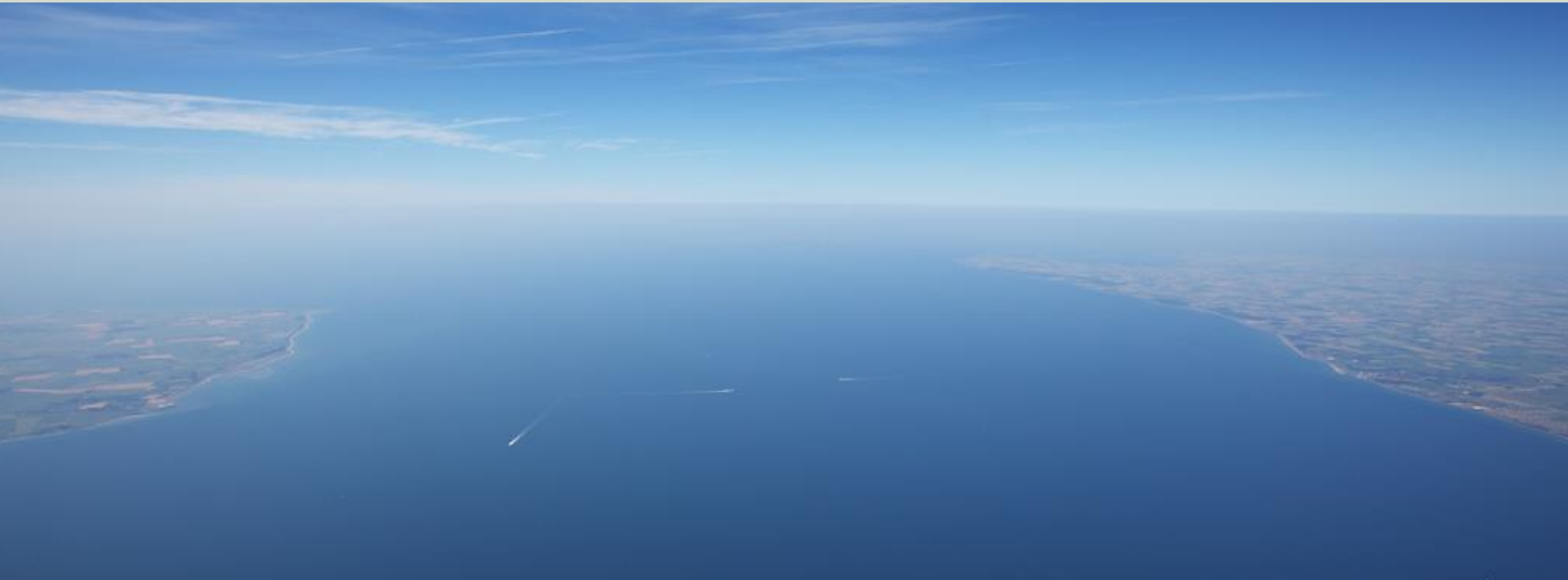


Femern A/S

The Fehmarn Tunnel

12 April 2018

Claus F. Baunkjær, CEO



The Fehmarnbelt project and Danish experiences



Key project features

- 18 km coast-coast fixed link between Rødby and Puttgarden + landworks
- Immersed tunnel (7 bn. Euro)
- Twin track railway in separate tubes and a 4 lane motorway with emergency lanes



Why?

- **Flexible and seamless transport**
- **Faster transport** - Substantial time savings between Copenhagen and Hamburg - 2 ½ vs. 4 ½ hours by train
- **More capacity** for the increasing traffic between Central Europe and Scandinavia
- **Economic development – A more attractive region**
 - Connecting European markets and Europeans (EU/CEF)
 - A more competitive German/Scandinavian business region
 - Enhanced opportunities for cross-border cooperation
 - Goods, knowledge and labour – culture, science and tourism

Status of the Fehmarnbelt tunnel project

(1) Denmark

Final Danish Construction Act passed in 2015

(2) Economy

Reviews and final financial analysis in 2016

(3) Tender process

Conditioned contracts signed with major contractors in 2016

(4) Germany

Plan approval process in Germany

Construction

The financial model behind the Fehmarnbelt Tunnel

- Femern A/S is organized like a private company, but owned 100 pct. by the Danish state
- The tunnel is financed using the state guarantee model (Tolls) and via EU funding:
 - Estimated construction costs are €7 billion, incl. a reserve of almost €1 billion
 - Loans are taken out on the international financial markets
 - Loans are guaranteed by the Danish state (AAA)
 - Loans are repaid with the revenue from the users of the tunnel
 - Estimated repayment period is 36 years ("Green Zone")
- The revenue covers both construction costs and the cost of operation and further maintenance of the tunnel
- The state guarantee model was used on the Great Belt and Öresund Fixed Link projects with great success

The Tunnel Contracts – 7 bn. Euro

- Four major construction contracts have been signed with two international contractor consortia
 - Tunnel North
 - Tunnel South
 - Tunnel Portals and Ramps
 - Tunnel Dredging and Reclamation

- Ongoing tender processes
 - Electrical & Mechanical installations
 - Railway installations

- Several minor contracts

Companies within the international contractor consortia

Tunnel:



GRANDS PROJETS



AARSLEFF



Ingenieurbau



COWI

Portals:



AARSLEFF



GRANDS PROJETS



Ingenieurbau



COWI

Femern
Sund ≈ Bælt

Dredging & Reclamation:



Contract types

Possible approaches in the civil works tender process

1. Design-Bid-Build

- Design phase is fully finalized before construction phase is initiated
- Limited interaction
- The traditional method
- Experience from the Great Belt Link – a national project

2. Design & Build

- More interconnected design and construction phases
- The main construction contracts on the Fehmarn Project
- Experience from the Øresund Link

3. Design & Build + Maintenance

- E&M contracts on the Fehmarn Project

Design & Build contracts used on the Fehmarnbelt project

- Plan approval processes in both Germany and Denmark
 - Requires flexibility from the contractor - design and construction work hand-in-hand
 - Working with interconnected phases enables the client company to respond more effectively to administrative and political demands
- The technical complexity of the project
 - Interdependency between designers and builders – contractors experience in the design is vital to enhance quality and innovation
 - Time risks are reduced because the responsibility for both design and construction is by one entity – the contractor
- Design & Build requires a skilled client company to check and balance the contractor + choosing the right contractors

Working with ever more complex surroundings

- Megaprojects are a special breed: Important projects – the game changers – are often the most complex and challenging projects
- Project companies must handle still increasing expectations towards:
 - Environmental protection
 - Citizen involvement
 - Strong budget control and financing models
 - Corporate social responsibility
 - Labour market conditions
 - Rapid technology driven innovation

A case: Planning cross border megaprojects

From State Treaty to construction work:

- 1991-1995: Øresund Fixed Link (5 years)
- 2004-2011: Brenner Base Tunnel (8 years)
- 2008-2020: Fehmarnbelt Fixed Link (13 years)

Ever longer planning phases and journeys especially for megaprojects?

Is the construction phase becoming the easy part?

