

June 2009

# The Fehmarn Belt Crossing

## **Business impact**

- Significant opportunity for selected key sponsors and funders with special expertise in bridges.
- One of Europe's largest transport projects with considerable impact for the construction industry, shipping lines and the region as such.
- Necessary extension of onshore road and rail connections will create additional opportunities and smaller add-on projects, as may environmental protection measures.

The construction of a crossing over the Fehmarn Belt - the strait separating Germany and southern Denmark - which has been under discussion for some 15 years, has now finally been given the green light. As one of the European Union's 30 most important traffic projects, which will form part of the Trans-European Transport Network (TEN-T), it represents one of the most prestigious infrastructure projects in procurement today.

The crossing will connect the German island of Fehmarn with the Danish island of Lolland across the 18km-wide Fehmarn Belt in the Baltic Sea: see the map overleaf for further details. The preferred solution is a cable-stayed bridge.

Once constructed, it will represent the final missing link connecting Scandinavia to mainland Europe. Proponents of the project emphasise that, as a fixed link, the crossing will provide an uninterrupted, fast and safe transport corridor for both road and rail between the cities of Copenhagen and Hamburg. In particular, the travel time between the two cities will be reduced by an hour to a total of just three and a half hours.

## **Background**

### **Historical background**

Back in September 2006, the ministers of transport of Germany, Denmark and the German federal state of

Schleswig-Holstein met with a view to determining the likely interest of potential private investors (in terms of risk transfer and financing possibilities) in the scheme.

On 29 June 2007 - following lengthy political discussions - the Danish and German governments finally announced that agreement had been reached in relation to the construction of the crossing, and details of the agreement were set out in a memorandum of understanding (MoU).

### **Memorandum of Understanding**

Under the terms of the MoU, construction works will begin by 2012, and the crossing will open to traffic by 2018.

The bridge company (Femern Bælt A/S - owned by the Kingdom of Denmark) will be responsible for the preparation, planning, financing and operation of the bridge. It will also fix the road tolls. The Kingdom of Denmark will receive any profits and be liable for any losses arising from the operation of the crossing.

Regarding construction works, a non-open call to selected reputable companies can be expected. Also, the private sector may be asked to provide financial assistance for the project. In addition, the transfer of functions (e.g. design, operation, etc.) from the bridge company to the private sector (e.g. through the use of



*Computer image of cable-stayed bridge across the Fehmarn Belt, courtesy of Femern Bælt A/S*

the public private partnership (PPP) model) is also a possibility.

It is intended that Denmark will, ultimately, become the sole owner of the bridge. Germany, for its part, has agreed to invest in the construction of the necessary road and rail links. As the project is a TEN-T project, further EU funding is to be expected.

### Treaty between Germany and Denmark

The results of the MoU were laid down in a formal treaty between Germany and Denmark. It was signed by the Ministers of Transport of both countries on 3 September 2008.

### Approval of the national parliaments

Furthermore the approval of both parliaments is required. This month the German Parliament gave its vote for the treaty and on 10 July the German Bundesrat will give its consent. The Danish Parliament has already accepted it overwhelmingly in March 2009.

## Introduction to the project

### Feasibility studies

The feasibility studies which were undertaken indicate that:

- the financial feasibility of the project will - to a large extent - depend on the level of competition within the rail sector and the willingness of potential users to pay the bridge toll; and
- the establishment of a fixed link is expected to result in major changes to traffic patterns in a large part of northern Europe.

### Traffic forecasts

In January 1999, a comprehensive traffic demand analysis and forecast initiated by the German and



Danish ministries of transport was completed and revealed the following findings:

- **Road traffic:** based on extensive surveys undertaken in 1994, road traffic volume for the year 2010, in the case of a four-lane motorway solution, was predicted to amount to approximately 2.8m vehicles per year, compared to 1.8m without a fixed link. This corresponds to approximately 7,700 vehicles per day. However, there have been other forecasts predicting a maximum number of as high as 12,000 vehicles per day.
- **Rail traffic:** According to the traffic forecast for 2010, 10.8m tons of goods and up to 1.8m passengers will cross the Fehmarn Belt fixed link by train each year. At present, all freight trains and some passenger trains are routed via the Danish Great Belt fixed link - the link between the Danish islands of Zealand and Funen across the Great Belt.

€5.6bn

Estimated construction cost for the coast-to-coast connection

## Technical solution and construction

### Technical solution

Taking into account environmental considerations and safety issues, as well as the likely construction, operating and maintenance costs of a bridge in such an exposed location, the optimum solution is thought to be a triple-span cable-stayed bridge with each of the three spans being 724m in length. Vertical clearance would be 65m to allow for the passage of sea traffic underneath. An alternative solution of an immersed tunnel has also been put forward. Both options are designed to provide a four-lane motorway and a double-track railway line.

One of the main challenges is the anchorage of the construction on the seabed. Geotechnical analyses started in August 2008.

### Construction costs

Construction costs for the coast-to-coast connection (i.e. including link roads and track) are calculated to amount to €5.6bn, of which Denmark is expected to contribute €4.8bn and Germany €800m. It is estimated that the construction period will be seven to eight years.

## Conclusion

Although it has been a very long time coming, and is not due to be open to traffic for at least another eight to ten years, this project, as a TEN-T scheme, represents one of the final pieces in the jigsaw for the

further integration of the European road and rail network.

It is to be hoped that this lengthy gestation period is not further delayed, as significant economic benefits are likely to accrue, particularly to Danish businesses

on the large island of Zealand (as well as those in Sweden, which is linked to Zealand by the Øresund link, which opened in 2000 between Copenhagen and the southern Swedish city of Malmö) by giving them a more direct fixed link to the substantial markets of northern Europe.

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### Key transport contacts in Germany



**Dr. Nikolaus von Jacobs**  
Partner, corporate  
T: +49 (0)69 97 11 26  
E: nikolaus.vonjacobs@ashurst.com



**Anne Force**  
Partner, finance  
T: +49 (0)69 97 11 26  
E: anne.force@ashurst.com



**Peter Junghänel**  
Partner, real estate  
T: +49 (0)69 97 11 26  
E: peter.junghanel@ashurst.com



**Daniel Schmachtenberg**  
Senior associate, corporate and projects  
T: +49 (0)69 97 11 26  
E: daniel.schmachtenberg@ashurst.com

**Abu Dhabi**

Suite 101, Tower C2  
Al Bateen Towers  
Bainunah (34th) Street  
Al Bateen  
PO Box 93529  
Abu Dhabi  
United Arab Emirates  
T: +971 (0)2 406 7200  
F: +971 (0)2 406 7250

**Brussels**

Avenue Louise 489  
1050 Brussels  
Belgium  
T: +32 (0)2 626 1900  
F: +32 (0)2 626 1901

**Dubai**

Level 5, Gate Precinct Building 3  
Dubai International Financial Centre  
PO Box 119974  
Dubai  
United Arab Emirates  
T: +971 (0)4 365 2000  
F: +971 (0)4 365 2050

**Frankfurt**

Oberlindau 54-56  
60323 Frankfurt am Main  
Germany  
T: +49 (0)69 97 11 26  
F: +49 (0)69 97 20 52 20

**Hong Kong**

Suites 1601-6, 16/F ICBC Tower  
Citibank Plaza  
3 Garden Road  
Central, Hong Kong  
T: +852 2846 8989  
F: +852 2868 0898

**London**

Broadwalk House  
5 Appold Street  
London EC2A 2HA  
UK  
T: +44 (0)20 7638 1111  
F: +44 (0)20 7638 1112

**Madrid**

Alcalá, 44  
28014 Madrid  
Spain  
T: +34 91 364 9800  
F: +34 91 364 9801/02

**Milan**

Via Sant'Orsola, 3  
20123 Milan  
Italy  
T: +39 02 85 42 31  
F: +39 02 85 42 34 44

**Munich**

Prinzregentenstraße 18  
80538 Munich  
Germany  
T: +49 (0)89 24 44 21 100  
F: +49 (0)89 24 44 21 101

**New Delhi Liaison Office**

6 Aurangzeb Road, D-1  
New Delhi 110011  
India  
T: +91 11 2301 4054  
F: +91 11 2301 4089

**New York**

1 Penn Plaza, 36th Floor  
New York, NY 10119  
USA  
T: +1 212 245 4540  
F: +1 212 245 4335

**Paris**

18, square Edouard VII  
75009 Paris  
France  
T: +33 (0)1 53 53 53 53  
F: +33 (0)1 53 53 53 54

**Singapore**

55 Market Street  
#07-01  
Singapore 048941  
T: +65 6221 2214  
F: +65 6221 5484

**Stockholm**

Birger Jarlsgatan 6B  
Box 55564  
102 04 Stockholm  
Sweden  
T: +46 (0)8 407 24 00  
F: +46 (0)8 407 24 40

**Tokyo**

Shiroyama Trust Tower, 30th Floor  
4-3-1 Toranomom, Minato-Ku  
Tokyo 105-6030  
Japan  
T: +81 3 5405 6200  
F: +81 3 5405 6222

**Washington DC**

1725 I St NW, Suite 300  
Washington, DC 20006  
USA  
T: +1 202 349 1111  
F: +1 202 349 3838

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