calculations forming the basis for the Construction Act and in the financial analysis of November 2014, it was decided, in consultation with the Danish Ministry of Transport, to base the financial calculations for the bridge companies on a real interest rate level of 3.0 per cent p.a. Sund & Bælt believes that at a real interest rate level of 3.0 per cent, a conservative real interest rate assumption is used to assess the companies' long-term finances.

Accordingly, Femern A/S in collaboration with Sund & Bælt is checking a number of specific options to ensure that some of the loans can be taken out at favourable interest rates, including that it will be possible to take early interest-rate hedging measures shortly before construction commences, when the political and contractual preconditions are met. Interest rates are usually hedged in the following way: Using standard financial instruments currently used in the financial administration of both the Great Belt and Øresund links, contracts are concluded to lock interest rates on future loans before they are raised. Interest rate hedging means that the market rate immediately before commencement of construction will be of greater significance to the project's financing costs than long-term interest rate trends over the entire term of the project, which are obviously more difficult to predict.



It would currently be theoretically possible to hedge interest rates on the loans for the Fehmarnbelt project (or part of it) at a real interest rate of below 1 per cent, including the costs associated with such hedging.

As it will not be possible to hedge interest rates until the project has been finally approved, however, the project's financing costs will be determined by the level of interest rates in the period up to commencement of construction. Assessment of such level is obviously subject to uncertainty, but even in this context, a real interest rate of 3 per cent is relatively high. For example, the market-driven real forward interest rates (the real interest rates priced into the fixed-income markets) in 2020 are close to 0 per cent. The government's convergence programme anticipates e.g. a real interest rate for 10-year Danish government bonds of 1.6 per cent in 2020, cf. Table 12 below.²⁰

Table 12: Assumed levels of interest rates and inflation in Convergence Programme Denmark 2015 (per cent p.a.)						
	2015	2016	2017	2018	2019	2020
Nominal interest rate on 10-year Danish government bond ²¹	0.4	0.5	1.4	2.3	3.1	3.9
Inflation (GDP deflator) ²²	0.9	1.6	1.9	2.2	2.1	2.3
Real interest rate (calculated)	-0.5	-1.1	-0.5	0.1	1.0	1.6

Therefore, it will probably be possible to lock real interest rates at a level substantially below 3 per cent on final approval of the project, which might have a significant impact on the repayment time, cf. chapter 11. However, due to the uncertainty that will always be associated with such assessments, it has been decided to base the financial analyses on a conservative baseline real interest rate assumption of 3 per cent.

Furthermore, the financial calculation model is based on an expected average inflation rate of 2.0 per cent p.a., consistent e.g. with the European Central Bank's overall inflation target. This means that the assumed average real interest rate of 3.0 per cent is equivalent to a nominal interest rate of 5.1 per cent.

The opportunities for ensuring lower financing costs are monitored closely and will be examined further when final German plan approval of the project is near.

²⁰ Source: "Convergence Programme Denmark 2015 – March 2015"

²¹ Source: "Convergence Programme Denmark 2015 – March 2015", Table 2.1 on page 19.

²² Source: "Convergence Programme Denmark 2015 – March 2015", Table 1b on page 68

8. Other assumptions

8.1. Tax issues

Pursuant to section 31 of the Danish Corporation Tax Act, affiliated companies are subject to joint taxation. In this connection, a group is defined in accordance with Danish accounting legislation, i.e. two companies are affiliated and thereby subject to joint taxation if one company has control of the other, or if a third company has control of both companies. Pursuant to the most recent amendment of the Danish Act on Sund og Bælt Holding A/S,²³ the companies in Sund & Bælt Holding A/S are subject to statutory joint taxation like all other Danish groups.

The most significant effect of joint taxation is that tax losses in one of the companies in the group are offset against taxable income in other companies in the jointly taxed group.

In such situations, the profit-making company will reduce tax payments for the year, but then, according to the distribution principle, the company must pay a joint taxation contribution equivalent to the tax value to the loss-making company. So for the profit-making company the net effect is neutral. For the loss-making company, the joint taxation means that the company will achieve a liquidity gain because the tax loss is exploited more quickly than would have been the case if e.g. Femern A/S and/or A/S Femern Landanlæg were independent objects of taxation. Since Femern A/S will have substantial deficits in the construction phase and the first years of the operation phase, the joint taxation contributions that the company receives via the other infrastructure companies will help limit the early build-up of debt.

The joint taxation does not imply that the Group will reduce its overall tax payments, but under the specific circumstances of the Group, it means that tax payments are postponed compared with a situation in which each company is an independent object of taxation.

Furthermore, in relation to the previous financial analyses, the taxation time for EU funding has been determined, meaning that the funding will be taxable at the time of disbursement. This puts a liquidity strain on the project finances, having a minor, negative impact on the repayment time.

In addition, the conditions for the company's tax settlement in Germany have been further clarified, entailing that a higher tax deduction for incurred interest expenses can be obtained in tax payments to Germany. This has a minor, positive impact on the repayment time.

8.2. Group issues

Since the financial calculations forming the basis for the Construction Act were made in February 2015, the finances of both A/S Storebælt and A/S Øresund have performed better than expected. This is due to two factors: Following the annual calibration, traffic forecasts for both links now indicate more traffic and thus higher revenues in the coming years. Moreover, the real interest rate on loans raised on an ongoing basis in both A/S Storebælt and A/S Øresund has been below the rate of 3.0 per cent assumed in the

²³ "Lov om ændring af lov om Sund og Bælt Holding A/S, lov om projektering af fast forbindelse over Femern Bælt med tilhørende landanlæg i Danmark og selskabsskatteloven" (Act amending the Act on Sund og Bælt Holding A/S, the Act on the planning of a fixed link across the Fehmarnbelt with associated landworks in Denmark, and the Corporation Tax Act) adopted by the Danish Parliament on 28 April 2015.

financial model for the Group's companies. As a result, the companies' interest expenses in the coming years will be lower than previously assumed.

With better financial results in A/S Storebælt and A/S Øresund, the joint taxation contributions to Femern A/S will be higher than previously assumed, which will improve the repayment time for the Fehmarnbelt project. Viewed in isolation, the improved finances of the entire Group will reduce the repayment time by approx. 1 year.

The financial forecasts for all the Sund & Bælt Holding Group's companies factor in the impact of removing the rail infrastructure payment to A/S Storebælt, A/S Øresund and Øresundsbro Konsortiet financed via the Danish Finance Act, and the price reduction of the Great Belt commuter discount, which was introduced in connection with the Danish Finance Act for 2016. By way of the joint taxation described, this will extend the repayment time for the Fehmarnbelt project by approx. 1 year.

8.3. Notification of the financing model

The European Commission approved the financing model for the Fehmarnbelt project on 23 July 2015 and resolved that the model was in line with EU law. In that connection, the Commission informed the Danish Ministry of Transport and Building that it did not find it necessary to consider whether the public-sector financing granted to Femern A/S solely with regard to planning, construction and operation of the fixed link across the Fehmarnbelt represents state aid according to the EU rules on state aid. The Commission believes that these measures comply in all respects with the EU rules on state aid, as they promote realisation of an Important Project of Common European Interest (IPCEI).

With regard to the financing of the road and railway landworks, the Commission does not believe that state aid is involved under EU law. The landworks form an integral part of the public transport network in Denmark. According to the Commission, it is assumed that public-sector financing of such common infrastructures will neither distort competition nor affect trade between the member states.

In a press release of 12 November 2015, Scandlines announced that the shipping company will bring the Commission's approval of the financing model before the European Court of Justice with a view to cancellation of the approval. Femern A/S will monitor and assess any implications of the case, if it is brought before the European Court of Justice, and if the European Court of Justice chooses to proceed with it.

9. Changes since the Construction Act

The preceding sections review the key assumptions for assessing the project finances and the changes made since the financial calculations on which the presentation of the Construction Act in February 2015 was based. The isolated consequences of the changes are summarised in Table 13.

Table 13. Update from February 2015 to February 2016		
	Basis in the Construction Act, February 2015	39 years
A	Updated traffic forecasts and actual interest conditions on Øresund and the Great Belt	-1 year
B	Reduction of railway funding for Øresund and Storebælt and commuter discount on the Great Belt	+1 year
C	Bringing forward taxation of EU funding to the time of disbursement	+½ year
D	Deduction for construction loan interest in Germany	-½ year
E	Adjustment of the traffic forecast to technically assumed opening in mid-2026	-1 year
F	Adjustment of construction sum for lower historical inflation	-1 year
G	Efficiency improvement of operation, maintenance and reinvestment, coast-to-coast section	-2 years
H	Reduction of assumptions of EU funding in the construction phase from 18 per cent to 10 per cent	+4 years
I	Reduced construction sum as a result of new bids as of 15 September 2015	-3 years
	Repayment time on commencement of construction at the beginning of 2018 and opening in mid-2026. Reserve fully used	36 years
	Repayment time on commencement of construction at the beginning of 2020 and opening in mid-2028. Reserve fully used	36 years

Note: The isolated effects of the individual changes depend e.g. on the order in which the changes are implemented in the calculation method.

The individual changes and their isolated effects on the repayment time for the overall Fehmarnbelt project are reviewed below.

A) Updated traffic forecasts on Øresund and the Great Belt and actual interest conditions

The forecasts for A/S Storebælt and A/S Øresund have been updated with the most recent estimates of future traffic on the two existing links, which indicate a higher increase in traffic than previously expected. This leads to higher revenue in the companies. Moreover, the financial forecasts for A/S Storebælt and A/S Øresund have been updated, as a number of new loans have been raised at a real interest rate below the rate of 3.0 per cent assumed for all the companies in the Group. This leads to lower expenditure in the companies.

Based on the new financial forecasts for A/S Storebælt and A/S Øresund, higher joint taxation contributions than previously assumed may be received by Femern A/S by way of statutory joint taxation of the companies in Sund & Bælt Holding A/S, cf. chapter 8.2, which will have a positive impact on the project repayment time.

B) Reduction of railway funding for Øresund and the Great Belt and commuter discount on the Great Belt

The financial forecasts for all companies in Sund & Bælt Holding A/S factor in the impact of removing the rail infrastructure payment from Banedanmark to A/S Storebælt, A/S Øresund and Øresundsbro Konsortiet financed via the Danish Finance Act, and the price reduction of the Great Belt commuter discount, which was introduced in connection with the Danish Finance Act for 2016.

The changes are not deemed to be of any real importance to traffic on the Fehmarnbelt Fixed Link, but by way of statutory joint taxation of the companies in Sund & Bælt Holding A/S, cf. chapter 8.2, lower revenue in A/S Storebælt and A/S Øresund will result in lower joint taxation contributions to Femern A/S, which will have a negative impact on the repayment time for the Fehmarnbelt project.

C) Bringing forward taxation of EU funding to the time of disbursement

In the planning phase, there is symmetry between taxation of EU funding and deduction for planning costs as operating costs. In practice, this means that the EU funding received by the project in the planning phase is taxed at the time when the specific costs for which funding is granted are actually incurred and therefore eligible for deduction.

It was previously assumed that a similar model could be used in the construction phase. However, this issue was clarified in dialogue with the tax authorities, meaning that the funding will be taxable at the time of disbursement. This puts a liquidity strain on the project finances, having a negative impact on the project repayment time.

D) Deduction for construction loan interest in Germany

In connection with the drafting of the previous financial analysis of November 2014, the calculation model was updated so as to allow for the possibility of Femern A/S having a permanent establishment in Germany for tax purposes.²⁴ As a precaution, the financial model allocates part of the revenue to separate taxation there. Taxation of companies in Germany is made up of a number of different taxes and is therefore not directly comparable with Danish corporate tax. Eurostat has estimated the total rate at approx. 30 per cent, which was used as the basis in the financial model.

Since the update of the model in collaboration with the company's consultants, further clarification has been achieved about the company's tax settlement in Germany, entailing that the company may obtain a higher tax deduction for incurred interest expenses in Germany than previously assumed, which will have a positive impact on the repayment time.

E) Adjustment of the traffic forecast to technically assumed opening in mid-2026

The same traffic forecast is used as the basis for the 2022, 2026 and 2028 opening scenarios. This means that following the ramp-up period, the forecasts for e.g. the 6th or 15th year of operation show exactly the same volume of traffic. Hence, the traffic forecast is generally unaffected by the year of opening. As a precautionary measure, however, the analysis assumes zero growth in traffic after the 25th year of operation. As the 26th year of operation in the scenarios with the opening in 2026/2028 is 4/6 years later than assumed in the previous financial calculations, traffic volumes in the later opening scenarios at that time

²⁴ "Financial analysis of the Fehmarnbelt Fixed Link including Danish landworks", Femern A/S, November 2014. Source: <http://www.femern.dk/material-folder/documents/2014-publikationer/finansiell-analyse-2014.pdf>

are higher. Accordingly, traffic trends peak at a higher level, which, viewed in isolation, leads to more traffic and higher traffic revenue and thus has a positive impact on the repayment time.

In addition to the isolated impact of the timing difference of the traffic forecast, which is indicated as an improvement of 1 year in Table 13 above, there are also a number of opposite effects of postponing the opening year. They include costs of client consulting and organisation etc. in the extended planning and preparation phase and costs to retain the bids for the four major tunnel contracts for a longer period than previously assumed. These additional costs are included in the calculation of the drawdown on the project's reserves, etc. and, consequently, in the calculation of the total repayment times.

F) Adjustment of construction sum for lower historical inflation

The financial model assumes an average inflation rate of 2 per cent p.a. From 2013 to 2014, inflation was considerably lower. In connection with the calculations forming the basis for the Danish Construction Act, traffic rates were only adjusted upwards by 0.75 per cent from 2014 to 2015. Viewed in isolation, this reduced revenue relative to the price regulation of 2 per cent assumed in the model, thereby having a negative impact on the repayment time. On the other hand, the indices used to project the construction budget were not available yet at the time, and the construction budget was consequently revalued by 2 per cent from 2014 to 2015 in connection with the presentation of the Construction Act. Adjustment has now been made for this issue. Capital expenditure is technically written down in connection with backward adjustments for lower historical inflation, thereby improving the repayment time. From a net perspective, this means that, in terms of prices, the assumptions concerning construction costs are now consistent with revenue. Overall, this has a positive impact on the total repayment time.

G) Efficiency improvement of operation, maintenance and reinvestment, coast-to-coast section

In collaboration with its engineering consultants (RAT), Femern A/S has conducted an analysis of the maintenance and reinvestment programmes for the coast-to-coast section. As a result of the analysis, the estimate of costs of operation, maintenance and reinvestment has been adjusted downwards from DKK 549 million per year to DKK 468 million per year, cf. chapter 4. The budget improvement of DKK 81 million per year (2015 prices) is equivalent to a net present value of approx. DKK 1.3 billion. This helps reduce the total project repayment time.

The company will continue its efforts to optimise the operating and maintenance activities, including the interfaces between the individual items, which may lead to adjustments.

H) Reduction of assumptions of EU funding in the construction phase from 18 per cent to 10 per cent

In the summer of 2015, the coast-to-coast section of the Fehmarnbelt Fixed Link was granted maximum EU funding of 40 per cent of railway-related costs in the period 2016-2019, equivalent to approx. 20 per cent of the total costs in that period. The amount of funding constitutes approx. DKK 4.4 billion, cf. chapter 6. As a precaution, the assumed estimate of total EU funding for the coast-to-coast section has been reduced from 18 per cent to 10 per cent of the construction costs. This change in the assumption has a negative impact on the repayment time in the present financial analysis.

The assumptions concerning the future possibilities of obtaining further funding are determined in collaboration with the Danish Ministry of Transport and Building. Femern A/S and the Ministry of Transport and Building are in a dialogue with the European Commission concerning the specific use of the funds granted, including the construction work timetable and the future funding opportunities. Applications for maximum

funding for the coast-to-coast section as well as the Danish landworks will continue to be submitted in future funding rounds.

1) Reduced construction sum after new bids as of 15 September 2015

The new bids for the four major tunnel contracts as of 15 September 2015 make it possible to increase reserves from the assumed level of DKK 3.7 billion in the Construction Act to approx. DKK 10 billion. A more detailed risk assessment, cf. EY's external quality assurance, shows that a total reserve of DKK 7.3 billion in the construction budget is required. Hence, as a consequence of the new baseline budget and reserve estimates, the financial analysis assumes that the full construction budget of DKK 55.1 billion in the Construction Act will not be fully used. This improves the repayment time by 3 years, while increasing the total reserves from DKK 3.7 billion to DKK 7.3 billion.

10. Risk assessment

10.1. Financial risks

The financing model for the Fehmarnbelt Fixed Link entails that the project costs will be fully financed by EU funding and, particularly, government guaranteed loans to be repaid through user charges for travellers who opt to use the fixed link. This makes the project's ability to pay for itself (revenue) and the financing costs (real interest rate) key parameters. The assumption is that no tax-funded public budget resources will be used to finance the project.

The government guarantee model thus entails that the loans are to be repaid via revenue from the users of the road and railway sections of the fixed link. Hence, the role of future revenues will also be of major financial importance. Add to this the possibility of considerable EU funding being granted for the construction costs of the project, because it is a cross-border project between two EU member states.

As far as the **construction costs** for the coast-to-coast section are concerned, receipt of the final bids for the four major contracts has created the opportunity to increase the total reserve framework to approx. DKK 10 billion, equivalent to approx. 25 per cent of construction costs within the framework of the Danish Construction Act. Based on the external quality assurance of the reserve requirement performed by EY, Femern A/S has based its calculations on a reserve of DKK 7.3 billion for the coast-to-coast project. At the same time, the final and binding bids have created an opportunity for establishing a high level of future budgetary certainty for most of the construction costs, if the bids submitted are accepted. This has significantly reduced the uncertainty concerning the construction budget.

As far as the Danish landworks are concerned, Banedanmark has long experience with planning, budgeting and implementing projects of this nature. The construction budget for the Danish landworks of DKK 9.5 billion also includes a total reserve framework of approx. DKK 2.2 billion.

The overall construction budgets and reserves for the Fehmarnbelt tunnel are therefore deemed to be robust.

On a large-scale, complex infrastructure project such as the Fehmarnbelt Fixed Link, the annual costs of **operation, maintenance and reinvestment** are substantial. These current costs are included in the calculation of the project repayment time. Femern A/S has worked on analysing, reassessing and optimising the estimate of what it would cost to operate and maintain the fixed link. The technical and financial analyses of the maintenance programme have increased the budgetary certainty of the estimate.

The EU co-financing of the construction costs is an important contribution to the project's finances, because it constitutes cash grants that are not subsequently to be repaid. This limits the overall borrowing requirement. The funds are allocated and disbursed on an ongoing basis, based on assessments of the importance, quality, maturity and progress of the project. For this reason, the scale of EU funding cannot be established definitely in advance. In connection with the allocation of the first round of funding, the European Commission sent a clear signal that the Fehmarnbelt project is considered to be of critical importance to the extension of the trans-European transport infrastructure. The coast-to-coast section of the fixed link was thus granted DKK 4.4 billion in the period 2016-2019 based on guidelines stipulating that the costs of the project's railway part – constituting just over half of the total construction costs – may receive the maximum funding of 40 per cent. Overall, the funding granted for the budget period 2016-2019

constitutes approx. 20 per cent of the eligible costs on the road and railway sections. The Commission has subsequently made it clear to the Danish Ministry of Transport and Building that the project is well positioned to receive further funding. Against this background, the assumed funding level of 10 per cent in the financial analysis is deemed to be cautious.

Revenue from the users of the fixed road and railway link has been determined on the basis of comprehensive traffic model calculations carried out by the same German experts who prepare the official German traffic forecasts and according to the same high standards. All partial results and a number of supplementary analyses have been presented. The traffic forecast has subsequently been subjected to external quality assurance via a review conducted by the COWI consultancy group, cf. chapter 5.

Due to the government guarantee model and the high creditworthiness of the Danish state, the loans to finance the Fehmarnbelt Fixed Link can now be raised at rates close to the lowest possible interest rates in the market. The financial calculations are based on a **real interest rate** of 3.0 per cent p.a. This estimate may seem reasonable – albeit conservative – in terms of long-term interest rate trends over the entire term of the project. Short-term interest rate trends are an equally relevant parameter for the project's financing costs, as the interest rates on many of the loans can be hedged on the basis of the interest rate level at the beginning of the construction period. Seen in this light, the assumed real interest rate of 3.0 per cent p.a. seems to be highly conservative.

10.2. Time-related risks

The most significant time-related project risk is the German plan approval procedure and its derived consequences for the tender process. Femern A/S is therefore focusing intently on the German plan approval procedure.

The administrative hearing and plan approval procedure in Germany poses a significant risk to the timetable with regard to commencement of construction work. Reinhard Meyer, Minister of Transport for Schleswig-Holstein, believes that the German plan approval will not be granted until 2017.²⁵ The approval may subsequently become the subject of legal proceedings, which may, according to Reinhard Meyer, postpone the final approval for another two years, if a German court decides that construction work must await the decision of the court.

On conclusion of a new hearing phase, the German hearing and plan approval authority LBV Kiel will be able to make a decision on approval of the project and issue the plan approval. The company is not aware of any major uncertainty as to whether plan approval for the project can be obtained, but solely as to the *timing* of the issue of approval.

The parties directly affected by the project as well as recognised environmental protection organisations that are entitled to file an appeal in accordance with German law may subsequently appeal the German

²⁵ Cf. press release of 2 October 2015 from the Danish Ministry of Transport and Building: "Reinhard Meyer orienterede Femern-forligskredsen om tysk myndighedsgodkendelse" (Reinhard Meyer briefed the political parties backing the Fehmarnbelt project about the German plan approval). Source: <http://www.trm.dk/da/nyheder/2015/reinhard-meyer-orienterede-femern-forligskredsen-om-tysk-myndighedsgodkendelse>

plan approval to the courts. Appeals must be submitted within one month from the issue of the plan approval.

It is currently expected that in accordance with the project application, the railway legislation will form the basis for the plan approval decision. That means that any appeals must be taken directly to the highest appeals body – the Federal Administrative Court in Leipzig – thus avoiding an even more time-consuming appeal to two appeals bodies in pursuance of road legislation.

The company intends to request the approvals authority in Schleswig-Holstein to ensure that approval comes into effect immediately on expiry of the appeals deadline of one month after the decision is published ("Immediate Permission"). If that is the case, this will mean that the company can start construction work on the German side on expiry of the appeals deadline, provided that any appeals to the Federal Administrative Court requesting suspensive effect are either rejected completely or denied any suspensive effect.

In consultation with its German legal advisers, Femern A/S is preparing to manage the proceedings, including the risk of appeals filed with the Federal Administrative Court. The aim for the company's efforts to manage the legal risk in the German plan approval procedure is for the quality of the application material to be such that appeals are not granted suspensive effect. If, however, legal proceedings are granted suspensive effect, the potential financial consequences and delays must be reduced as much as possible. In any case, an attempt must be made to minimise the risk of the approval ultimately being declared invalid. This is an integral part of the company's work on the German application.

The company believes that the extensive administrative consultation and approval procedure in Germany has resulted in the company's project application becoming increasingly robust in relation to appeals. This must be seen, in particular, in the light of the fact that the thoroughness of the various German public authorities in the consultation process has contributed to a great extent to assure the quality of the application on several occasions, leading, all things being equal, to a general reinforcement of the documentation and the arguments in the application material. The aim for LBV Kiel is precisely to ensure that the final approval decision is adequately robust to resist any subsequent appeal proceedings.

As part of risk limitation, the company is seeking to define the areas that complaints could probably be aimed at (including on the basis of the objections received from German environmental organisations and the public). The company is also looking into what procedural issues might become the subject of appeals.

It is difficult to predict the length of court cases which are necessarily dependent on the number and complexity of the appeals. According to information from Reinhard Meyer, the authorities in Schleswig-Holstein believe that legal proceedings will continue until 2019, so the total duration of the legal proceedings is estimated to be around 2 years.

In the light of this information, the financial calculations assume that the German plan approval will be issued in 2017, and that it may be delayed for another two years by legal proceedings with suspensive effect. Hence, as a precaution, the baseline assumptions in the financial analysis seeks to factor in the risk of delays of the administrative as well as the legal part of the plan approval procedure in Germany. Furthermore, a sensitivity calculation has also been performed of the consequences for the repayment time of further complications in the German plan approval procedure, cf. chapter 11.

Reference is made to EY's external quality assurance of reserves and risk distribution on the Fehmarnbelt project, cf. also chapter 3.

10.3. Construction budget, reserves and risk management

Femern A/S uses a number of different instruments in order to limit the risk of the project.

The overall organisation is characterised by Femern A/S being a subsidiary under Sund & Bælt Holding A/S with extensive experience and competences from planning, construction and operation of both the Great Belt and Øresund links, including the immersed tunnel part of the Øresund link.

Work performed with a view to limiting the overall financial risk of the project includes the following specific initiatives:

- The key parameters of the financial analysis have been carefully reviewed by the company and its consultants, and the assumptions are described in more detail in this update of the financial analysis.
- On behalf of the Danish Ministry of Transport and Building, independent experts have performed external quality assurance, including of the traffic forecast, the construction budget, the volume of reserves and the German plan approval procedure for a number of the key parameters.
- Final and binding bids have been obtained for the four major tunnel contracts, which make up approx. 78 per cent of the total construction costs (consisting of the four major tunnel contracts, electrical and mechanical installations, the railway and the series of minor contracts, cf. chapter 3. This provides a high level of certainty in terms of the overall construction budget, if the best bids are accepted.
- The final bids for the four major tunnel contracts enable an increase of the total project reserves to approx. DKK 10 billion in relation to the framework of the Danish Construction Act. This is deemed to be fairly robust – particularly in the light of the fact that final bids are available for 78 per cent of the total construction costs, cf. above. Based on the external quality assurance of the reserve requirement performed by EY, Femern A/S has based its calculations on a calculated reserve framework of DKK 7.3 billion.
- The company has performed external reviews of all other major items of expenditure within the construction budget, including electrical and mechanical installations by Mairl Tunnelconsultants, the railway by WSP and the series of minor contracts by the EY consultancy.
- In step with the elaboration of the project, the company has continuously developed the risk description and risk model, which form the basis for determining the total reserve requirement.

With regard to managing the construction budget and risks in the construction phase, Femern A/S has been engaged in implementing the following measures, among others:

- In the planning phase, the company keeps the company's owner, the Danish Ministry of Transport and Building, the government and the Danish Parliament, continuously apprised of the project's progress, finances and risk scenario by means of quarterly reports and the semi-annual construction status.
- These reports will be strengthened by the transition to the construction phase, during which Femern A/S will fully adopt the governance and reporting model for mega projects established by

the Ministry of Transport in 2014 with the assistance of the McKinsey & Company consultancy. At the present time, the company has implemented a large part of the model.

- In preparation for the construction phase, Femern A/S has – within the framework of the McKinsey project in collaboration with the Quartz&Co consulting firm – developed a governance concept and model that includes risk as one of the key dimensions together with finance and time.

- The objects of the governance model in the transition to and during the construction phase are primarily:
 - to create transparency of Femern A/S' governance and control of the three governance dimensions Finance, Time and Risk
 - to ensure traceability between decisions, activities and follow-up throughout the phases of the Fehmarnbelt project
 - to establish one common reference document for Femern A/S in order to avoid deviations from the governance model throughout the phases of the Fehmarnbelt project
- The main focus of the governance model is to document Femern A/S' governance activities within each of the key governance dimensions *Finance, Time and Risk*. Governance activities means the activities which Femern A/S as the client will use for governance of the construction activities, including meeting structure, reporting and underlying processes. In terms of governance activities, a distinction is made between activities associated with governance of planned construction activities (such as budgeting, quarterly reporting) and unforeseen construction activities (primarily claims).
- In addition to the governance dimensions Finance, Time and Risk, Femern A/S also controls dimensions such as Quality, Environment and Health & Safety. Since these dimensions are addressed in separate governance models, they are not described in the governance model.
- Core to the governance model are the five governance elements: *Tools and Input; Principles; Roles and Responsibilities; Structure and Governance activities*. The object of the governance elements is to ensure that the governance dimensions are attended to punctually, fairly and accurately, and reported to the relevant stakeholders.
- Governance of unforeseen construction activities is centred around three areas: *Risk management, Processing of claims and other unforeseen construction activities and Impacts on governance dimensions and allocation of reserves*. For these, the governance model charts:
 - Risk management: How Femern A/S' risk management is based on the general guidelines set out in the Danish Ministry of Transport and Building's model for governance of mega projects. The model also indicates how identification and registration of risks are performed in the risk register, which provides the data source for risk management. The model then describes that the entire risk scenario is reported to Femern A/S' Board of Management, while the 5-10 most significant risks are reported to the company's owner and Board of Directors.
 - Processing of claims: Femern A/S' assessment and registration of claims and other unforeseen construction activities (i.e. supplementary work (variations) and force majeure), together with the roles, responsibilities and mandates that exist for addressing these. The governance model also specifies Femern A/S' procedures for handling claims and variations.
 - Impacts on governance dimensions: Femern A/S' principles for allocation and use of the budget reserve in connection with risks and claims and how Femern A/S allocates the reserve.

Finally, the model indicates how the Fehmarnbelt project's financial scope in response to unforeseen construction activities is obtained from the correlation between the risk scenario, distributable reserves and the cost-to-complete.

- In connection with the development of this governance model, risk activities were moved organisationally from the company's technical division to the finance division in the spring of 2015 to ensure a closer link between risk and budget follow-up.
- Risks for the construction phase are documented in reports in connection with the construction budget presented in the financial analysis of November 2014, in which the company increased its construction reserves significantly. In connection with the further development of the construction budget towards this financial analysis, the risk reports have been continuously updated.
- The overall risk scenario in the construction phase, including scenarios and mitigation plans, will be finally documented towards the beginning of the construction phase based on the final contract conditions and the progress of the German plan approval procedure. This will also include the complete risk scenario for the client and contractors, respectively.
- The company has also launched an internal project concerning preparations for the transition to the construction phase, including a plan for staffing of the organisation in the construction phase. Thus, the company's management is continuously discussing its staffing and the composition of employee skills to ensure that the company is able to address the issues facing the company from time to time. In the current situation, special focus is placed on retaining key employees to enable the company to handle the German plan approval procedure as well as the tender process for the major contracts.

The company will carefully review EY's recommendations in the new external quality assurance of reserves and risk distribution with a view to ensuring that EY's analyses and recommendations are reflected in the company's risk activities.

In terms of limiting the time risk related to the German plan approval procedure, Femern A/S is engaged in implementing the following measures, among others:

- The plans for the project work, including the tender processes, are based on the assessments received from the Ministry of Transport in Schleswig-Holstein and the company's own assessments in close collaboration with the company's German legal advisers, CMS Hasche Sigle. The plans now assume that the German plan approval will be available in 2017 and that, in addition, it may be delayed for two years due to legal proceedings.
- The company is in close, continuous dialogue with the public authorities in Schleswig-Holstein at all levels concerning the plan approval procedure and the presentation of the application.
- The company uses German experts and consultants in the areas of law (CMS Hasche Sigle) as well as the environment (BioConsult SH and Trüpner Gondesens GmbH, among others), engineering (the German WTM engineering company affiliated with RAT, the company's principal consultants) and traffic forecasts (Intraplan Consult GmbH and BVU Beratergruppe Verkehr + Umwelt GmbH), which are highly experienced and knowledgeable with regard to the procedural requirements relating to German plan approvals in particular.
- Furthermore, Femern A/S has employed Miller & Meier Consulting in Berlin as strategic consultants in the areas of PR, communication and stakeholder relations in Germany. The company has continuously intensified the use of resources in its work on the German approval procedure.

- The project and the project application in Germany of more than 10,000 pages have been the subject of extensive public hearings in Germany where all parts of the project have been presented. The company and its consultants have carefully reviewed the 3,100 comments to the project received and prepared a response of more than 10,000 pages. Public hearings have also been held in Denmark.
- In parallel with the public hearing procedure in Germany, potentially affected neighbouring countries were consulted concerning the potential cross-border environmental impact of the Fehmarn-belt project in accordance with the UN Espoo Convention and Article 7 of the EIA Directive.
- The internal organisation of the company reflects the approach of working in parallel on the tender processes and the German plan approval, as the company consists of separate divisions responsible for the technical work related to the tender processes and the work on regulatory matters in Denmark and Germany. Work on the German plan approval procedure and the tender process is thus strategically rooted at the company's management level, and permanent collaboration and coordination groups and procedures have been established.
- In collaboration with the company's German legal advisers, the company has also launched inquiries into the substantial and procedural issues which could become the subject of appeals based on the hearing responses received.

The risk assessment and mitigation work also comprises a number of sensitivity calculations and stress tests developed on an ongoing basis in recent years, cf. chapter 11.

11. Sensitivity calculations

In order to assess the financial robustness of the project to changes in the key parameters, a number of sensitivity calculations have been carried out. The following chapter describes the individual sensitivity calculations and their results in the form of changes in the expected repayment time for the coast-to-coast section and the Danish landworks.

The sensitivity calculations are technically based on the baseline scenario with construction commencing at the beginning of 2020, opening of the fixed link in mid-2028, a real interest rate of 3.0 per cent and use of the reserve in the coast-to-coast section of DKK 7.3 billion, equivalent to total construction costs of DKK 52.6 billion (2015 prices). Statistically, the reserve is calculated on the basis of Femern A/S' risk register and reflects the likely costs that the project will incur. When the sensitivity calculations estimate e.g. an additional drawdown on the reserves, the results of such calculations indicate the effect of fluctuations beyond what is already comprised by the reserve. Therefore, the reserve in itself is intended to accommodate considerable cost fluctuations.

As far as the Danish landworks are concerned, calculations are based on the corresponding scenario where construction will be completed in 2028 and full drawdown on the reserves. In this scenario, the overall project is expected to be debt-free after 36 years.

The calculations are obtained by applying the well-established and recognised financial model adopted for calculating the financial economics of the Great Belt and Øresund links. This model was devised in line with common practice for assessing the profitability of construction projects.

Table 14: Overview of partial sensitivity calculations

No.	Parameter	Change
1	Construction costs, coast-to-coast section	Full drawdown on the overall budget of the Construction Act: DKK 55.1 billion (+DKK 2.5 billion) Baseline: DKK 52.6 billion Lower drawdown on reserves: DKK 50.6 billion (-DKK 2 billion)
2	Construction costs, Danish landworks	Baseline: DKK 9.5 billion Lower drawdown on reserves: DKK 0.7 billion (-DKK 1.5 billion)
3	Operation, maintenance and reinvestment, coast-to-coast section	+DKK 50 million per year Baseline: DKK 468 million per year -DKK 50 million per year
4	Operation, maintenance and reinvestment, Danish landworks	+DKK 25 million per year Baseline: DKK 239 million per year -DKK 25 million per year

5	EU funding	No further funding in addition to the already allocated framework of DKK 4.4 billion (-DKK 1,4 billion) Baseline: DKK 5.8 billion +DKK 1 billion +DKK 2 billion
6	Real interest rate	3.5 per cent Baseline: 3.0 per cent 2.5 per cent
7	Redistribution of passenger car traffic from the Great Belt	-500 cars per day Baseline: 1,967 cars per day +500 cars per day
8	New traffic and dynamic effects	Baseline: No dynamic effects Impact of dynamic effects
9	Jump in traffic	25 per cent 40 per cent Baseline: 54 per cent
10	Average annual traffic growth during the first 25 years of operation	-10 per cent traffic growth Baseline: 1.4 per cent traffic growth per year +10 per cent traffic growth
11	Continued ferry service	1-hourly service, temporary 2-hourly service, temporary 1-hourly service, permanent 2-hourly service, permanent -25 per cent ferry fare Baseline: No ferry service
12	Differentiated fares on the fixed link	Baseline: Flat price structure Differentiated price structure
13	Continued ferry service with shopping discount on both ferry and tunnel	Half-hourly ferry service with -25 per cent shopping ticket price and -25 per cent shopping ticket price in the tunnel Baseline: No ferry service and a flat fare structure
14	Delay of the German plan approval	Commencement of construction at the beginning of 2022, opening of the fixed link in mid-2030

		Baseline: Commencement of construction at the beginning of 2020, opening of the fixed link in mid-2028
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Results of sensitivity calculations

The results of the sensitivity calculations are shown as the change indicated by the calculation relative to the baseline scenario, rounded to the nearest whole year.²⁶

11.1.1. Construction costs, coast-to-coast section

In September 2015, Femern A/S received final and binding bids for the four major tunnel contracts. Together with the external reviews of the other contract areas, cf. chapter 3, this has created the opportunity for establishing a high level of budgetary certainty for most of the construction budget for the coast-to-coast section, if the best bids are accepted. The reduced bids for the four major tunnel contracts enable an increase of the total project reserves to approx. DKK 10 billion in relation to the framework of the Construction Act. In the scenario with construction commencing at the beginning of 2020, the reserves constitute DKK 7.3 billion, cf. the reserve requirement calculated by EY.

The sensitivity calculation shows a repayment time of 36 years under the baseline assumption. In the event of a full drawdown on the framework of the Construction Act of DKK 55.1 billion in total, the repayment time will be extended by 2 years. If the drawdown on reserves is reduced by DKK 2 billion relative to the baseline assumption, the repayment time will be reduced by 2 years.²⁷

Table 14.1: Construction costs, coast-to-coast section	
Assumption	Repayment time
Full drawdown on the overall budget of the Construction Act (DKK 55.1 billion)	+2 years
Full drawdown on reserves of DKK 7.3 billion, coast-to-coast section (DKK 52.6 billion)	36 years
Lower drawdown on reserves (DKK 50.6 billion)	-2 years

²⁶ The sensitivity calculations have been performed as partial calculations. This means that the effect of the individual changes on the repayment time cannot be added up. The primary reason is that, in general, the sensitivity to changes declines in the event of a lower repayment time and vice versa. The sounder the economics of the project, the more robust it is to fluctuations in the key parameters. The sensitivity calculations do not indicate the probability of actual developments deviating from the key assumptions; they serve to illustrate various risk aspects of the project.

Moreover, certain changes will be interrelated and point in opposite directions. This applies, for example, to changes in traffic volumes and real interest rates, which are both key parameters for the project. In an environment of stronger economic growth, both interest rates and traffic volumes tend to increase (and vice versa), working in opposite directions in terms of the repayment time.

²⁷ In general, the financial risk exposure of the Fehmarnbelt project is limited in terms of currency movements, which are borne by the contractors. Inflation development will affect the total repayment time by affecting the actual costs in the construction and operation phases and revenue in the operation phase. The correlation between the two phases is expected to have a neutralising effect on the repayment time.

11.1.2. Construction costs, Danish landworks

The Danish landworks predominantly consist of a typical railway project on land, and the client – Banedanmark – has long experience with projects of this nature. But as a precaution, the construction estimate for the landworks is based on a full drawdown on the reserves of DKK 2.2 billion in the main scenario. It should be noted that, historically, Banedanmark has been able to keep the use of reserves at or below 10 per cent on similar projects, equivalent to a drawdown on reserves of DKK 0.7 billion.

A sensitivity calculation has been performed of the effects of reducing the drawdown on the reserves to 10 per cent of the construction costs, corresponding to DKK 0.7 billion. Such a reduction would reduce the repayment time by 1 year.

Table 14.2: Construction costs, Danish landworks	
Assumption	Repayment time
Full drawdown on reserves of DKK 2.2 billion, Danish landworks (DKK 9.5 billion)	36 years
Drawdown on reserves corresponding to 10 per cent of construction costs (DKK 0.7 billion)	-1 year

11.1.3. Operation, maintenance and reinvestment, coast-to-coast section

The estimate of costs of operation, maintenance and reinvestment for the coast-to-coast section is based, inter alia, on the experience gained from the Great Belt and Øresund projects and on analyses performed by Femern A/S and external consultants. The budgeted amount of DKK 468 million per year includes unallocated funds of DKK 15 million per year. The preparation of the estimate is described in chapter 4.1.

A calculation has been made of the sensitivity to cost fluctuations of DKK 50 million per year, or just over 10 per cent of the estimated average annual costs. The sensitivity calculation shows that an annual increase of DKK 50 million in costs of operation, maintenance and reinvestment for the coast-to-coast section will extend the repayment period by 1 year, all other things being equal. If costs are DKK 50 million lower, the repayment period will be reduced by 1 year, all other things being equal.

Table 14.3: Operation, maintenance and reinvestment, coast-to-coast section	
Assumption	Repayment time
Increased costs of DKK 50 million per year (DKK 518 million per year)	+1 year
Estimated costs (DKK 468 million per year)	36 years
Reduced costs of DKK 50 million per year (DKK 418 million per year)	-1 year

11.1.4. Operation, maintenance and reinvestment, Danish landworks

The estimate of costs of operation, maintenance and reinvestment for the Danish landworks has been prepared by Banedanmark, cf. chapter 4.2, based on general experience of operating the Danish railway infrastructure.

A calculation has been made of the sensitivity to cost fluctuations of DKK 25 million per year, or just over 10 per cent of the average annual costs. The sensitivity calculation shows that an annual increase of DKK 25 million in costs of operation, maintenance and reinvestment for the Danish landworks will extend the repayment time by less than 1 year, all other things being equal. If costs are DKK 25 million lower, the repayment period will be reduced by less than 1 year, all other things being equal.

Table 14.4: Operation, maintenance and reinvestment, Danish landworks	
Assumption	Repayment time
Increased costs of DKK 25 million per year (DKK 264 million per year)	+less than 1 year
Estimated costs (DKK 239 million per year)	36 years
Reduced costs of DKK 25 million per year (DKK 214 million per year)	-less than 1 year

11.1.5. EU funding

The assumption of the extent of EU project funding is based, among other factors, on previous funding allocated to the project and similar projects and on framework announcements by the European Commission; however, naturally, there is a considerable element of estimate in the figures. Thus, the extent of funding is subject to some uncertainty that will be clarified only as the funding is allocated and disbursed.

The financial calculations assume total EU funding for the coast-to-coast section of 10 per cent of the construction costs in the event of a full drawdown on the reserves set aside, equivalent to approx. DKK 5.0 billion, plus 10 per cent for the Danish landworks, equivalent to approx. DKK 0.7 billion. Hence, total funding for the entire project is expected to be approx. DKK 5.8 billion.

Furthermore, sensitivity calculations have been performed for the two alternative levels of funding, including the impact of the coast-to-coast section not receiving any funding in addition to the DKK 4.4 billion already allocated, and of the Danish landworks not receiving any funding. The impact of the project receiving further funding has also been calculated. The funding already allocated solely concerns the period 2016-2019. The results of the sensitivity calculations are indicated below.

Table 14.5: EU funding	
Assumption	Repayment time
No further funding for the coast-to-coast section and no funding for the Danish landworks (DKK 4.4 billion)	+1 year
10 per cent funding for the coast-to-coast section and 10 per cent funding for the Danish landworks (DKK 5.8 billion)	36 years
Further funding of DKK 1 billion (DKK 6.8 billion)	-1 year
Further funding of DKK 2 billion (DKK 7.8 billion)	-2 years

11.1.6. Real interest rate

As a precautionary measure, a real interest rate level of 3.0 per cent is assumed in the financial analysis, which is somewhat higher than the current level of real interest rates, cf. chapter 7. Sensitivity calculations have been performed for real interest rate levels of 3.5 per cent and 2.5 per cent, respectively, cf. Table 14.6.

Table 14.6: Real interest rate	
Assumption	Repayment time
3.5 per cent p.a.	+7 years
3.0 per cent p.a.	36 years
2.5 per cent p.a.	-5 years

11.1.7. Redistribution of passenger car traffic from the Great Belt

The Fehmarnbelt Forecast of November 2014 anticipates a redistribution of passenger cars from the Great Belt averaging 1,967 cars per day, equivalent to 5.6 per cent of the volume of car traffic on the Great Belt link in 2028.²⁸ This figure is based on a number of different analyses, including analyses of the users' place of departure and final destination, their choice of route, licence plate scans and analyses of Great Belt transaction data. The latter were carried out by A/S Storebælt, while, generally, the remaining analyses were carried out by DTU based on e.g. data collection performed by the two Danish consultancy firms COWI and Tetraplan. This information was submitted to the German consultancies behind the traffic forecast, i.e. Intraplan and BVU, which incorporated it into their traffic model, thereby arriving at the estimate indicated for the redistribution of passenger car traffic from the Great Belt to the Fehmarnbelt Fixed Link.

In connection with its external quality assurance of the traffic forecast, COWI noted that it is difficult to document the potential redistribution from the Great Belt to the Fehmarnbelt Fixed Link. Intraplan, which is behind the Fehmarnbelt Forecast 2014, assesses that the average redistribution of 1,967 cars per day is a conservative estimate. Based on the uncertainty associated with the actual redistribution, two sensitivity calculations were performed, showing that the daily redistribution will be 500 passenger cars higher (respectively 500 passenger cars lower) than forecast, equivalent to a redistribution fluctuation of approx. 25 per cent.

The calculation shows that if 500 passenger cars fewer than estimated are redistributed in the opening year, the repayment time will be extended by 2 years. If 500 passenger cars more than estimated are redistributed in the opening year, the repayment time will be reduced by 2 years.

Table 14.7: Redistribution of traffic from the Great Belt	
Assumption	Repayment time

²⁸ The figure is calculated on the assumption of the fixed link opening in 2022 according to the traffic forecast of 2014.

500 fewer passenger cars redistributed per day (1,467 cars per day in total)	+2 years
Baseline assumptions in the Fehmarnbelt Forecast 2014, opening in mid-2028 (1,967 cars per day)	36 years
500 more passenger cars redistributed per day (2,467 cars per day in total)	-2 years

11.1.8. New traffic and dynamic effects

In connection with the external quality assurance of the traffic forecast, COWI pointed out that any dynamic effects on traffic are not included in the Fehmarnbelt Forecast 2014, and the volume of new traffic is very limited. Hence, redistributed traffic from other routes makes up most of the calculated jump in traffic in the Fehmarnbelt Forecast 2014.

New traffic is the traffic seen in connection with the opening of a new traffic link that did not already exist on other routes. Part of this is the result of immediate adaptation, but to this should be added gradual adaptation that is often attributed to dynamic effects. Dynamic effects are the extra growth occurring when new links create better conditions, e.g. for the business community.

The primary reason why dynamic effects are not factored into the traffic forecast for the Fehmarnbelt Fixed Link is that such effects are difficult to predict and model. At present, the tools available are insufficient to specifically calculate expectations for the dynamic effects, so a conservative approach has been taken, according to which dynamic effects are generally not included in the traffic forecast.

Professor Christian Wichmann Matthiessen from the University of Copenhagen believes that the traffic forecast for the Fehmarnbelt Fixed Link probably underestimates the traffic potential, since the proliferation of businesses, new opportunities for working in one city and living in another, new partnerships creating new knowledge and new jobs, etc. are generally not included in the forecast. *"All the things that are created when cities, regions and countries are bound together and we are brought closer together. We have seen all that after we got the Great Belt Bridge. We have seen all that after we got the Øresund Bridge. And I expect that we will see it again when the Fehmarnbelt tunnel is completed and we can cross the Fehmarnbelt in less than 10 minutes,"*²⁹ he says in connection with a report on dynamic effects³⁰.

In the main scenario of the traffic forecast, the opening of the Fehmarnbelt Fixed Link only gives rise to very limited volumes of new traffic. In that sense, the traffic forecast is conservative.

In its 2008 report for Sund & Bælt, COWI studied the traffic impacts of the Great Belt link in the period since its opening³¹. The report shows that new traffic due to the Great Belt Bridge constituted approx. 28 per cent of total traffic in 2007. Redistribution of traffic from other routes and other modes of transport made up approx. 13 per cent of total traffic.

²⁹ Source: <http://www.femern.dk/servicemenu/presse-og-dokumenter/nyheder/femern-potentiale-er-undervurderet>

³⁰ Source: C. Wichmann Matthiessen: "The Fehmarnbelt link will be a growth dynamo for the Baltic Sea Region", 17 April 2015, page 13.

³¹ Source: <http://www.sundogbaelt.dk/uk/menu/publications/traffic/trafikale-effekter>

Consequently, new traffic was equivalent to around 40 per cent of total passenger traffic, including ferries and planes in the Great Belt corridor, without the fixed link.

For example, an assessment of the possible impact of dynamic effects on traffic due to the opening of the Fehmarnbelt Fixed Link may be based on the technical assumption that the opening will give rise to half of the new traffic observed on the Great Belt link, i.e. 20 per cent of the total existing traffic in the corridor. As a precautionary measure, when calculating the financial effects of this, it is assumed that new traffic will be phased in slowly over 10 years. The financial calculations show that this may reduce the project repayment time by 5 years.

Table 14.8: New traffic and dynamic effects	
Assumption	Repayment time
Baseline assumptions in the Fehmarnbelt Forecast 2014, opening in mid-2028 No dynamic effects	36 years
20 per cent new traffic as a result of dynamic effects	-5 years

11.1.9. *Jump in traffic*

Another approach to analysing the impacts of redistribution and new traffic is to carry out sensitivity calculations on a changed jump in traffic. The Fehmarnbelt Forecast 2014 predicts a jump in traffic of 54 per cent, as calculated by Intraplan and BVU based on the FTC model, which is expected to be fully phased in by the fourth year of operation. It thus assumes a period when traffic can adapt to the opportunity of using the fixed link.³² The jump in traffic is calculated as a weighted average across all vehicle types.

Femern A/S has performed sensitivity calculations on two alternative levels for the traffic jump, 25 and 40 per cent respectively. The calculations assume that the alternative jumps in traffic are fully phased in by the fourth year of operation, equivalent to the main scenario of the Fehmarnbelt Forecast 2014.

The calculations show that a traffic jump of 25 per cent, i.e. less than half of the calculated traffic jump of 54 per cent in the traffic forecast, will lead to a 10 year extension of the repayment time. A traffic jump of 40 per cent means that the repayment time will be extended by 3 years.

Table 14.9: Jump in traffic	
Assumption	Repayment time
25 per cent jump in traffic	+10 years
40 per cent jump in traffic	+3 years
Baseline assumptions in the Fehmarnbelt Forecast 2014, opening in mid-2028 54 per cent jump in traffic	36 years

³²"Fehmarnbelt Forecast 2014", ITP and BVU, November 2014

11.1.10. Average annual traffic growth

In the sensitivity calculations, calculations are made for two traffic scenarios – one in which traffic growth is permanently 10 per cent higher and one in which it is permanently 10 per cent lower than the calculations in the traffic forecast.³³

In a scenario of 10 per cent permanently lower growth, approx. 185,000 fewer passenger cars and approx. 10,000 fewer lorries per year will be using the fixed link in 2031 than calculated in the main scenario of the traffic forecast. In 2053, the last year of traffic growth, the corresponding figures will be approx. 348,000 fewer passenger cars and approx. 32,000 fewer lorries.

In a scenario of 10 per cent permanently higher growth, approx. 189,000 more passenger cars and approx. 10,000 more lorries per year will be using the fixed link in 2031 than calculated in the main scenario of the traffic forecast. In 2053, the last year of traffic growth, the corresponding figures will be approx. 368,000 more passenger cars and approx. 31,000 more lorries.

The sensitivity calculations show that if the annual traffic growth is permanently 10 per cent higher than calculated in the traffic forecast, the repayment time will be reduced by 3 years. If the annual traffic growth is permanently 10 per cent lower, the repayment time will be extended by 3 years.

Table 14.10: Average annual traffic growth	
Assumption	Repayment time
10 per cent lower annual traffic growth	+3 years
Baseline assumptions in the Fehmarnbelt Forecast 2014, opening in mid-2028 Average annual traffic growth of 1.4 per cent	36 years
10 per cent higher annual traffic growth	-3 years

For the railway, an annual payment of DKK 400 million is assumed, cf. chapter 5.3, equivalent to around 10 per cent of total revenue over the repayment period. As a precaution, the projected growth in rail traffic is not factored into the revenue estimate, which is only indexed. A sensitivity calculation shows that if the assumed annual rail infrastructure payment will permanently be DKK 50 million higher on average over the project's entire repayment time, the repayment time will be reduced by up to 1 year. If the annual rail infrastructure payment will permanently be DKK 50 million lower on average, the repayment time will be extended by up to 1 year.

11.1.11. Continued ferry service

According to Intraplan and BVU, which are behind the traffic forecast for the Fehmarnbelt Fixed Link (the Fehmarnbelt Forecast 2014), it is not deemed financially viable to continue the ferry service between

³³ In these calculations, the traffic jump has been interpreted as traffic growth, entailing that the traffic jump in the calculations is 10 per cent higher (respectively 10 per cent lower) than in the main scenario.

Rødby and Puttgarden when the fixed link opens to traffic. The main forecast therefore assumes that the ferry service between Rødby and Puttgarden will cease when the fixed link opens.

But the Scandlines shipping company has announced that they intend to continue operating after the opening of the fixed link. Against that background, a number of sensitivity calculations of the consequences for the Fehmarnbelt project's financial health have been made using various scenarios of continued ferry service.

If the ferry service continues for a short period after the opening of the fixed link, it will not have any significant impact on the finances of the link. The assumption of gradual phasing-in of the traffic jump (the ramp-up period) could be interpreted as a consequence of continued ferry service for a short period.

If the ferries are to be competitive in the medium or long term vis-à-vis a fixed link, lower ferry prices will be needed. If ferry prices are assumed to be on a par with the costs of using the tunnel, the traffic basis is not expected to be sufficient to continue the ferry service due to the shorter travelling time and greater flexibility inherent in using the tunnel.

In connection with the Fehmarnbelt Forecast 2014, Intraplan and BVU carried out sensitivity calculations of the traffic impact of continued ferry service at prices that are 25 per cent lower than the assumed prices for using the fixed link. It is expected that in such a situation, the ferry will primarily be attractive to the most price-sensitive and non-time-sensitive passenger traffic.

In the Fehmarnbelt Forecast 2014, Intraplan and BVU carried out sensitivity calculations based on two different business models for continued ferry service. The calculations show that a model of continued ferry service with one ferry departing every other hour between Rødby and Puttgarden (2-hourly service), traffic on the fixed link will be reduced by 10 per cent for passenger cars and 12 per cent for lorries in 2025 relative to the main scenario.

In a business model with two ferries departing every hour (hourly service) between Rødby and Puttgarden, traffic on the fixed link will, according to Intraplan and BVU, be reduced by 14 per cent for passenger cars and 15 per cent for lorries in 2025 relative to the main scenario.

On the basis of these calculations, Intraplan and BVU indicate in the Fehmarnbelt Forecast 2014 that even with prices reduced by 25 per cent compared to the tunnel prices, the overall volume of traffic on ferries will not only be limited, but will consist of seasonal traffic to a large degree. This means that traffic levels will be very uneven and at their highest in the peak season and certain weekends. Intraplan and BVU therefore indicate in the Fehmarnbelt Forecast 2014 that long-term continuation of ferry services after the opening of the fixed link will not be financially viable.

As a precaution, Femern A/S has performed financial sensitivity calculations of the effect on the project repayment time in a number of scenarios of continued ferry service, based on the results of the traffic sensitivity scenarios calculated by Intraplan and BVU in the Fehmarnbelt Forecast 2014. Under each business model, two financial calculations were made: one of permanently continued ferry service and one of temporarily continued ferry service for a total period of 6 years. The calculations were based on the main scenario in the Fehmarnbelt Forecast 2014, adapted to an opening date in mid-2028.

Temporary ferry service, 2-hourly service

In the financial calculation of temporary 2-hourly ferry service, according to Intraplan and BVU's traffic calculation in the Fehmarnbelt Forecast 2014, it is assumed that the ferry service will reduce passenger car traffic across the fixed link by 10 per cent and lorry traffic by 12 per cent over the first three years of operation. The reduction is subsequently phased out over the next three years. The calculation shows that a scenario of temporarily continued ferry service with 2-hourly service will extend the repayment time by 1 year.

Temporary ferry service, hourly service

In the financial calculation of temporary hourly ferry service, according to Intraplan and BVU's traffic calculation in the Fehmarnbelt Forecast 2014, it is assumed that the ferry service will reduce passenger car traffic across the fixed link by 14 per cent and lorry traffic by 15 per cent over the first 3 years of operation. The reduction is subsequently phased out over the next three years. The calculation shows that a scenario of temporarily continued ferry service with hourly service will extend the repayment time by 1 year.

Permanent ferry service, 2-hourly service

In the financial calculation of permanently continued 2-hourly ferry service, according to Intraplan and BVU's traffic calculation in the Fehmarnbelt Forecast 2014, it is assumed that the ferry service will reduce passenger car traffic across the fixed link by 10 per cent and lorry traffic by 12 per cent each year for the life of the link. The calculation shows that a scenario of permanently continued 2-hourly ferry service will extend the repayment time by 8 years.

Permanent ferry service, hourly service

In the financial calculation of a permanently continued hourly ferry service, according to Intraplan and BVU's traffic calculation in the Fehmarnbelt Forecast 2014, it is assumed that the ferry service will reduce passenger car traffic across the fixed link by 14 per cent and lorry traffic by 15 per cent each year for the life of the link. The calculation shows that a situation with permanently continued ferry operations with hourly service will extend the repayment time by 12 years.

The results of the four sensitivity calculations for continued ferry service are presented in Table 14.11 below.

Table 14.11: Continued ferry service	
Assumption	Repayment time
1-hourly service, permanent	+12 years
2-hourly service, permanent	+8 years
1-hourly service, temporary	+1 year
2-hourly service, temporary	+1 year
Baseline assumptions in the Fehmarnbelt Forecast 2014, opening in mid-2028 (no ferry service after opening of the fixed link)	36 years

The financial calculations described above are based, inter alia, on the assumption that the price of using the ferries is reduced by 25 per cent relative to the price of using the tunnel, as traffic calculations show that the ferries with identical prices will hardly attract any traffic. Accordingly, the financial calculations are based on the assumption that *no* differentiated price structure or discount schemes will be introduced on the Fehmarnbelt Fixed Link, as exemplified by the Great Belt and the Øresund links.

11.1.12. Differentiated prices

The traffic forecast for the Fehmarnbelt Fixed Link uses a flat, technical average price for both passenger cars and lorries. Prices for lorries are regulated by EU legislation, including limits to discount schemes. For passenger cars, however, there is greater scope for pricing in order to optimise traffic.

The technically assumed average price for passenger cars of DKK 494 (2015 prices), cf. chapter 5.3, is based on a projection of Scandlines' latest available list prices from 2007 for use of the Rødby-Puttgarden ferry service. Since then, a differentiated price structure has been introduced on the ferry service with a series of different ticket types, discount schemes and 10-fare cards.³⁴ As information about the number of tickets sold broken down by price categories on the Rødby-Puttgarden route is not available, the actual price structure on the route is not known. In connection with the financial analysis of November 2014, Scandlines stated that 33 per cent of its customers use the ferry service for shopping purposes. Scandlines sells a so-called shopping ticket for DKK 549 where travellers can get either DKK 250 or a voucher if the return trip is made within a pre-defined time. It is not specified whether the 33 per cent did any shopping in connection with their trip or bought a shopping ticket to get the reimbursement of DKK 250.

The final prices for use of the fixed link across the Fehmarnbelt will be determined by the Danish Minister for Transport and Building, who will also decide whether commercial discount products are to be introduced. The prices will be set just before the opening of the link. As road and rail users have different levels of price sensitivity, it would increase revenue on the link and thus reduce the repayment time, if prices were differentiated according to the road and rail users' ability and willingness to pay. At the same time it would meet the users' demand. Differentiated prices are currently used on both the Great Belt and Øresund links.

Intraplan, the German experts behind the traffic forecast, carried out a number of analyses of different price scenarios. Overall, they analysed the users' response to price changes in relation to short trips, commuters, business travellers and general price increases. Based on those calculations, Intraplan drafted an example of a differentiated price structure that will, to a higher degree, allow for the individual users' ability and willingness to pay. This type of price adjustment to the users' needs may increase or reduce traffic volumes for different segments.

In the example calculated, a standard ticket will cost 10 per cent more than the average price used in the forecast, while discount schemes will be available to users who take short trips or use the link frequently, cf. Table 14.12.1 below. Fairly simple price differentiation has been applied, the main purpose of which is to show the impact on traffic of relatively minor price adjustments.

Table 14.12.1: Differentiated price structure	
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³⁴ Cf. www.scandlines.dk

Purpose of trip	Price change	Change in traffic volume
Commuter	-75 per cent	+314 per cent
Weekend commuter	-25 per cent	+46 per cent
Holiday	+10 per cent	-7 per cent
Short holidays	+10 per cent	-5 per cent
Business traveller	+10 per cent	-6 per cent
Shopping	-25 per cent	+30 per cent
Visiting friends and family	+10 per cent	-7 per cent
Other day trips	-25 per cent	+42 per cent
Total	-16 per cent (weighted average)	+23 per cent

A differentiated price structure as described above will substantially increase traffic volumes on the fixed link, particularly for users whose purpose is short trips, as these users are more sensitive to prices. For less price sensitive users, traffic volumes will decline, but without the overall effect on the repayment time becoming negative. Consequently, by introducing a relatively simple price differentiation and what is overall a lower average price it will be possible to attract approx. 23 per cent more users to the fixed link without this having a negative impact on the finances of the link.

Hence, a calculation of the impact on the project's finances of a differentiated price structure as described above shows that such a scenario would reduce the repayment time by just over 1 year. The financial calculation of the effect assumes that the annual revenue from passenger cars will increase by 3.4 per cent as a result of the changes in traffic volumes and prices.

Table 14.12.2: Differentiated prices	
Assumption	Repayment time
Baseline assumptions in the Fehmarnbelt Forecast 2014, opening in mid-2026	36 years
Differentiated price structure	-1 year

11.1.13. Continued ferry service and differentiated prices

Scandlines has previously announced that they intend to continue operating the Rødby-Puttgarden ferry service after the opening of the fixed link. The shipping company also announced that such future ferry service in parallel with the tunnel would be conceptually profitable, if shopping tickets are offered at reduced prices. The German traffic experts of Intraplan, who are behind the Fehmarnbelt Forecast 2014, therefore calculated the impact of such a scenario on the fixed link across the Fehmarnbelt.

Intraplan's traffic calculation assumes that it is possible to buy a shopping ticket at a 25 per cent discount on the ferry route as well as the fixed link. A similar ticket solution called "SmutTur" (i.e. quick trip) is currently available on the Øresund link. Intraplan's calculation shows that the total traffic volume on the Rødby-Puttgarden route, i.e. by ferry or via the fixed link, will increase by approx. 4 per cent. The ferry service will account for approx. 8 per cent of the total traffic volume, while approx. 92 per cent of the passenger cars will use the fixed link. Relative to the baseline scenario, the ferry service in this scenario will reduce traffic on the fixed link by approx. 4 per cent of the passenger cars. The volume of lorry traffic is assumed to be unaffected.

The calculated effect of a reduction in traffic using the fixed link is a 3-year extension of the repayment time.

Table 14.13: Continued ferry service and differentiated prices	
Assumption	Repayment time
Half-hourly ferry service with a 25 per cent discount on shopping tickets and a 25 per cent discount on shopping tickets on the fixed link	+3 years
Baseline assumptions in the Fehmarnbelt Forecast 2014, opening in mid-2028	36 years

11.1.14. Further delay of the German plan approval

The financial calculations assume that the final German plan approval will be granted in 2017, cf. chapter 2. The calculations are then technically based on two different scenarios:

- If potential legal proceedings are not granted suspensive effect, construction work can in principle commence at the beginning of 2018. Followed by a construction period of 8½ years, the fixed link in this scenario can then be opened for traffic in mid-2026.
- If potential legal proceedings are granted suspensive effect, construction work cannot commence until the legal proceedings are resolved. It is assumed that the legal proceedings will be resolved in 2019 and, if so, that construction work can commence at the beginning of 2020. Followed by a construction period of 8½ years, the fixed link can then be opened for traffic in mid-2028. This scenario with suspensive effect has been used as the basis for the sensitivity calculations made.

Given the timescale uncertainty about the German plan approval procedure, a sensitivity calculation has also been made regarding a scenario in which the final German plan approval procedure is delayed for another 2 years and will not be available until 2021, meaning that the overall approval procedure will be delayed for almost another 6 years. In this scenario, construction work can commence in 2022, and the fixed link can then be opened for traffic in 2030.

The additional costs of such a further extension will depend on the project owner's actual approach to the procedure, including whether any contracts with the contractors are terminated in e.g. 2019 with a view to a subsequent new invitation for tenders at a later time, or whether a financially attractive agreement may be concluded regarding the extension of any contracts in exchange for compensation to the contractors. Hence, various options are available, and the financial consequences will depend on an overall assessment of the finances and risks at the time when the decision is made.

The sensitivity calculation assumes that costs will be incurred for operation of the client organisation, including for external technical, environmental and legal advisers, if the project phase is extended by another two years. In addition, there will be costs for a possible update of environmental investigations, further legal assistance and other costs for support of the German plan approval procedure. The situation and tasks will depend on the specific reasons for the further delay of the German procedure.

Moreover, the sensitivity calculation assumes expenditure for either compensation for retaining already appointed contractors or for a new invitation for tenders for some contracts in the event that the German plan approval procedure is further delayed after 2019.

The extent of a possible compensation will be decided by negotiation with the contractors, including e.g. whether the contractors will be allowed to initiate certain activities within the contracts before the German plan approval is granted. This will depend on assessments of the finances, risks and conditions of procurement law in relation to the solution actually chosen, just as it will depend on the terms already agreed with any contractors appointed at the time.

Overall, the sensitivity calculation assumes additional annual expenditure totalling up to DKK 500 million per year for two years in addition to the reserves already assumed in the event of a further delay of the German plan approval procedure. An overall framework of up to DKK 500 million per year in 2020 and

2021 could cover a number of different activities in the client organisation and various models on how to deal with the contractors depending on the specific situation and the strategic assessments at the time.

As far as the Danish landworks are concerned, it assumes a postponement of the construction process to allow the section from Nykøbing F to Holeby to be completed at the same time as the coast-to-coast section.

On the revenue side, the traffic figures are lagged until an opening date in mid-2030 according to the method used to adjust the technically assumed opening date in the analysis from 2021 to 2026/2028, cf. chapter 5.1.

Overall, the sensitivity calculation shows that such a scenario with a further delay of the German plan approval procedure until the end of 2021 will extend the repayment time by 1 year.

Assumption	Repayment time
Commencement of construction at the beginning of 2022, opening of the fixed link in mid-2030	+less than 1 year
Commencement of construction at the beginning of 2020, opening of the fixed link in mid-2028	36 years

11.2. Sensitivity scenarios

Chapter 11.1 above analyses the effects of changing individual parameters of the link's finances. But in reality, some parameters are often interrelated, e.g. interest rates and traffic trends. As far as possible, the baseline assumptions concerning real interest rates as well as traffic trends have been determined conservatively.

As regards real interest rates, trends to date and the official interest rate assumptions for the coming years, cf. chapter 7, indicate that the assumed real interest rate of 3.0 per cent per year is a conservative estimate. Against this background, it does not seem realistic to assume an average real interest rate for the project's overall interest-bearing debt of more than 3.0 per cent per year.

With regard to the calculated traffic trends, the baseline assumptions of the forecast include a certain upside in relation to e.g. new traffic and dynamic effects, cf. chapter 5 and the sensitivity calculations in that respect in chapter 11. However, the calculations of future traffic are obviously subject to some uncertainty. As a precaution, it can then be assumed that a situation with lower general growth may lead to less traffic than assumed. On the other hand, in view of the conservative estimate of the traffic forecast in terms of new traffic and dynamic effects, it does not seem unreasonable to assume that a situation of higher growth may lead to more traffic than assumed.

In order to assess the effects of co-variation of the development in real interest rates and traffic growth in scenarios with higher and lower general economic growth, respectively, two scenario calculations have been made.

For illustration purposes, a calculation with high economic growth is based on the assumption that the average real interest rate for the company's interest-bearing debt will be 3.0 per cent p.a. on average. At the same time, it is assumed that the higher traffic volumes that are empirically the result of a situation with higher general growth will cause traffic revenue from the fixed link to be 10 per cent higher than in the baseline scenario. The other assumptions are unchanged relative to the baseline assumptions.

The calculation shows that this will reduce the repayment time for the overall Fehmarnbelt project in such a scenario by 5 years.

Table 15.1: High-growth scenario	
Assumption	Repayment time
Real interest rate of 3.0 per cent p.a. Traffic revenue 10 per cent higher than in the baseline scenario	-5 years

An additional calculation has been made in which it is assumed that, due to lower economic growth, the interest rate trend will enable the company to realise an average real interest rate for the interest-bearing debt of 2.0 per cent p.a. on average. At the same time, it is assumed that the lower traffic growth in such a scenario will cause traffic revenue to be 10 per cent lower than in the baseline scenario. The other assumptions are unchanged relative to the baseline assumptions.

The calculation shows that this scenario will reduce the repayment time by 4 years.

Table 15.2: Low-growth scenario	
Assumption	Repayment time
Real interest rate of 2.0 per cent p.a. Traffic revenue 10 per cent lower than in the baseline scenario	-4 years

A number of calculations have been made of the repayment time using various combinations of real interest rates and jumps in traffic, cf. Table 15.3 below.

Table 15.3: Repayment times using various combinations of real interest rates and jumps in traffic			
	2.0 per cent real interest rate	2.5 per cent real interest rate	3.0 per cent real interest rate (baseline)
54 per cent jump in traffic (baseline)	27 years	31 years	36 years
40 per cent jump in traffic	29 years	33 years	39 years
25 per cent jump in traffic	33 years	38 years	46 years

11.3. Stress tests

Stress tests are partial calculations based on the assumption that the total project repayment time must never exceed 50 years. Subsequently, the fluctuations in the project construction sum and traffic revenue that can be accommodated within this framework have been calculated.

Like the other sensitivity calculations, these calculations are based on the baseline scenario with construction commencing at the beginning of 2020 and a full drawdown on the reserves of DKK 7.3 billion for the coast-to-coast section, equivalent to total construction costs of DKK 52.6 billion. As far as the Danish landworks are concerned, the calculations also assume a full drawdown on the reserves of approx. DKK 2.2 billion, corresponding to total construction costs of DKK 9.5 billion. Accordingly, the total construction costs can be estimated at DKK 62.1 billion for the overall Fehmarnbelt project.

The stress test of construction costs shows that the Fehmarnbelt project can handle additional construction costs of approx. DKK 11.7 billion, equivalent to an increase of approx. 19 per cent relative to the baseline scenario, without the repayment time exceeding 50 years. This means that even in the event of a full drawdown on the reserves of DKK 7.3 billion for the coast-to-coast section as well as the full reserve of DKK 2.2 billion for the Danish landworks, the project can still accommodate additional costs of approx. DKK 11.7 billion.

As regards EU funding, the coast-to-coast section was paid approx. DKK 1.5 billion for planning costs and advance activities, while the Danish landworks received approx. DKK 0.3 billion during the planning phase. In addition, the coast-to-coast section was awarded a funding budget of approx. DKK 4.4 billion in July 2015 for the period 2016-2019, cf. chapter 6. Assuming that the project will not receive any funding during the construction phase, meaning that the funding budget of DKK 4.4 billion would lapse, the total repayment time will be extended by 6 years to a total of 42 years, i.e. less than 50 years.

A stress test was also performed of the traffic revenue generated by users of the road section of the link. The traffic forecast shows that with the technically assumed flat price structure, the link will generate approx. DKK 2.8 billion (2015 prices) by 2031, which is the first year after full phasing-in of the calculated traffic increase via the Fehmarnbelt (the jump in traffic). In the subsequent years, revenue will increase in step with the calculated traffic growth rates. This means that by 2053, which is assumed to be the last year of road traffic growth, road revenue will amount to approx. DKK 3.5 billion (2015 prices).

The stress test shows that the project will be able to accommodate road revenue that – year by year in the link repayment time – is 16 per cent below the assumption in the baseline scenario. This means that within a repayment time framework of 50 years, the project can handle a decline in annual revenue of approx. DKK 500 million from 2031, increasing to approx. DKK 630 million by 2053 onwards.

A stress test has been performed of the average level of real interest rates on the company's interest-bearing debt that can be handled within the framework of a 50-year repayment period. The stress test shows that even at an average real interest rate for the debt of 3.8 per cent, the repayment time will not exceed 50 years. Since the financial calculation model assumes an average inflation rate of 2.0 per cent p.a., this means that the project finances can accommodate loans taken out at an average nominal interest rate of 5.9 per cent p.a.

The results of the stress tests performed are summarised in Table 16 below.

Table 16: Stress test relative to an assumed maximum repayment time of 50 years

No.	Parameter	Maximum change
1	Construction costs for the overall Fehmarnbelt project, including the Danish landworks	+DKK 11.7 billion or +19 per cent, equivalent to total costs of DKK 73.7 billion
2	EU funding during the construction phase	Lapse of EU funding in the construction phase: Repayment time of 42 years, i.e. less than 50 years
3	Traffic revenue from the road section of the link	-16 per cent per year, equivalent to approx. DKK 500 million less in 2031 and approx. DKK 630 million less by 2053 onwards
4	Average real interest rate on the project's interest-bearing debt	3.8 per cent p.a., equivalent to a nominal interest rate of 5.9 per cent p.a.