TRAFFIC ANALYSIS

Business Park Falster

TENTacle WP2, Group of Activities 2.1, Activity 2.1.5.

Version: June 2017

GULDBORGSUND
REGION BLEKINGE
Lead Partner
Interreg
Baltic Sea Region
EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

Content

0. Summary

Guldborgsund Municipality is planning to expand the transport centre Business Park Falster near highway Exit 43 Nørre Alslev on the highway E47/E55 as this location is expected to have a business potential in relation to the planned Fehmarn Belt tunnel.

Ramboll is preparing an analysis on behalf of Guldborgsund Municipality. The analysis will cover three main subjects:

- Transport analysis
- Analysis of potentials for the development
- Stakeholder analysis

This technical memo describes the first part of the delivery regarding the traffic analysis. The main findings on the transport subjects are described in this summary.

The analysis covers freight transport on road, rail and sea. The situation is analysed for these situations:

- 2016 - how does it look today
- 2028 - the first year with an open Fehmarnbelt Fixed Link (FBFL)
- 2038 - the FBFL has been open in 10 years and is part of everyday life

The overall results of the analyses are summarized below:

	2016	2028	2038
ROAD	About one fifth of the truck traffic between Denmark and Germany are crossing the Fehmarn Belt and most of these pass by Business Park Falster.	The opening of the FBFL is not expected to impose major changes in route choice for truck transport, but the number of trucks crossing the Fehmarn Belt will grow. The number of trucks passing by Business Park Falster is expected to be 36% higher than in 2016.	In the period 2028 to 2038 the number of trucks is still growing but at a more steady state. 24% more trucks are expected to pass by Business Park Falster than in 2028 and 68% more trucks pass by than in 2016.
RAIL	The majority of rail freight in Denmark is transit transport through Denmark. About 8% of the international rail freight to/from Denmark is going to/from Region Zealand but there is no freight rail infrastructure in the region as all international rail freight is using the connection across The Great Belt. It is estimated that half of the international rail freight to/from Region Zealand or 93 thousand tonnes a year will have an endpoint within the catchment area of Business Park Falster. When exchanged to trucks the rail freight volumes is estimated to be equivalent of nearly 13 trucks a day to or from Business Park Falster.	The opening of the FBFL radically changes the transport structure as the connection will be a vital link in the European rail freight network. Rail freight is expected to grow, but the FBFL will mainly boost the transit rail freight which is of little interest in relation to Business Park Falster. But the rail freight to/from Region Zealand is also expected to grow and it is estimated that 118 thousand tonnes a year will have an endpoint within the catchment area of Business Park Falster. This is a 27% increase from 2016 to 2028. This is an equivalent of about 16 trucks a day to or from Business Park Falster.	Rail freight is continuing to grow after the opening of the FBFL, especially the transit rail freight, but also international rail freight relevant to Business Park Falster. The growth in freight volumes to and from the Business Park Falster and its hinterland is estimated to be 22% from 2028 to 2038 and 55% from 2016 to 2038 The rail freight to/from Business Park Falster is estimated to be 144 thousand tonnes a year in 2038. This is an equivalent of about 20 trucks a day to or from Business Park Falster.

	2016	2028	2038
SEA	The major component in freight transport by sea is the ferry freight – freight carried on trucks on the ferries crossing Fehmarn Belt. The freight transport to/from the four local Guldborgsund harbours is only 6% of the volumes carried on the two ferries.	Ferry freight will grow as described above for truck freight. The prognoses on sea freight in general are very uncertain as a very sudden decline in Danish sea transport has occurred in 2016 and it has not been found viable to do a prognosis on this basis	Ferry freight is expected to grow in accordance with the growth in truck freight..

The major changes in transport patterns and structures will be the reintroduction of rail freight transport crossing the Fehmarn Belt.

Rail freight transport is expected to get a substantial growth but the major growth will be in transit transport, to which Business Park Falster has no or few services to offer.

But still some rail freight has endpoints within the catchment area of Business Park Falster and in 2038 this freight is estimated to be an equivalent of 20 trucks a day to or from Business Park Falster.

No major structural changes are expected in the road freight pattern and structures - the main routes will be unchanged but the volumes will grow. In 2038 the number of trucks passing by Business Park Falster on E47/55 is estimated to be 68% higher than in 2016.

Freight transport by sea is dominated by the ferry freight on trucks and the development will follow the developments in truck transport.

1. Project Background

Guldborgsund Municipality is planning to expand a transport centre Business Park Falster near highway Exit 43 Nørre Alslev on the highway E47/E55.

Ramboll is preparing an analysis on behalf of the Guldborgsund Municipality. The analysis will cover three main subjects:

- Transport analysis
- Analysis of potentials for the development
- Stakeholder analysis

This technical memo describes the first part of the delivery regarding the traffic analysis. Later memos will cover potential and stakeholder analysis. These analyses will be based on the results from this transport analysis.

The transport centre has a beneficial location in the centre of an area with cities like Hamburg, Berlin, Copenhagen, Malmo, Stockholm and Oslo. The opening of the Fehmarnbelt Fixed Link (FBFL) is expected to enhance the benefits even more.

The Fehmarn Belt project is pointed out as "a key component in the main north-south route between central Europe and the Nordic countries" in the TEN-T network. After the completion of the project, the travel time between Copenhagen and Hamburg will be reduced by approximately one hour and for rail freight transport by approximately two hours[1]". As a result, the mobility and accessibility of Guldborgsund Municipality and Exit 43 will be improved, and companies as well as individuals may consider moving to the municipality.

Business Park Falster is visible and accessible from the highway E47/E55 and it has a short distance from the railway and the Orehoved harbour. The existing nearby Transport-Center CARGO SYD is a partner in the plans for the business park.

The existing industrial area in the business park will be extended by 625,000 m^2, and the total area of Business Park Falster will be 120,000 m^2.

[1] https://ec.europa.eu/transport/themes/infrastructure/ten-t-guidelines/corridors/scan-med_en

Figure 1 - Extension of Business Park Falster

The analyses in this document evaluate traffic patterns in:

- 2016 – Current year
- 2028 – Expected first year with an open Fehmarnbelt Fixed Link (FBFL)
- 2031 (ultimo) – four years after the opening where the full effect of the tunnel is expected to occur
- 2038 (primo) – ten years after the opening

With a focus on freight transport on road, rail and sea.

1.1. Future infrastructure projects related to Lolland-Falster

Not only will the Fehmarn Belt tunnel impact the traffic patterns on Lolland-Falster. Other future infrastructure projects may have impacts on Lolland-Falster too.

There is no doubt that the biggest projects taking place on Lolland-Falster in the nearest future will be the Fehmarnbelt Fixed Link (FBFL). This will be an 18 km long tunnel for both road and rail. The tunnel will have a four-lane motorway and two electrified rail tracks[2].

Another major project is an upgrading of the railway line Ringsted-Fehmarn to 200 km/h as well as electrification and installation of a new signalling system. The Ringsted-Fehmarn line will be connected to the fixed link across Fehmarn Belt and it will be an important part of the trans-European railway network[3].

A third project that is relevant for Lolland-Falster is the construction of a new Storstrøm Bridge. This is important in relation to the Fehmarn Belt project, as the railway will use this bridge too. The new bridge will have two electrified railway tracks and a two-lane road. The bridge will open not later than 2022[4].

The nearby Orehoved harbour has been considered as a potential production location for the Storstrøm Bridge. But these plans have lately been stopped due to a high risk of extensive costs on deepening the harbour after recent archaeological findings in the area. The harbour may serve as a

[2] http://femern.com/en/Tunnel/Facts-on-the-tunnel

[3] http://uk.bane.dk/visBanearbejde_eng.asp?artikelID=18563

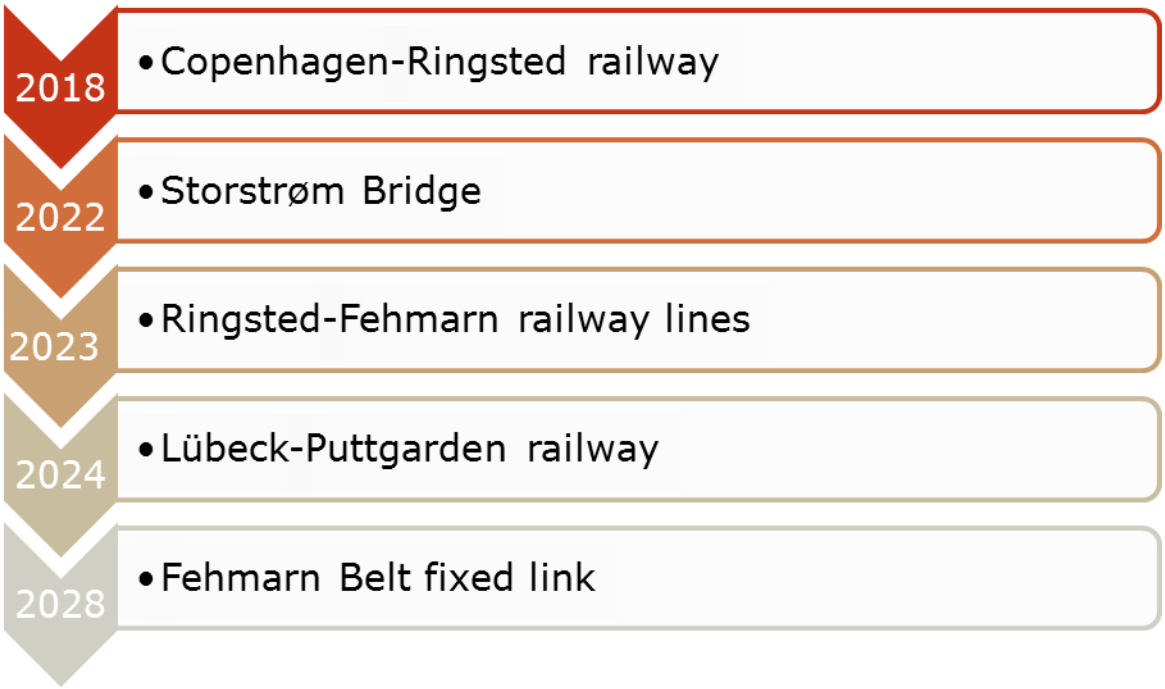
[4] http://vejdirektoratet.dk/DA/vejprojekter/storstroemsbro/Sider/default.aspx

service harbour for things like inspections of the bridge construction work, but this is not expected to cause extra transport at a level relevant for inclusion in this analysis.

Another infrastructure project that can affect travel patterns on Lolland and Falster is the new railway line Copenhagen-Ringsted. The line will have two tracks and it will be electrified. The new railway will stop in Køge too[5]. The opening year for the new line is set to be 2018.

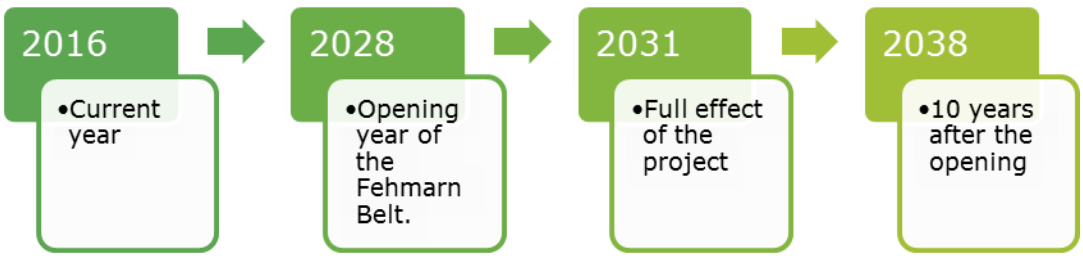
The figure below summarizes the above mentioned infrastructure projects and their expected opening years.

Figure 2 – Expected opening years of the future major infrastructure projects related to Lolland-Falster



The figure below shows milestones in the Fehmarn Belt project, which will have a great influence on traffic patterns on Lolland-Falster including Guldborgsund Municipality.

Figure 3 - Timeline of the Fehmarn Belt project



Year 2016 is set to be a current year for this traffic analysis, while 2028 is the opening year of the Fehmarnbelt Fixed Link. The traffic impact of the new fixed link is analysed in year 2031, four years after the opening, since the full effect of the project will not be visible from day one. Furthermore, the traffic patterns are evaluated for year 2038 where the Fehmarn Belt tunnel has been open for traffic in 10 years.

[5] http://uk.bane.dk/visBanearbejde_eng.asp?artikelID=15469

The first four years after the opening of the fixed link are referring to a so called “ramp-up” period. The “ramp-up” period is the period where the road users will be adapting to the new infrastructure and get used to it.

1.2. Focus in project

This project is mainly focusing on freight transport on road, rail, ferry or ship. The analysis of the future transport patterns are primary based on the existing traffic forecasts prepared for Fehmarn A/S. No new traffic forecasts were prepared in this analysis due to the available resources and time frame. Therefore, the whole analysis is based on the existing forecasts and reports.

The geographical area covered in this analysis is Lolland-Falster including the proposed fixed link.

As the Fehmarnbelt Fixed Link may radically change overall traffic patterns also major traffic links at a regional level in Denmark are included like the Great Belt Bridge and the Øresund Bridge.

2. Current and historical traffic situation

In the following sections the base line situation will be described. What is the status on road, rail and sea freight transport and how has the developments been up till today?

2.1. Road traffic

In this section the road transport situation is described with a focus on the truck traffic.

Figure 4 shows the most recent counts of traffic on the roads just around Business Park Falster (as AADT – annual average daily traffic). The daily traffic on E47/55 near exit 43 is between 23,100 and 25,700 vehicles per day. Of these 3,600 to 4,000 are trucks (HGV's).

On the four ramps connecting E47/55 and Stubbekøbingvej, the daily traffic is about 1,000 trucks. On Stubbekøbingvej about 500 trucks a day pass by Business Park Falster.

Figure 4 - Annual Average Daily Traffic (AADT) as sum of both traffic directions in 2015-2017 as well as number of HGVs (heavy goods vehicles) nearby Exit 43

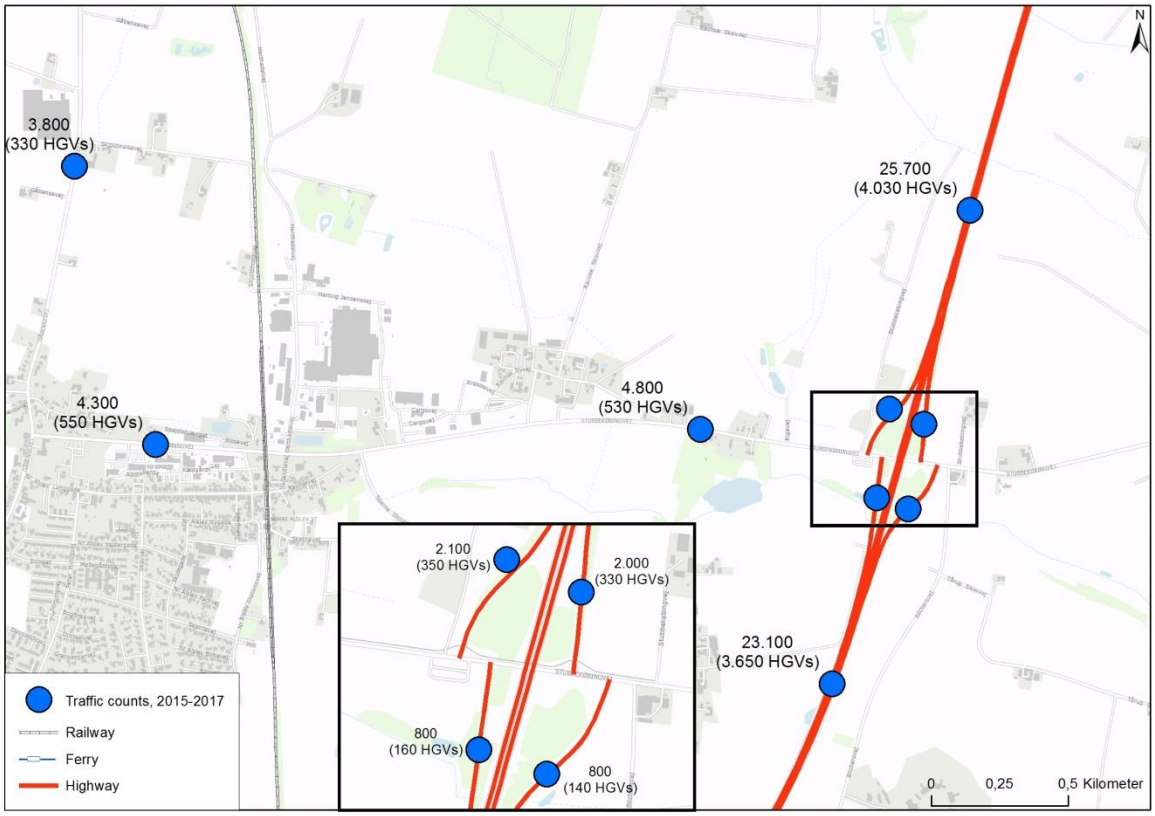
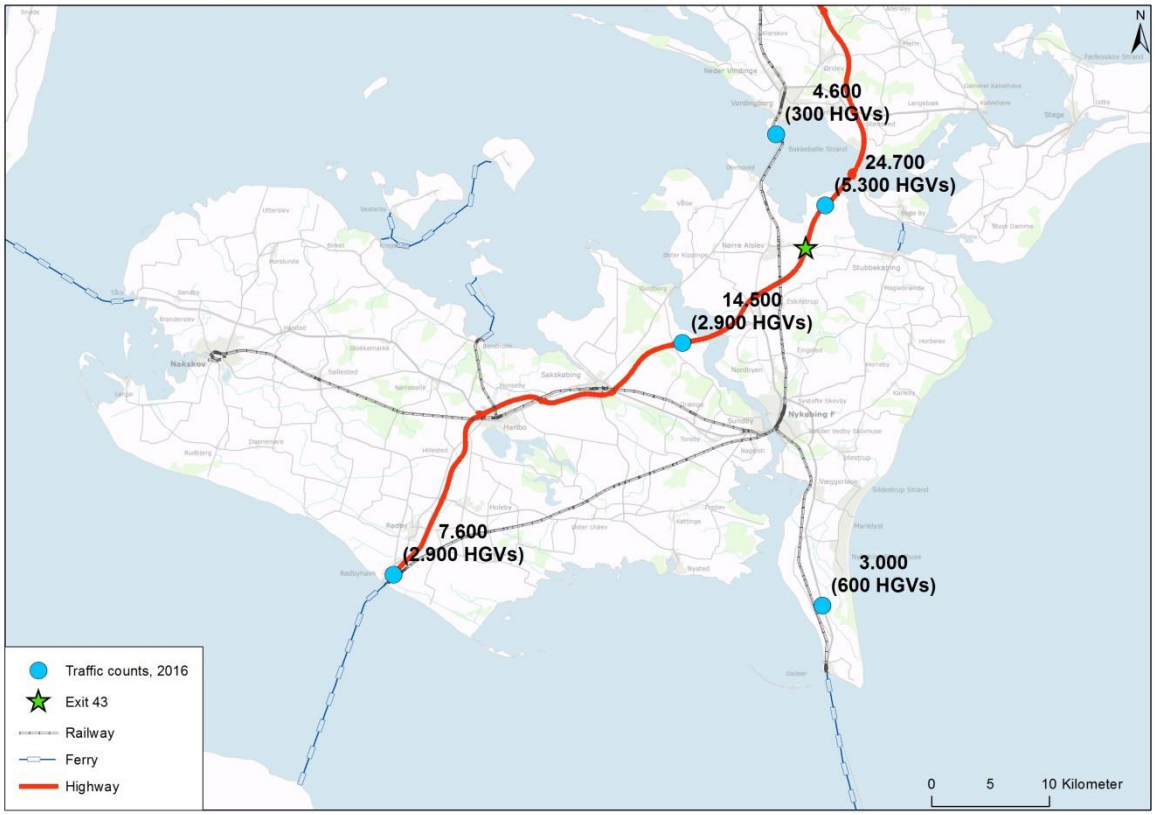


Figure 5 is zooming out from Business Park Falster and shows the daily traffic at selected count locations on Lolland-Falster. West of Guldborgsund the daily traffic is 2,900 trucks and the same number of trucks is counted near Rødby north of the ferry harbour. On E55 north of Gedser the daily truck traffic is 600 vehicles.

Not all the trucks counted on the roads close to the two ferry harbours are necessarily heading for the ferry - they may be delivering goods in Rødby or Gedser. According to the latest statistics, about 1,235 trucks (2015) are using the Rødby-Puttgarden ferry on an average day and 280 trucks (2015) are using the Gedser-Rostock ferry (see Figure 9 and Figure 10).

At present, only 300 trucks per day are entering or leaving Falster on the Storstrøm Bridge as the bridge has restrictions on total weight[6] due to damages on the construction.

Figure 5 - Selected traffic counts on Lolland-Falster, 2016



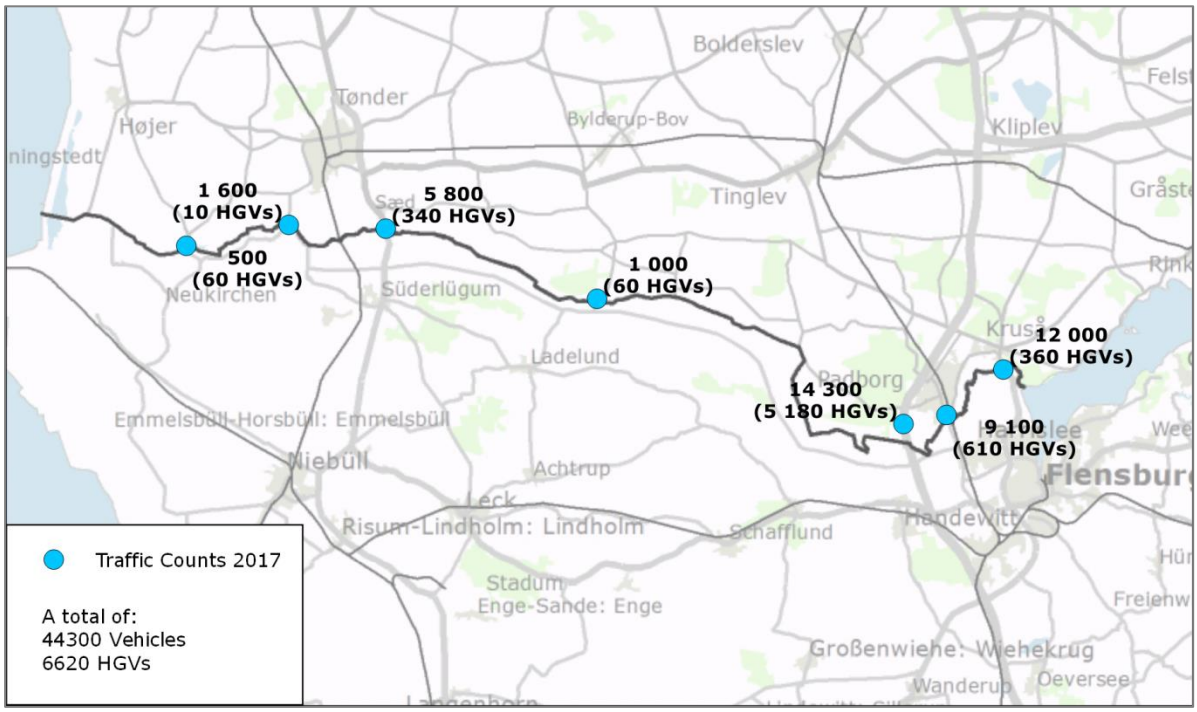
Zooming even further out the next figure reveals the major truck flows related to transport between Denmark and Germany. The Great Belt Bridge is crossed by a little more than 6,000 trucks a day while The Little Belt Bridge is crossed by 9.600 trucks per day. Finally, the border-crossing traffic in Jutland near Frøslev is 6,700 trucks a day.

[6] http://www.vejdirektoratet.dk/DA/trafik/erhverv/begr%C3%A6nsninger/Sider/Broer-med-begr%C3%A6nset-passage.aspx

Figure 6 - Selected traffic counts in Denmark, 2016

However, the South Jutland has several border-crossing points – they are all shown in Figure 7 together with the daily traffic in 2017. A total of 44,300 vehicles per day cross the Danish-German country border and 6,620 are trucks.

Figure 7 – Annual Average Daily Traffic (AADT) in 2017 at the Danish-German country border in Southern Jutland



Source: Mastra, The Danish Road Directorate (traffic data from January and February 2017 extrapolated to yearly traffic inside the Mastra System)

In Table 1below the traffic crossing the border in Jutland (up-scaled to yearly number of vehicles) is compared with the number of vehicles using the ferries between Lolland-Falster and Germany (see also Figure 9 and Figure 10):

Table 1 - Vehicles per year between Germany and Denmark

	RØDBY-PUTTGARDEN 2015	GEDSER-ROSTOCK 2015	FERRY TOTAL 2015	BORDER IN JUTLAND 2017	DENMARK-GERMANY TOTAL 2015/2017
TRUCKS	450 886	101 935	552 821	2 416 300	2 969 121
%	15%	3%	19%	81%	100%
ALL VEHICLES	2 024 553	393 476	2 418 029	16 169 500	18 587 529
%	11%	2%	13%	87%	100%

Source: The Danish Road Directorate and Statistics Denmark

The majority of vehicles use the border crossings in Jutland: 81% of the trucks and 87% of all vehicles do this.

Since 2015 figures for the ferries are compared with 2017 figures for the Jutland border, the percentages using the ferries are probably a bit higher since some traffic growth must be expected to have taken place on the ferries between 2015 and 2017.

However, what is more important is that these percentages are likely to be altered by the future Fehmarnbelt Fixed Link.

During the last 15 years, the road traffic has been ever growing. According to the Statistics Denmark, the average yearly traffic growth at Sydmotorvejen was 2.7% between 2011 and 2015, and a bit lower in the period 2000-2015 due to the financial crisis. Gedser-Landevej near Gedser ferry has also had an increase in daily traffic of 0.5% per year in 2011-2015.

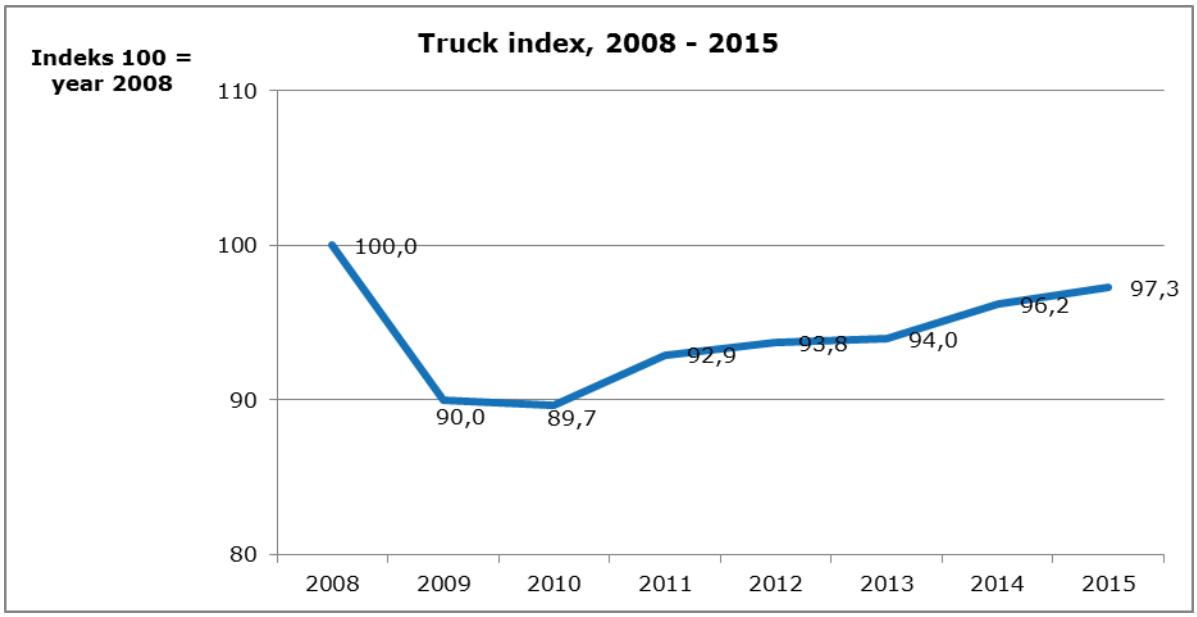
Table 2 - Traffic growth at E47/E55 in the period of 2000-2015 and 2011-2015.

	AVERAGE YEARLY INCREASE IN TRAFFIC	
	2000-2015	2011-2015
E47 E55 SYDMOTORVEJEN, SOUTH OF ALGESTRUP	2,4%	2,2%
E47 E55 SYDMOTORVEJEN, SOUTH OF TAPPERNØJE, MV. I 90	2,4%	1,7%
E47 E55 SYDMOTORVEJEN, FARØ BRIDGES, BEFORE EXIT 43	2,2%	2,3%
E47 E55 GULDBORGSUND TUNNEL, AFTER EXIT 43	3,0%	5,1%
E47 SYDMOTORVEJEN, EAST OF RØDBY	3,2 %	2,2%
AVERAGE	**2,6%**	**2,7%**
GEDSER LANDEVEJ, NEAR GEDSER FERRY	-*	0,5 %

*The traffic on this location was not counted in 2000-2010.
Source: Statistics Denmark per year between Germany and Denmark

The growth in number of trucks registered in Denmark is illustrated in the figure below. The figure illustrates that in the period 2008-2010, there was a decline in number of trucks, which probably is related to the financial crisis. Afterwards the number of trucks increased slightly. In 2015, the truck index was at 97.3 compared to 2008. But also an increasing number of foreign trucks doing transport in Denmark may have affected the trend.

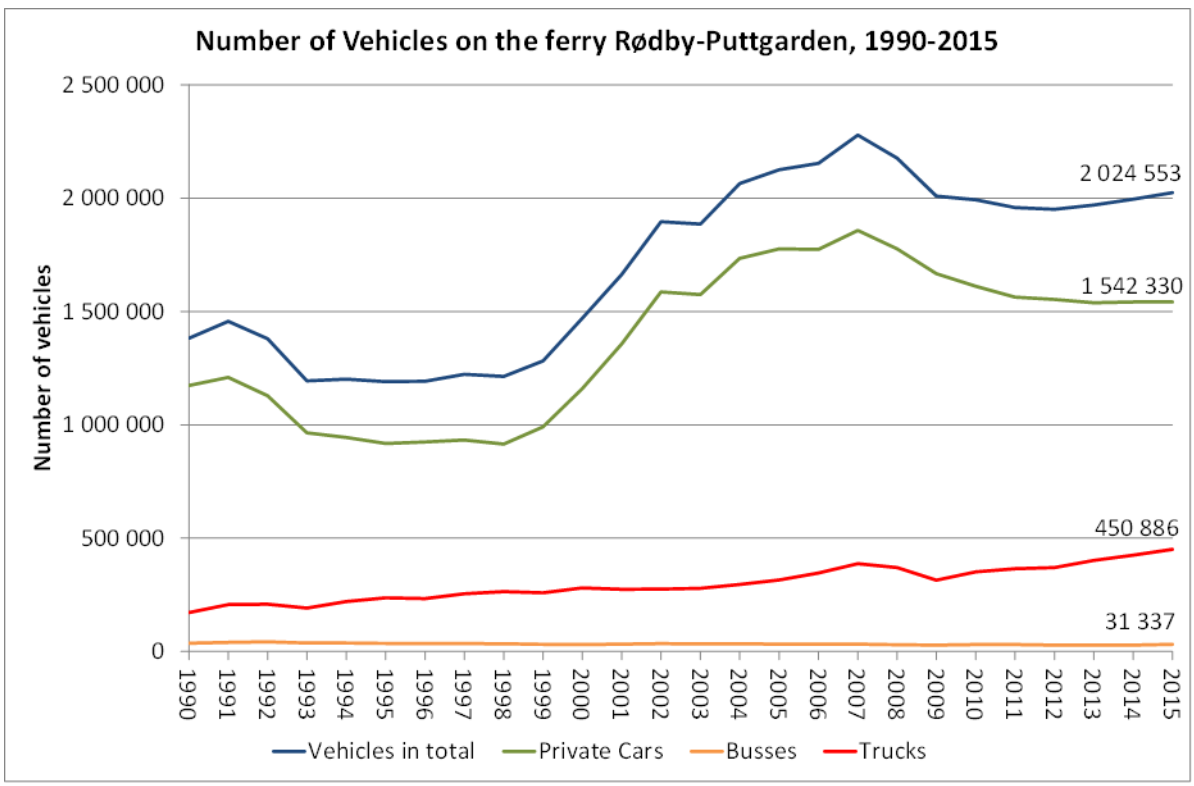
Figure 8 - Increase in number of registered trucks in Denmark from 2008 to 2015



Source: Statistikkatalog "Nøgletal om vejtransport", The Danish Road Directorate, 2016

Data from Statistics Denmark on the Rødby-Puttgarden ferry in Figure 9 shows that the number of trucks transported has been steadily increasing since 2001 with a slight decline during the financial crisis around 2008. In 2015 the number of trucks bordering the ferry was about 451,000, which are about 1,235 trucks on an average day.

Figure 9 - Vehicles transported on the ferry line Rødby-Puttgarden

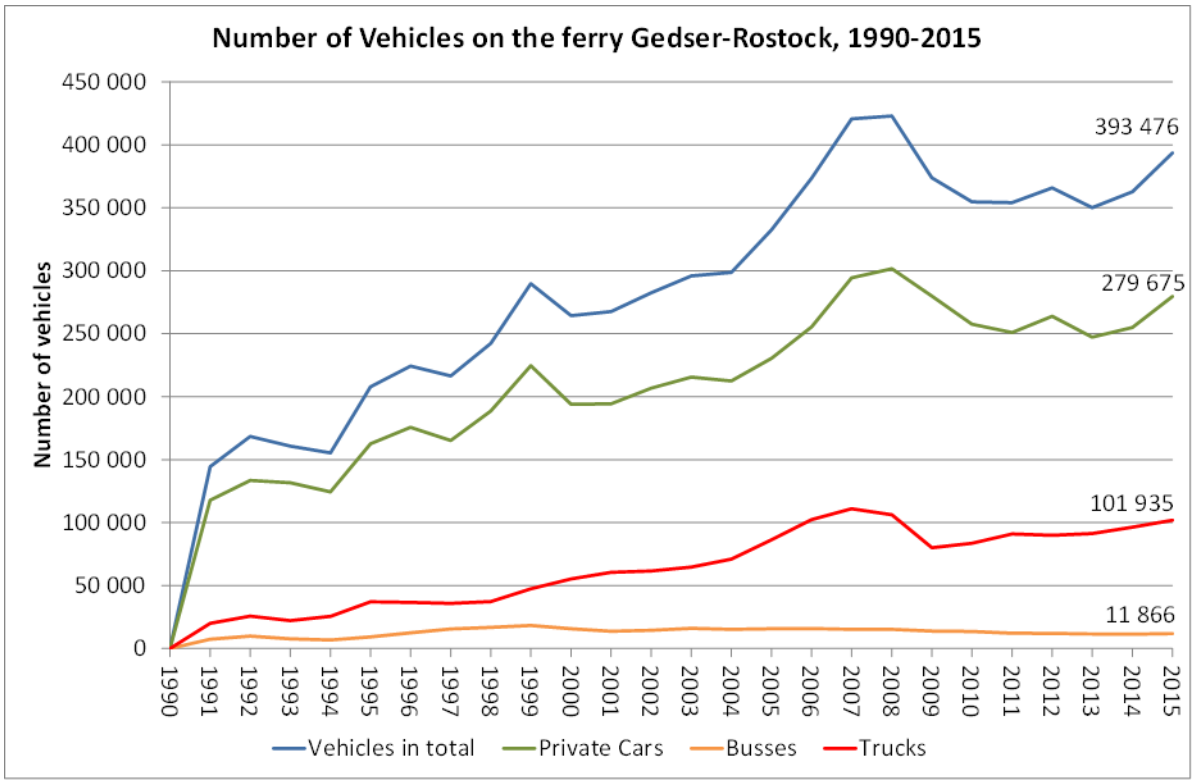


Source: Statistics Denmark

In Figure 10 similar data are shown for the Gedser-Rostock ferry. In 2015 about 102,000 trucks used the ferry equalling about 280 trucks a day.

For both ferries a notable increase in number of trucks has been seen after 2001 when the Øresund Bridge was opened.

Figure 10 - Vehicles transported on the ferry line Gedser-Rostock



Source: Statistics Denmark

2.2. Freight transport by rail

In this section the current situation and the historical development on rail freight transport is described. Results are given for Denmark in total and for Region Zealand.

In Denmark, freight transportation by rail is managed by five companies[7]:

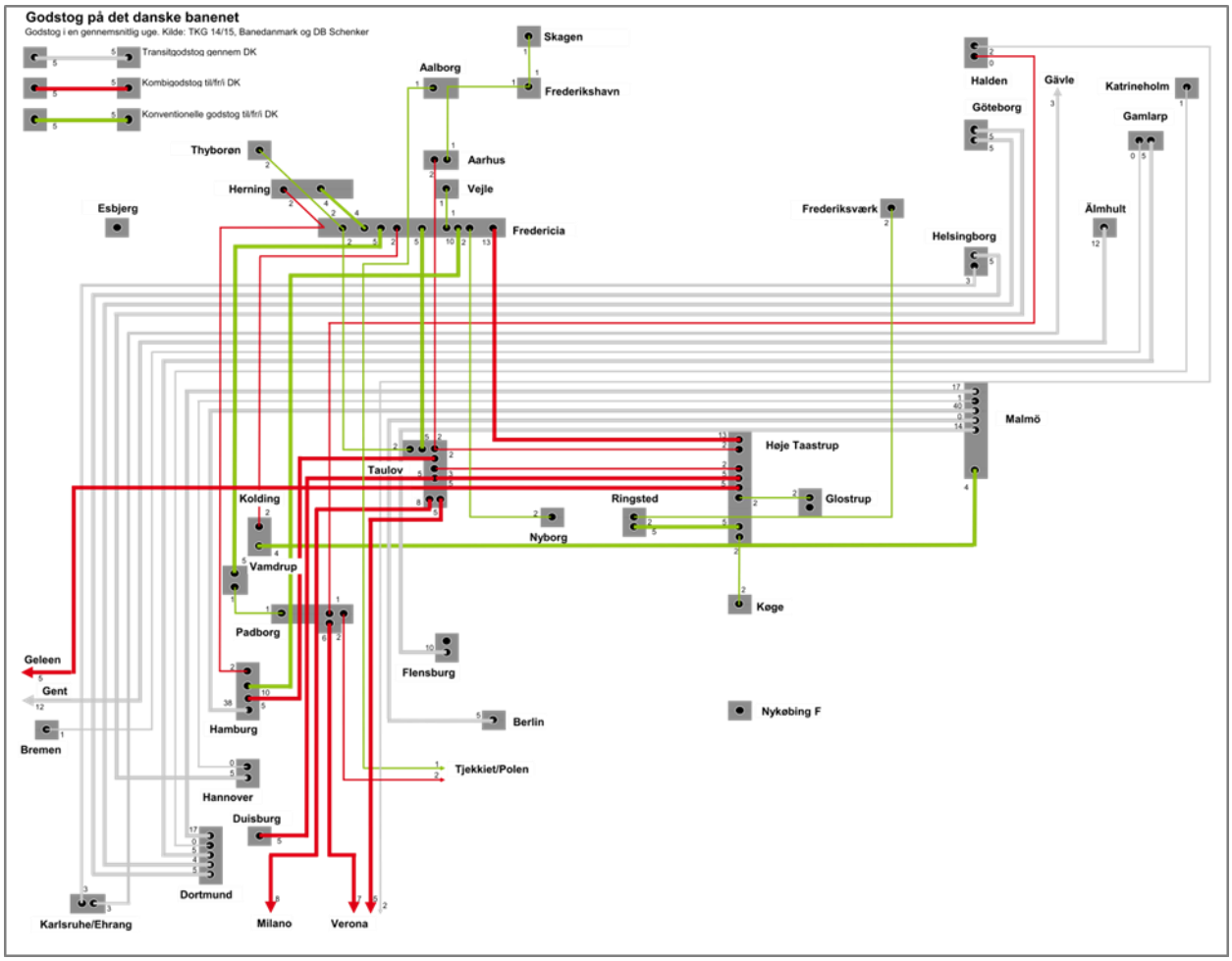
- DB Schenker Rail Scandinavia
- TX Logistik
- CFL Cargo
- Captrain
- Hector Rail

Since the opening of The Great Belt Bridge, all international freight trains are using the bridge and cross the border between Denmark and Germany in Jutland. So no freight trains are today using the ferries across the Fehmarn Belt and no freight trains pass by Business Park Falster.

All freight train routes are shown in the quite complex Figure 11 below. What is obvious is that the grey transit lines are very dominating in the overall picture:

[7] *"Fremme af gods på bane", Trafik- og Byggestyrelsen, januar 2016*

Figure 11 - All freight train routes in Denmark for an average week in 2014/15



Grey lines are transit trains, red lines are trains with intermodal containers ("kombitog") to or from Denmark and green lines are conventional freight trains to or from Denmark.

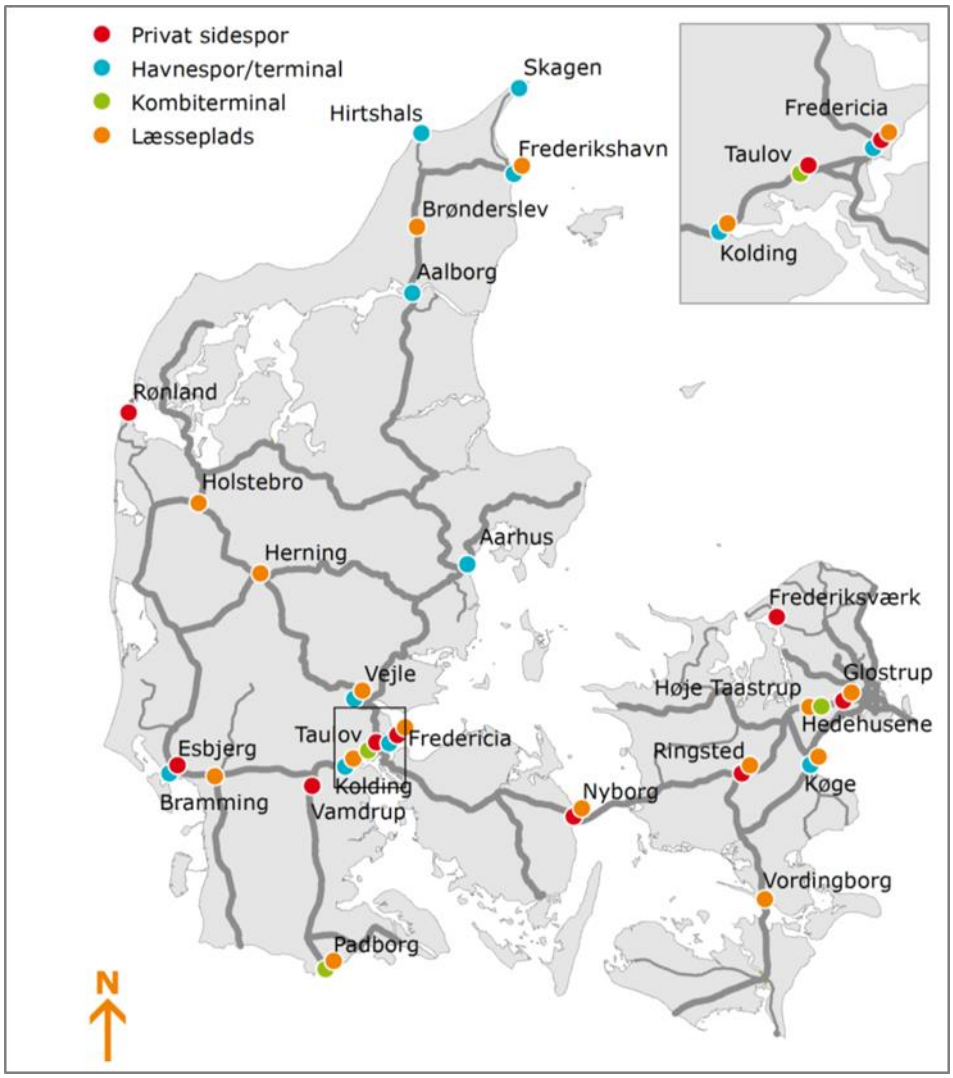
Source: "Fremme af gods på bane", Trafik- og Byggestyrelsen, januar 2016

During an average week, about 410 freight trains drive in Denmark: approximately 230 trains are transit trains, about 60 trains are national trains and about 120 trains are international trains running to or from Denmark. So 56% of the freight trains are transit trains, 15% are national trains and 29% of trains carry freight to or from Denmark.

Several of the national routes serve as transport for one company only like the route to Køge which carries wood to the Junckers factory and the Høje Taastrup – Fredericia route which carries brewery products and empty bottles for the Carlsberg Breweries. This one route for Carlsberg makes up 33% of all the Danish national freight trains.

Existing facilities for rail freight is shown in Figure 12. As can be seen the nearest existing facility to Business Park Falster is a loading spot in Vordingborg. In the source it is pointed out that many of the loading spots not are up to date, with tracks too short to handle the normal length of freight trains of today.

Figure 12 - Existing facilities for rail freight in Denmark



Red: Private track, blue: Harbour track or terminal, Green: Intermodal terminals (containers interchangeable between truck and train), Orange: Loading spot.
Source: "Fremme af gods på bane", Trafik- og Byggestyrelsen, januar 2016.

In 2010 about 0.6 million tonnes of freight was carried by train **to** Denmark[8] and about 1.5 million tonnes was carried **from** Denmark, a total of 2.0 million tonnes of rail freight:

[8] *Data downloaded from Eurostat:* https://data.europa.eu/euodp/en/data/dataset/rfD6ckJKmFSIUFCchQAY9Q

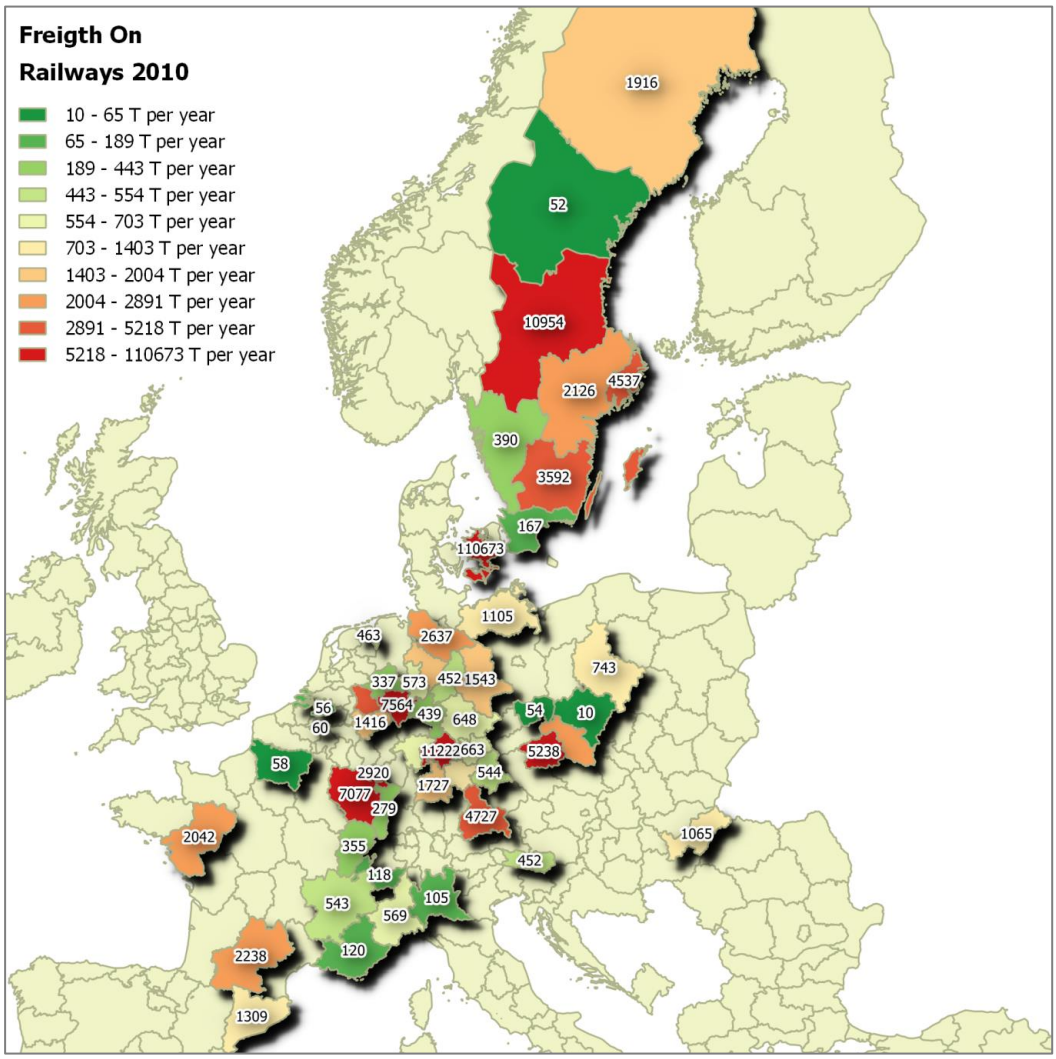
Table 3 - International rail freight volumes to and from Danish regions in 2010

TONNES RAIL FREIGHT IN 2010	TO REGION	%	FROM REGION	%	TOTAL	%	% WITH "UNSPECIFIED" EXCLUDED
CAPITAL REGION	19 364	3	95 645	6	115 009	6	8
REGION ZEALAND	50 815	9	59 858	4	110 673	5	8
REGION SOUTHERN DENMARK	405 207	69	672 455	45	1 077 662	52	77
CENTRAL DENMARK REGION	1 857	0	102 334	7	104 191	5	7
THE NORTH DENMARK REGION	0	0	541	0	541	0	0
UNSPECIFIED	106 301	18	557 846	37	664 147	32	…
TOTAL	**583 544**	**100**	**1 488 679**	**100**	**2 072 223**	**100**	…

In total 5% of the international rail freight (111 thousand tonnes) is to or from Region Zealand. If the freight to/from unspecified areas of Denmark is spread proportionally on all regions, Region Zealand is estimated to be an endpoint for 8% of the international rail freight going to or from Denmark. This equals 166 thousand tonnes a year.

In Figure 13 the other end-points of the 111 thousand tonnes of rail freight going to or from Region Zealand is shown. 25% is going to/from Sweden and 75% is going to/from the continent.

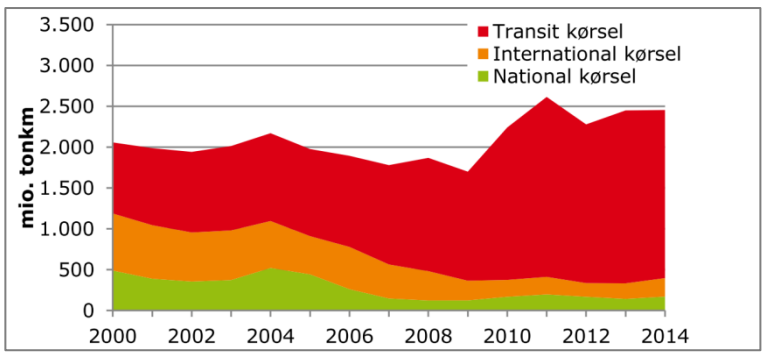
Figure 13 - Rail freight to or from Region Zealand



A total of 111 thousand tonnes in 2010 (sum of both directions).
Source: Data from Eurostat.

As can be seen from Figure 14 both national and international rail freight in Denmark has declined during the last 14 years. The main reason for this is probably a harder competition from road freight transport. But since the end of the financial crisis the transit rail freight transport has been growing.

Figure 14 - Development in freight on rail in Denmark

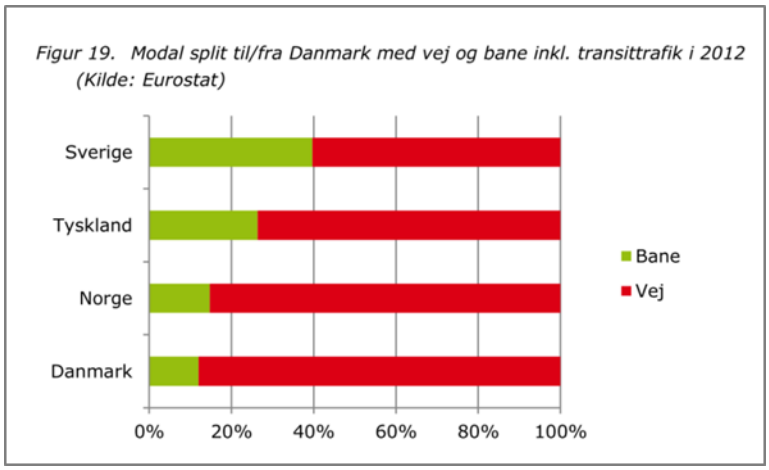


Red: International freight
Orange: International freight
Green: National freight

Source: "Fremme af gods på bane". Trafik og byggestyrelsen, januar 2016.

The rail share of total ground freight national transport inside Denmark is lower than the modal share on international freight to/from our neighbouring countries as can be seen from Figure 15 below:

Figure 15 - Used means of transportation in ground freight transport (rail green, road red)



Source: "Fremme af gods på bane". Trafik og byggestyrelsen, januar 2016

This is a natural consequence of distances travelled – rail freight is only economically beneficial at longer travel distances.

As a summary on rail freight it can be concluded that:

- Both national and international rail freight with relation to Denmark has been declining the last decade.
- Transit freight train transport has been increasing since the end of the financial crisis.
- The major part (56%) of the freight trains in Denmark is transit trains to which Business Park Falster has no or only little services to offer.
- National rail freight transport is mainly associated with a few specific companies and can probably be a vulnerable business with few or no alternative customers.
- 29% of the freight trains are bringing freight to or from Denmark.
- In 2010 166 thousand tonnes of rail freight was going to or from Region Zealand.

2.3. Freight transport by sea

In this section the current freight transport by sea with relation to Lolland-Falster is described.
The freight transport by sea between Lolland-Falster and Germany has two substantial components:

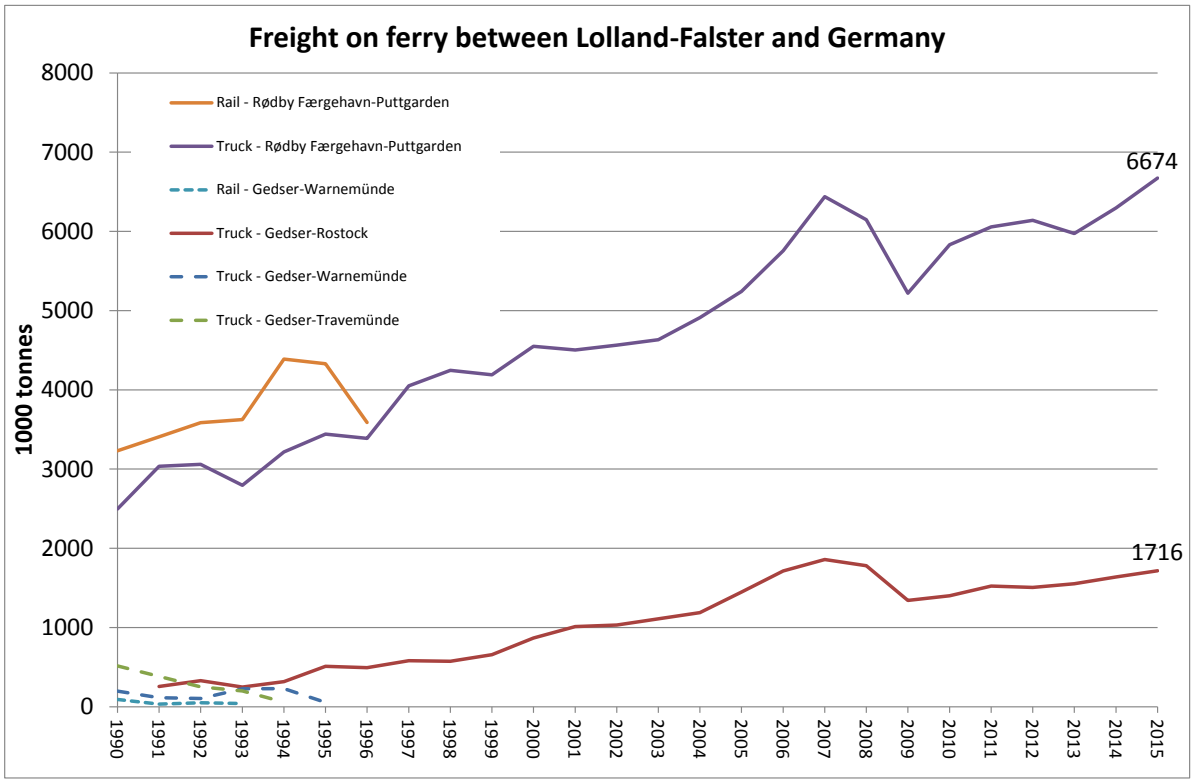
- The freight transported on vehicles using Rødby-Puttgarden and Gedser-Rostock ferries, and
- Freight loaded onto a coasters or similar ships either in bulk, containers or otherwise.

The ferry freight on vehicles has already been described in section 2.1 but the total volumes and the development is being summarized in Figure 16 below.

Until the opening of the Great Belt Bridge rail freight transport was also part of the ferry freight transport between Lolland-Falster and Germany. The last freight train across Fehmarn Belt ran in June 1997 and since then all freight trains have used The Great Belt Bridge and the border crossing in Jutland.

The ferry freight on trucks has, except for a few years during the financial crisis, been ever growing since 1990 and has almost tripled from 1990 to 2015.

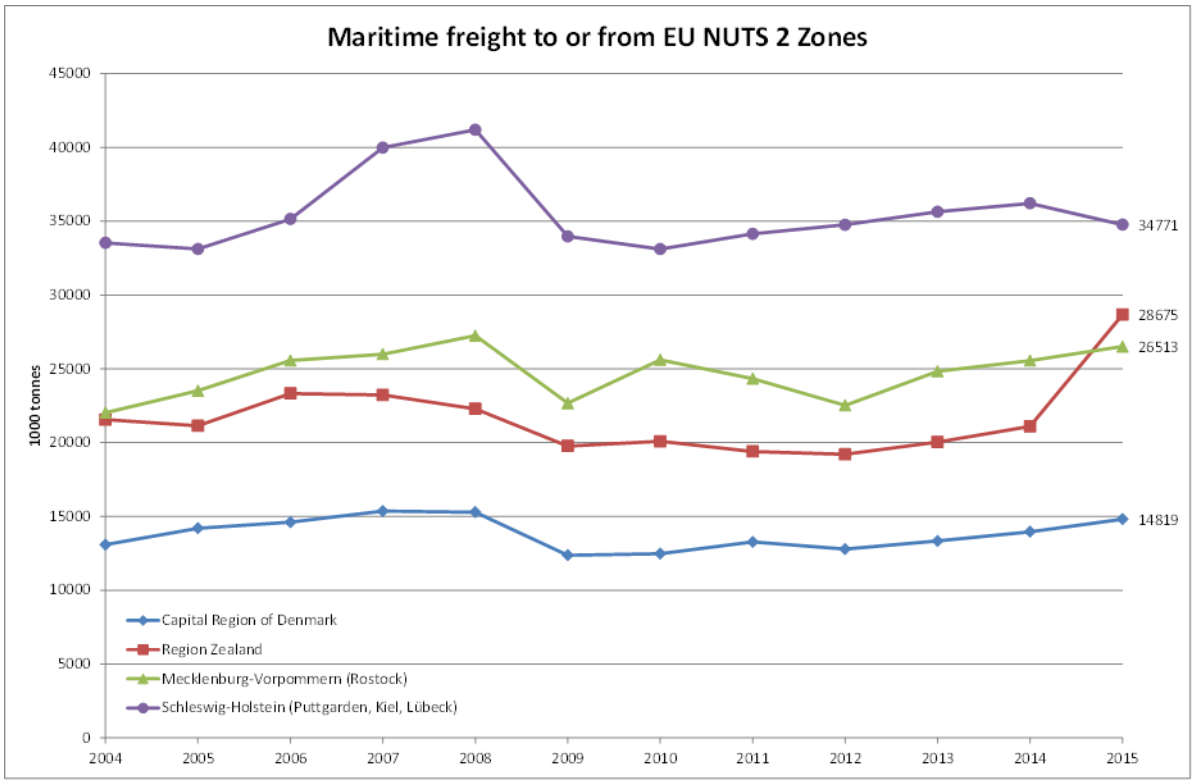
Figure 16 - Ferry freight volumes between Lolland-Falster and Germany.



Source: Statistics Denmark.

The freight on other types of ships is harder to map as no fixed routes are used. But the total amount of freight to/from harbours in the areas bordering the Fehmarn Belt/Baltic Sea and the Capital Region of Denmark are shown in Figure 17 below.

Figure 17 - Maritime freight to and from all harbours in the two regions of Zealand and the two German federal states bordering the Fehmarn Belt/The Baltic Sea



Source: Eurostat[9]

From the figure above it can be seen that over the last ten years the volumes of sea freight has been close to constant in all the four areas shown.

For Region Zealand a rise is seen from 2014 to 2015. Whether this is the start of a new rise in sea freight transport or just a result of coincidences is too early to say now.

In the following we are zooming in on the harbours of Guldborgsund Municipality: Guldborgsund Harbours (in Danish: "Guldborgsund Havne") consist of four harbours: Nykøbing Falster, Orehoved, Stubbekøbing and Gedser fishing harbour (not including the Gedser Ferry Harbour). Only the three first mentioned harbours have freight transport.

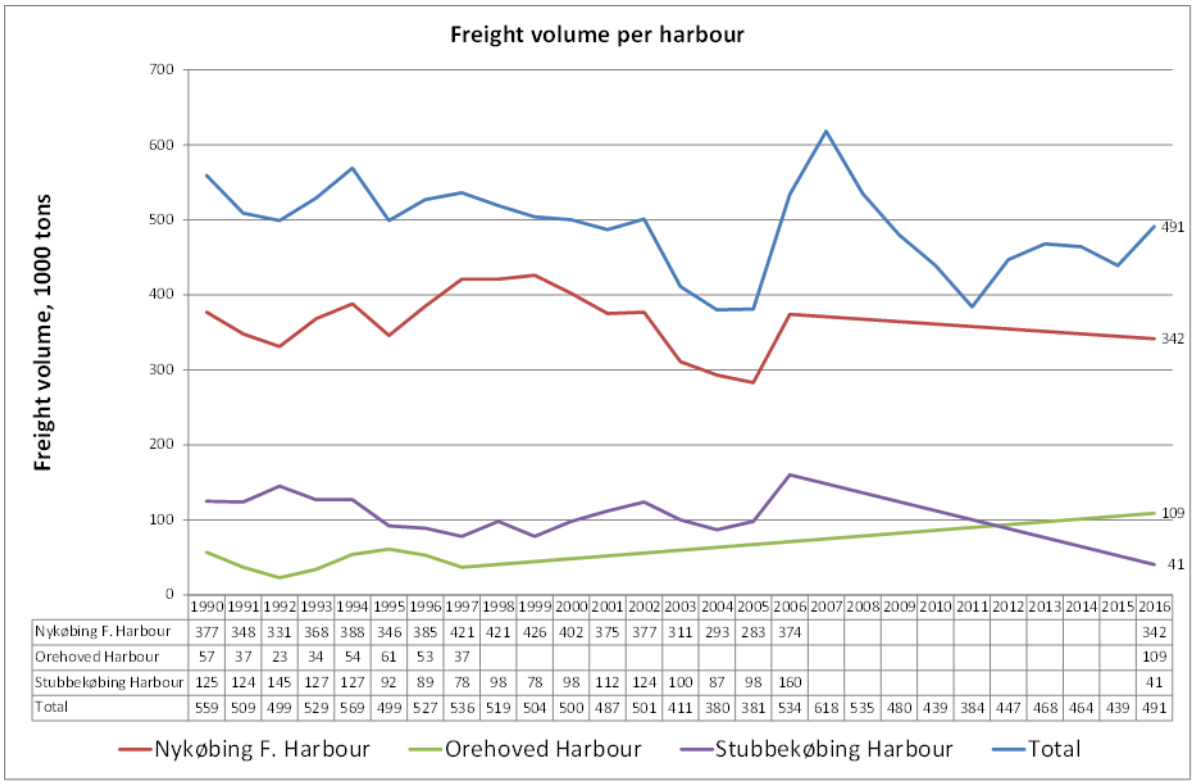
In the official data from Statistics Denmark the harbours have been grouped together since 2007, but combining with older data and new data from 2016 from the Municipality of Guldborgsund Figure 18 below has been created.

From the figure it can be seen that there has been a slight decline in the total volume of freight through the three harbours since 1990 but with temporary peak around 2007. In 2016, the total freight volume was 491,000 tonnes.

The harbour closest to Business Park Falster is Orehoved Harbour. In the period of 1990-1997, the Orehoved Harbour has had 44.500 tonnes of freight in an annual average. After 1998 no data are available from Statistics Denmark for Orehoved Harbour. According to data from Guldborgsund Municipality, Orehoved Harbour had 109,000 tonnes of freight in 2016.

[9] http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tgs00076

Figure 18 - Freight volumes at Guldborgsund Harbours



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nykøbing F. Harbour	377	348	331	368	388	346	385	421	421	426	402	375	377	311	293	283	374										342
Orehoved Harbour	57	37	23	34	54	61	53	37																			109
Stubbekøbing Harbour	125	124	145	127	127	92	89	78	98	78	98	112	124	100	87	98	160										41
Total	559	509	499	529	569	499	527	536	519	504	500	487	501	411	380	381	534	618	535	480	439	384	447	468	464	439	491

Sources: Statistics Denmark and Municipality of Guldborgsund (2016)

3. Experiences from the Great Belt and the Oresund fixed links

In Denmark we already have two recent examples of fixed links replacing ferry transport. In 1998 the Great Belt fixed link opened and in 2000 the Oresund Bridge opened.

A lot of local circumstances are of course different from the Fehmarn Belt but some overall perspectives from these two projects may be relevant to know.

The effects on the transport of the two projects are described in the following sections.

3.1. Road transport

Before opening the Great Belt fixed link and the Oresund fixed link, the following ferry routes were operating:

Table 4 - Ferry routes that were in operation before opening the fixed links

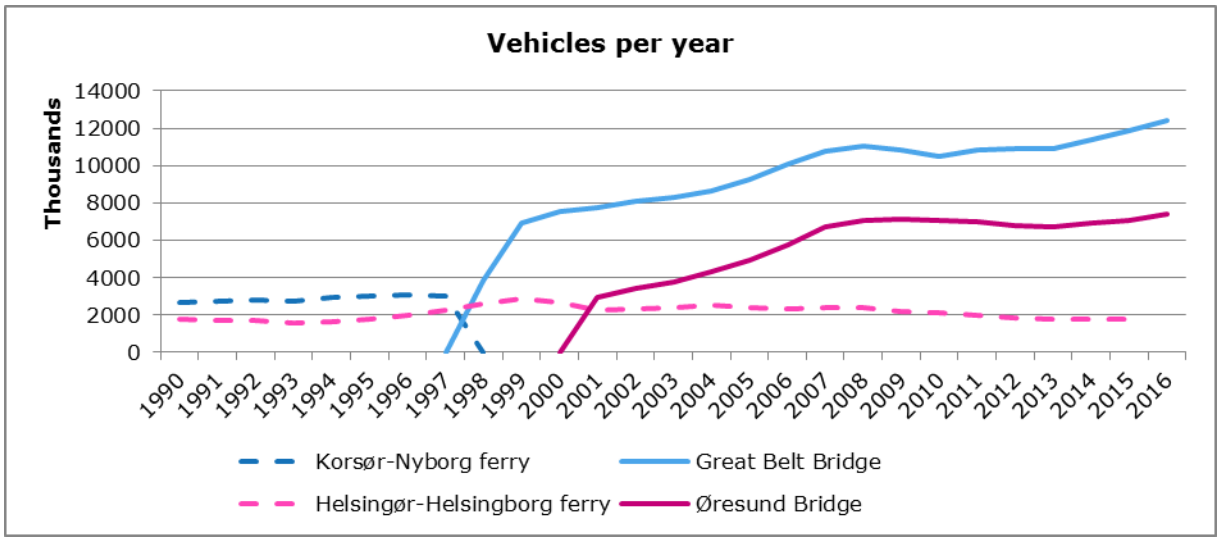
	FERRY ROUTES
GREAT BELT	• DSB train ferry, Korsør – Nyborg • DSB/Scandlines ferry for road traffic, Halsskov – Knudshoved • Vognmandsruten for road traffic, Korsør – Nyborg
ØRESUND	Copenhagen – Malmö corridor: • Scandlines Dragør – Limhamn (vehicles and walk-on passengers) • "Flyvebådene" Copenhagen – Malmö (only walk-on passengers) • "Pilen" Copenhagen – Malmö (only walk-on passengers) Helsingør – Helsingborg corridor: • Scandlines for vehicles and walk-on passengers • H-H Ferries for vehicles (Helsingør – Helsingborg ferry route) • Sundbusserne for walk-on passengers • Railway ferry operated between Copenhagen and Helsingborg. The ferry line was closed after the Oresund fixed link was opened for railway traffic.

Figure 19 shows the development in number of vehicles crossing Great Belt and Øresund before and after the opening of the fixed links in 1998 and 2000, respectively. The result of the opening of both fixed links is the same – the traffic across Øresund and Great Belt has had an extreme growth after the opening.

The Helsingør-Helsingborg ferry (located 70 km from the Øresund Bridge) lost 17% of the traffic in 2001 compared to 2000 after the Oresund fixed link was opened but since the number of vehicles

using the ferry has been relatively constant but with a small decline following the financial crisis. In 2015, the number of vehicles using the Helsingør-Helsingborg ferry was 1.7 million, which is 34% lower than in the year before the fixed link was opened.

Figure 19 - Historical development of vehicles on the Great Belt Bridge and the Oresund Bridge before and after the opening.



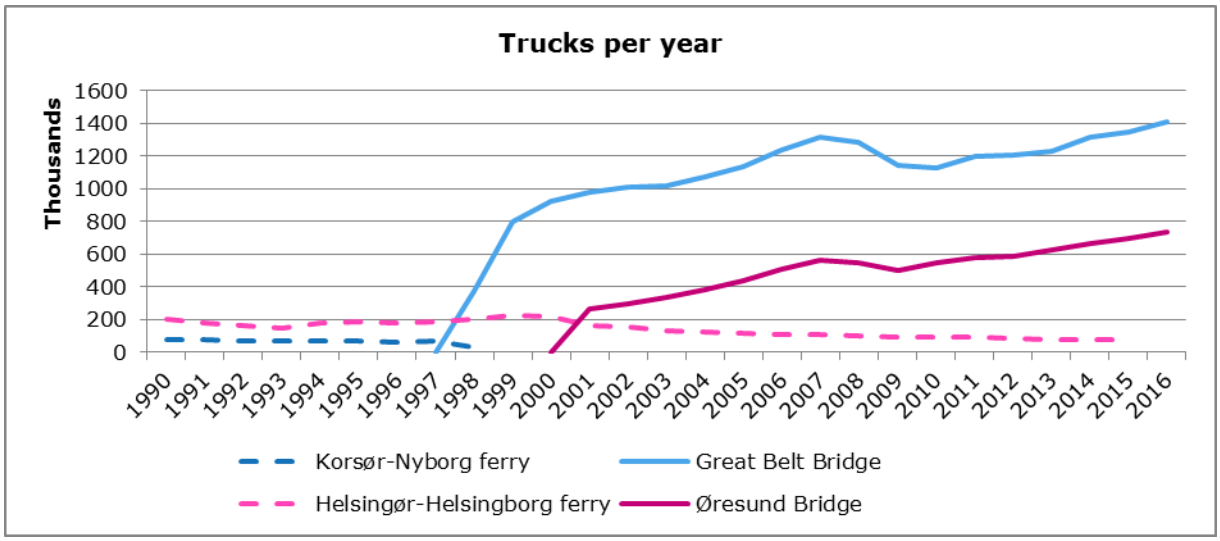
Source: Statistics Denmark, https://www.oresundsbron.com/da/traffic-stats, https://www.storebaelt.dk/omstorebaelt/trafiktal.[10]

Figure 20 below shows the historical development of trucks on the Great Belt Bridge and the Øresund Bridge before and after the opening. A development very alike the development for vehicles in total.

The traffic growth on the Great Belt Bridge in the years 2005-2007 are caused by a general fee reduction in June 2005 (according to Sund & Bælt). The fees were reduced by 20% for private cars and by 5% for trucks. Moreover, in the same year there were introduced new discounts that consider private journeys in weekends.

[10] Korsør-Nyborg ferry corridor on the graph is represented by three ferry routes: Vognmandsruten, Korsør-Nyborg DSB and Halsskov-Knudshoved. The ferry route Copenhagen-Malmø is not shown on the figure since this ferry route was passenger ferry and not vehicle ferry

Figure 20 - Historical development of vehicles on the Great Belt Bridge and the Oresund Bridge before and after the opening.

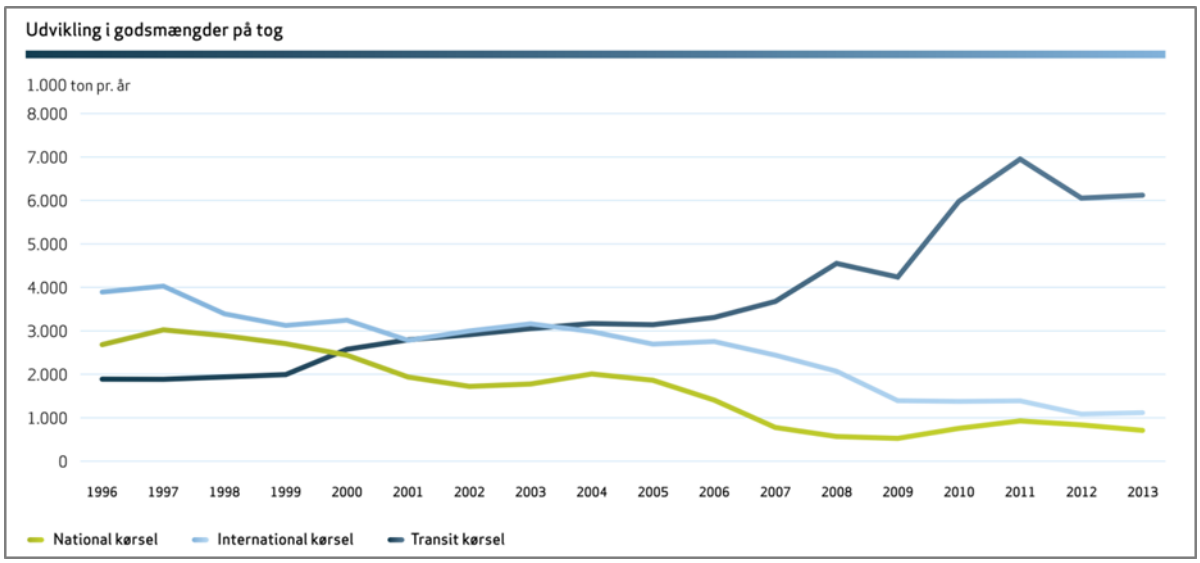


Source: Statistics Denmark, https://www.oresundsbron.com/da/traffic-stats, **https://www.storebaelt.dk/omstorebaelt/trafiktal**

3.2. Freight transport by rail

The opening of the Great Belt Bridge in 1998 also had an impact on the rail freight transport. As it can be seen from Figure 21 since the mid 1990-ties there has been a general decline in both national and international rail freight transport probably due to fierce competition from truck transport.

Figure 21 - Development in freight (in tonnes) on trains across The Great Belt.



Source: Storebæltsforbindelsens samfundsøkonomiske betydning, Sund&Bælt, 2014.

However, the opening of the Great Belt Bridge has meant a constant growth in rail freight transport in transit through Denmark almost every year since the opening. Since 1998 the amount of transit rail goods across the Great Belt has been tripled.

Also across the Oresund Bridge freight transport on rail is growing. From 2001 to 2011 the amount of goods transported on rail has been growing 114% and the number of freight trains has been

growing by 46%. In 2011 9.700 freight trains crossed the bridge[11]. The amount of freight on rail across Oresund before the opening of the bridge is unknown.

At present the rail freight trains across the Øresund Bridge is contributing to an increasing shortage of capacity on the rail line connecting Copenhagen and Malmö.

3.3. Summary of perspectives

Opening of the new links have offered new transport possibilities – possibilities which have been used also for freight transport.

In both situations road transport including truck traffic has had a significant growth and both links have added a boost to rail freight transport. The rail freight transport boost has been on transit transport, the Danish rail freight transport has continued to decline.

[11] *"Trafikken over Øresund"*, http://www.orestat.se

4. Future transport situation with the Fehmarnbelt Fixed Link

In this section major results from the most recent transport model calculations for the Fehmarnbelt Fixed Link are described as these results from the basis for Rambolls estimates on future transport related to Business Park Falster.

The construction of Fehmarnbelt Fixed Link and other major infrastructure projects on Lolland-Falster and Zealand will have a major impact on the traffic in the region. The forecasts of the traffic presented in this analysis are primarily based on the report "*Fehmarnbelt Forecast 2014 - Update of the FTC-Study of 2002*" made for Fehmarn A/S by two German consultancy firms, INTRAPLAN Consult GmbH and BVU.

The expected opening year for the fixed link in the Fehmarn A/S forecasts is **2022**. At present, (February 2017) the expected opening year is **2028** (Ministry of Transport, Building, and Housing). General growth or decline in transport between the years 2022 and 2028 will lead to need for adjustments of the forecasts. As we in the following section use several illustrations and tables from the official forecast reports **all traffic volumes** until section 4.3.4 are from the official forecasts based on 2022 as the opening year. In section 4.3.4 the forecast will be adjusted to 2028 as opening year.

The 2014-forecast is operating with following time schedule:

- 2022 – The opening year of the Fehmarn Belt project
- 2025 – Four years after the opening when the full effect of the fixed link can be observed
- 2030 – Eight years after the opening
- 2035 – 13 years after the opening

4.1. Available traffic forecasts

The history of traffic forecasts of the Fehmarn Belt project is very long. One of the first traffic forecast was made by Fehmarn A/S in 1999. Since then many other forecast have been made. The official forecast of today (2017) according to Fehmarn A/S and the Danish Ministry of Transport, Building and Housing is "*Traffic forecast for the Fehmarnbelt Fixed Link", FTC, 2014 made by BVU (Beratergruppe für Verkehr und Umwelt) and Intraplan Consult"*. The report is basically an update of the traffic forecast from 2002 made by the same consultancy firms.

In 2015 COWI has completed a quality assurance of the updates traffic forecast of the Fehmarn Belt project. The quality insurance includes the forecast of the main scenario without parallel ferry operation as well as the sensitivity forecasts with continued ferry operation in parallel with the fixed link. The main focus in the quality assurance is the forecast of the road traffic since the financial analysis is based on the traffic forecasts.

However, the official traffic forecasts made by Fehmarn A/S have been criticized at several occasions (by Knud Erik Andersen in his discussion book[12] and by Scandlines[13]). The main points of criticism of the official forecasts are listed below:

- Lack of documentation or poor description of the assumptions and results.
- Border shop traffic that account for over 30% of all private cars is assumed to pay full price when the fixed link will be open. This is a questionable assumption as the border shoppers today are paying only 299 DKK, but in the forecasts the average price of the return ticket using the tunnels is around 1000 DKK.
- The traffic model used for the analysis was not designed to handle parallel ferry operation. The major assumption in the traffic forecast is that the ferry Rødby-Puttgarden will be closed after the opening of the fixed link. This assumption has not been well documented.
- The great part of the new traffic on the Fehmarn Belt is derived from the Great Belt Bridge and the border crossings in Jutland. Documentation of the validity of these results does not exist.

None of the critics on the model calculations have been able to quantify the effects of their points of criticism. All traffic forecasts have some uncertainty; however, in this case, some larger uncertainties may exist according to the critics. Uncertainties that according to the comments listed above mainly will point at lower real traffic volumes than calculated in the official scenarios.

The existing traffic forecasts related to the Fehmarnbelt Fixed Link are operating with different future scenarios. The official traffic forecast called "*Fehmarn Belt Forecast 2002*" operates with two main scenarios and four additional scenarios. One of the general assumptions applied for all scenarios is that the fixed link between Rødby and Puttgarden consisting of a double-track railway and a four-lane motorway.

The FTC-model (Fehmarnbelt Traffic Consortium model) has been prepared with two different scenarios based on the different assumptions: Danish and German. The main difference in those two scenarios is factors such as transport prices, socio-economic factors and development in the infrastructure. The main scenario is the one with the Danish assumptions, while the "German" scenario is used as a sensitivity scenario.

All the scenarios are listed below:

- **Scenario without fixed link** (0-alternative)
- **Base Case B (main scenario)** – Scenario with assumptions used for the 1999 forecast of traffic demand on the Fehmarn Belt link with ferry supply 2002.The scenario is Danish based.

Sensitivity scenarios:

- **Base Case A** – the Integration Scenario under the German Bundesverkehrswegeplanung (Federal Ministry of Transport and Digital Infrastructure) with ferry supply 2002. The scenario is based on the German assumptions and is presented in the analysis as a sensitivity scenario. This scenario forecasts lower traffic growth between Scandinavia and Continental Europe compared to the "Danish" scenario.

[12] *"Analyse af nye trafikprognoser for Femern-forbindelsen, 2014" by Knud Erik Andersen, 2015*

[13] *"Undersøgelse: Vurdering af trafikprognosen for den faste forbindelse over Femern Bælt – en rapport på foranledning af Scandlines Aps", DiwEcon, 2015*

- **Scenario 1** – Base Case A assumptions with increased ferry supply for competing ferries[14] and ferry fares as in 2014.
- **Scenario 2** – Base Case A assumptions with increased ferry supply and reduced fares for competing ferries and reduced ferry fares with 25%.
- **Scenario 3** – Base Case A assumptions with reduced ferry supply and raised fares for competing ferries by 25%.
- **Scenario 4 (continued ferry service between Rødby and Puttgarden)** – Base Case A assumptions with increased ferry supply and reduced fares for competing ferries (like Scenario 2, – 25% in fares) and a parallel ferry service between Rødby and Puttgarden. The ferry operates one time per hour in one of the sub-scenarios and two times per hour in another sub-scenario.

Table 5 - Basic definition of the four additional scenarios in the Fehmarn Belt project.

VARIABLE	SCENARIO 1	SCENARIO 2	SCENARIO 3	SCENARIO 4
FEHMARNBELT FIXED LINK TOLLS	AS FERRY FARES IN 2002	AS FERRY FARES IN 2002	AS FERRY FARES IN 2002	AS FERRY FARES IN 2002
FERRY SERVICES	INCREASED FERRY SERVICES	INCREASED FERRY SERVICES	REDUCED FERRY SERVICES	INCREASED FERRY SERCIVES + FERRY RØDBY-PUTTGARDEN
FERRY FARES	AS IN 2002	-25%	+ 25 %	-25%
ØRESUND TOLLS AND FERRY FARES	AS IN 2002	+ 25%	-25%	+25%

Source: "Fehmarn Belt Forecast 2002", page 13. Note: the ferry fares were updated to price level 2014 in the latest forecast from 2014.

In all the sensitivity scenarios the competing ferries refer to the north-south routes across the Baltic Sea except Rødby-Puttgarden. The increase in ferry services may refer to the capacity expansion on the ferries and higher sailing frequency, however, the exact definition of the scenarios is not available in the official documents.

4.2. Relevant traffic scenarios for Exit 43

In collaboration with Guldborgsund Municipality and Business Lolland-Falster it is concluded that the scenarios listed below are the four most relevant scenarios for Exit 43:

The main Scenario (Case B) with the FBFL
Scenario with continued ferry service between Rødby and Puttgarden – Scenario 4 in Table 5. The ferry operates at one time per hour and a price reduced by 25%.
Scenario with four ferries on Gedser-Rostock – Not defined in the official forecast. The ferry will operate **one time per hour**. In this scenario the new tunnel is opened, while the ferry between Rødby and Puttgarden is not in service. Already today Scandlines has put into service two new ferries on Gedser-Rostock leading to a doubling of capacity.

[14] *According to the FTC-model, the competing ferries are defined as north-south routes across the Baltic Sea except Rødby-Puttgarden.*

Scenario with two ferries on Rødby-Puttgarden and four ferries on Gedser-Rostock - Not defined in the official traffic forecast. In this scenario the frequency of both ferries is one ferry per hour.

The first two scenarios are included in the Fehmarn A/S's traffic forecast, while the third and the fourth one are not.

At present, the ferry Rødby-Puttgarden sails every 30 minutes (against every hour in the pro-posed scenario), while the ferry Gedser-Rostock is operating up to 10 times a day (against every hour in scenario 3) – see the figure below.

Table 6 - Travel time and frequency by ferry lines (2016)

ROUTE NAME	TRAVEL TIME	NUMBER OF DEPARTURES
RØDBY-PUTTGARDEN	45 MIN.	EVERY ½ HOUR
GEDSER-ROSTOCK	1 H. 45 MIN	UP TO 10 TIMES A DAY

Source: http://www.scandlines.dk/billetter/billettyper-og-priser.aspx

4.3. Road traffic

4.3.1. Main Scenario

Table 7 illustrates number of private cars and trucks that will cross the Fehmarn Belt after the opening of the fixed link in 2022 (the main scenario). It can be seen from the table that number of cars in 2022 that will cross the fixed link is 2.9 mil. cars and 555 thousand trucks, which gives in total 3.5 mil. vehicles on a yearly basis. In the opening year, the volume of trucks on the ferry Gedser-Rostock is estimated to 131 thousand per year.

Table 7 - Yearly traffic estimated in the latest traffic forecast from 2014, main scenario.

	FEHMERN BELT FIXED LINK		GEDSER-ROSTOCK	
	CARS INCL. BUSSES [THOUSANDS]	*TRUCKS* [THOUSANDS]	*ROAD FREIGHT TONNAGE* [THOUSANDS]	*TRUCKS* [THOUSANDS]
2022	2 919	555	8 320	131
2025	3 453	594	8 788	-
2030	3 804	634	9 464	-
2035	4 091	673	10 140	-
2047	4 702	768	-	-

Source: Fehmarn A/S 2014. Note: Only limited scenario results are available for Gedser-Rostock ferry.

As a comparison, in 2015, the total number of vehicles that used ferry Rødby-Puttgarden was 2.0 mil. vehicles and 400 thousand vehicles used the ferry Gedser-Rostock (Statistics Denmark).

One of the first official traffic forecasts for the Fehmarn project (FTC, 2002) contains what can be seen as a sensitivity calculation using both a low and a high expected traffic growth from opening

year (which is 2015 in that scenario) to the scenario 10 years later. Table 8 presents the variation in yearly traffic between the basis scenario and the scenario with high and low traffic forecast. In the sensitivity analysis, the traffic varies with +/- 7% for all vehicle types. The variation in trucks is a bit higher and it is 10%.

Table 8 - Variation in estimated traffic volumes between the basis scenario and scenario with high and low traffic forecast

AVERAGE ANNUAL DAILY TRAFFIC	VARIATION
PASSAGER CARS	+/- 7%
BUSSES	+/- 4%
TRUCKS	+/- 10%
TOTAL	+/-7

4.3.2. Scenario with parallel ferry Rødby-Puttgarden – one time per hour

The total number of vehicles on the ferry line between Rødby and Puttgarden in the "P*arallel-Ferry-Case*" is estimated to be 538,000 vehicles per year in 2022 (see Table 9). Number of trucks on the ferry is 102,000 vehicles in 2022.

Table 9 - Estimated traffic on the ferry Rødby-Puttgarden - Scenario with parallel ferry line

	FERRY LINE RØDBY-PUTTGARDEN			
	CARS INCL. MOTORCYCLES [1.000 VEH./YEAR]	*TRUCKS [1.000 VEH./YEAR]*	*BUSSES [1.000 VEH./YEAR]*	*TOTAL VECHICLES [1.000 VEH./YEAR]*
2022	432	102	4	**538**
2025	481	108	4	**593**
2030	509	116	5	**630**
2035	520	123	5	**648**

Traffic on the fixed link is shown in the table below:

Table 10 - Estimated traffic on the FBFL - Scenario with parallel ferry line

	FEHMARNBELT FIXED LINK			
	CARS INCL. MOTORCYCLES [1.000 VEH./YEAR]	*TRUCKS [1.000 VEH./YEAR]*	*BUSSES [1.000 VEH./YEAR]*	*TOTAL VECHICLES [1.000 VEH./YEAR]*
2022	2 488	469	30	**2 987**
2025	2 969	503	32	**3 504**
2030	3 290	536	32	**3 858**
2035	3 562	570	32	**4 164**

The table below compares the traffic across Fehmarn Belt in the main scenario and in the scenario with the parallel ferry:

Table 11 - The difference in yearly traffic between the main scenario and the scenario with the parallel ferry Rødby-Puttgarden – the total traffic across Fehmarn Belt

	YEARLY TRAFFIC (SCENARIO WITH THE PARALLEL FERRY)	YEARLY TRAFFIC (MAIN SCENARIO)	DIFFERENCE
2022	3 525	3 474	51
2025	4 097	4 047	50
2030	4 488	4 438	50
2035	4 812	4 764	48

As it can be seen in the table, the difference in yearly traffic is around 50,000 vehicles per year indicating that there will be more vehicles across the Fehmarn Belt in the scenario with the parallel ferry service. For trucks, the difference is around 17,000 trucks per year or about 49 trucks per day.

Thus, the existence of the parallel ferry route will mean a marginal higher traffic of cars and trucks crossing the Fehmarn Belt and passing by Exit 43 – about 1% more.

4.3.3. Scenario with four ferries on Gedser-Rostock – one time per hour

This scenario was not simulated in the FTC-model. At present, the ferry is operating up to 10 times a day. The higher frequency up to 12 times a day and new ferries with more capacity can and will attract more users. In general, this ferry can get a higher attraction for trucks to/from the East-European market than today if Scandlines make a good business case with low prices for trucks.

The exact amount of traffic on the ferry cannot be estimated in this project due to resources available. However, it must be expected that the total amount of traffic volumes crossing the

Fehmarn Belt also with extra ferry services on Gedser-Rostock will be higher than for the tunnel alone (main scenario).

4.3.4. Road traffic summary

In this section, the presented truck volumes are summarized and adjusted for the new opening years. The total number of trucks passing through Exit 43 is calculated as well.

The truck flows of today and the truck flows across Fehmarn Belt in the main scenario in the FTC-model are summarized below:

Table 12 - The trucks across Fehmarn Belt today and in the main scenario in the FTC-model

THOUSAND VEHICLES A YEAR	RØDBY-PUTTGARDEN	FEHMARN BELT TUNNEL[2]	GEDSER-ROSTOCK	TOTAL - FEHMARN BELT CORRIDOR	
	TRUCKS	*TRUCKS*	*TRUCKS*	*TRUCKS*	*TRUCKS INDEX*
2016	462	0	105	567	**88**
2022 *(without FBFL)*[1]	530	0	111	641	**100**
2022 *(with FBFL)*	0	555	131	686	**107**
2025	0	594	135[3]	729	**114**
2030	0	643	143[3]	777	**121**
2035	0	673	151[3]	824	**129**
2047	0	768	172[3]	940	**147**

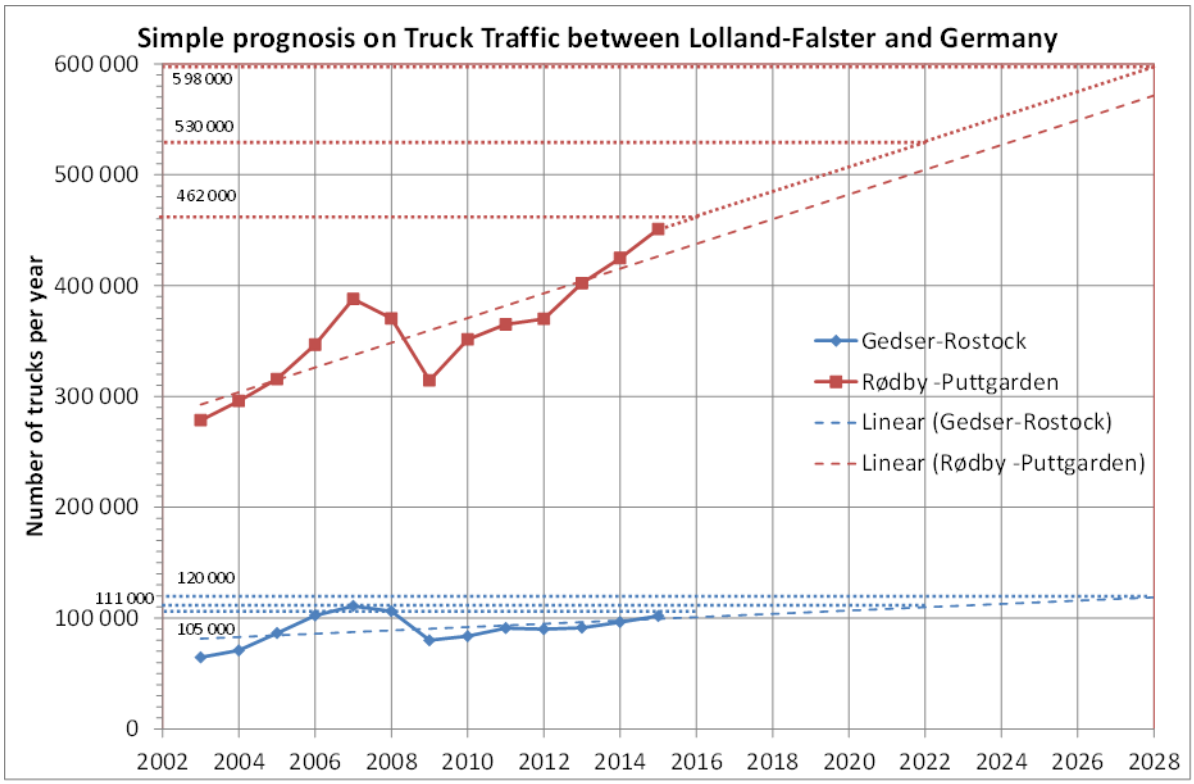
[1] Estimates based on Table 7.
[2]From the official traffic forecast from 2014
[3]Yearly increase from 2022 is set to 1.1% based on the FTC Model

As the expected opening year for FBFL at now is 2028 and not 2022 as in the model calculations there is a need to adjust the numbers in the above table. This will be done in the following.

The task is to estimate the number of trucks in 2028 without FBFL. The numbers for the following years will then be estimated using the truck indexes from the table above.

In Figure 22 below a simple linear trend on the historical development in truck traffic between Lolland-Falster and Germany is shown:

Figure 22 - Simple prognoses on Fehmarn Belt truck traffic without FBFL. Based on line slope from linear regression analysis.



Source: Data from Statistics Denmark

Using this simple prognosis give these estimates for truck traffic in 2028 (without FBFL):

- Rødby-Puttgarden: 598,000 trucks a year or about 1,600 trucks at an annual average day
- Gedser-Rostock: 120,000 trucks a year or 330 trucks at an annual average day
- **Total two ferries:** 718,000 trucks a year or 1,970 trucks at an average annual day

Using those numbers, Table 12 above is updated to the new expected opening year in the table below using an extrapolation of the 718,000 trucks in 2028 from above by using the indexes of Table 12 (data for the year 2038 is created using interpolation):

Table 13 - Yearly number of trucks crossing Fehmarn Belt today and in an updated scenario matching 2028 as the expected opening year for the FBFL

1000 TRUCKS PER YEAR	TUNNEL AND FERRY	INDEX
2016	587	88
2028 WITHOUT FBFL	718	100
2028 WITH FBFL	768	107
2031	818	114
2038	890	124

In 2016, 3,840 trucks pass by Exit 43 on E47/55 on an average day or 1,401,600 trucks per year. Around 567,000 trucks per year use the ferries between Lolland-Falster and Germany – this corresponds to around 40% of the trucks passing by Exit 43. It is assumed that the vast majority of the trucks crossing the Fehmarn Belt also pass by Exit 43. This means that 1,401,600-572,600=829,000 trucks at yearly basis pass by Exit 43 without crossing Fehmarn Belt.

For the future years the number of trucks crossing the Fehmarn Belt is given in Table 13 above. For the trucks not crossing the Fehmarn Belt it is assumed that the numbers will grow from the present value with an annual growth of 2.6% as the traffic on the "Sydmotorvej":

Table 14 - Estimated number of trucks passing by Exit 43 on E47/55

YEARLY TRAFFIC	TUNNEL AND FERRY	INDEX	TRUCKS PASSING EXIT 43 AND USING FBFL	*TRUCKS PASSING EXIT 43 AND NOT CROSSING FEHMARN BELT**	*ALL TRUCKS PASSING EXIT 43*
2016	567 008	88	567 009	834 600	1 401 600
2028 WITHOUT FBFL	718 000	100	718 000	1 135 656	1 853 656
2028 WITH FBFL	768 260	107	768 260	1 135 656	1 903 916
2038	891 756	124	891 756	1 467 981	2 359 737
				* Annual growth 2.6% as on the "Sydmotorvej"	

Summing up, the yearly number of trucks passing Exit 43 is estimated to rise from 1,401,600 in 2016 to 2,359,303 in 2038, a growth of 68%.

The results above are based on the main scenario. The scenarios with additional ferry services are both expected to give marginally larger traffic across the Fehmarn Belt and thus also passing by Exit 43. But it must be remembered that the uncertainty on transport model calculations are much higher than the calculated marginal percent changes with additional ferry services.

So with this in mind the conclusion is that based on the model calculations of additional ferry services on either Rødby-Puttgarden or Gedser-Rostock, it cannot be concluded that the additional ferry services significantly will change the amount of traffic between Germany and Lolland-Falster or traffic passing by Exit 43.

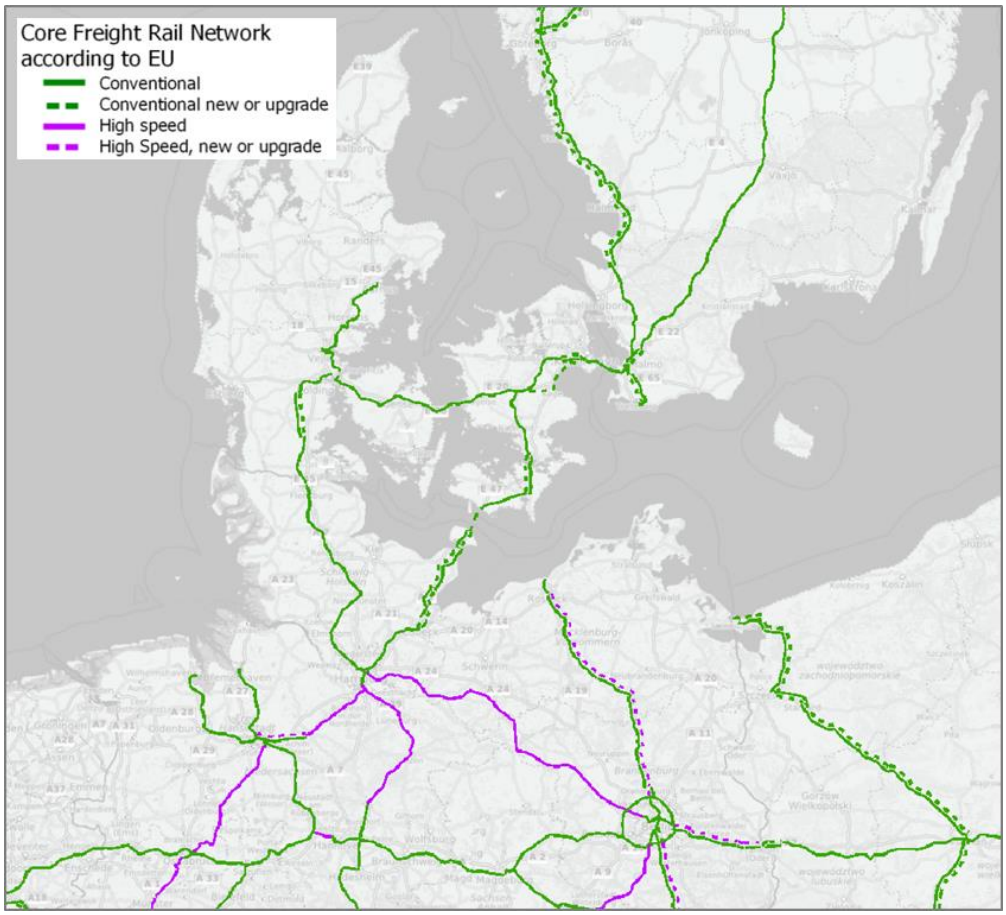
But it should be kept in mind that the Fehmarn Belt traffic model was not originally designed to handle the competing ferry services and certainly not to handle **increased** ferry services.

So from a 2017 point of view with the actual situation with recent increased services on the ferries in mind it must be expected that the additional ferry services will give some extra traffic between Germany and Lolland-Falster – extra traffic which also will be beneficial for the Business Parks Falster business case.

4.4. Freight transport by rail

With the Fehmarnbelt Fixed Link and upgraded rail connections the route across Fehmarn Belt will again be used for rail freight as shown in Figure 23 below:

Figure 23 - Core freight rail network in and around Denmark with upgrades including the Fehmarn Belt link

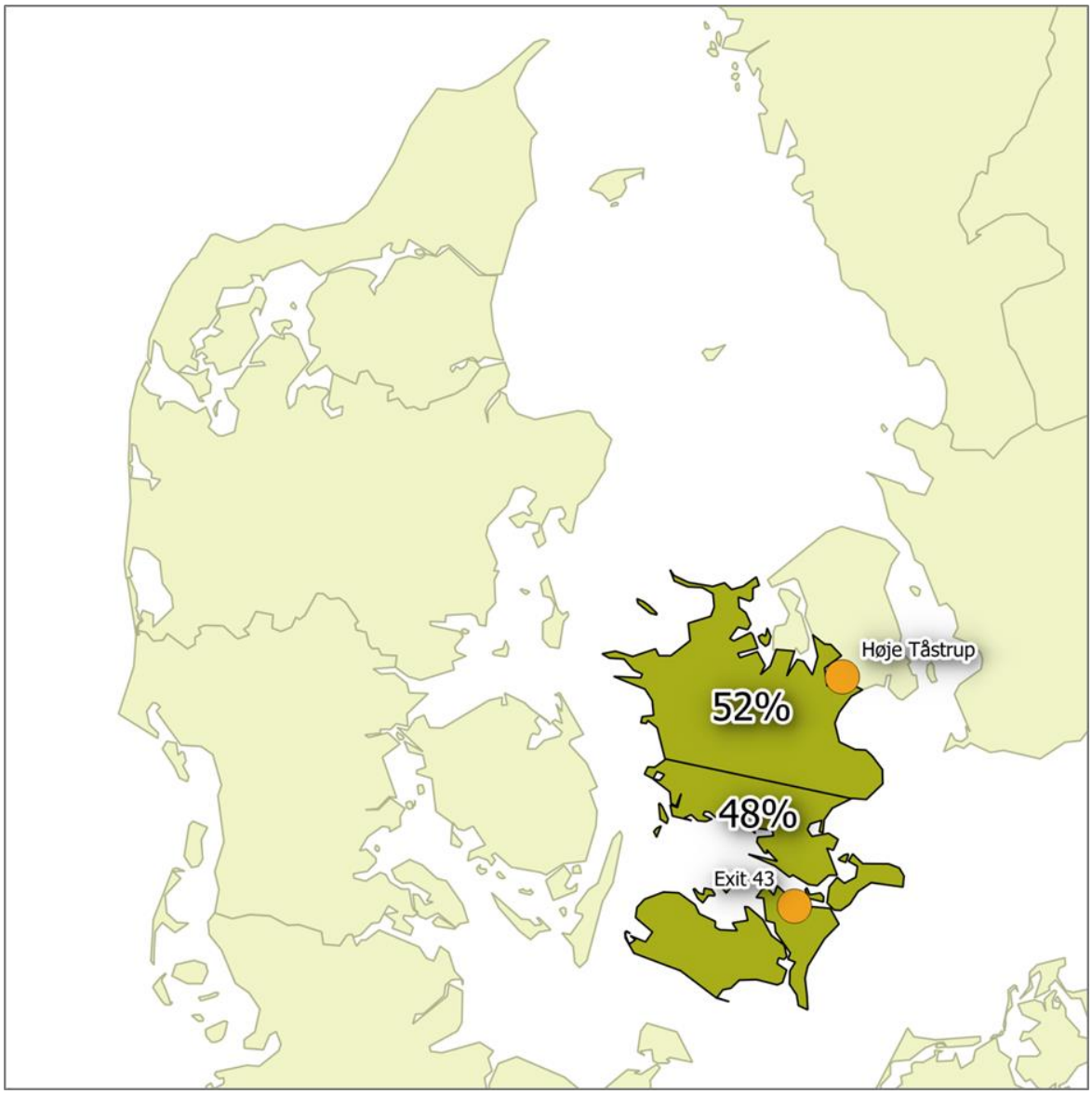


Source: EU TENTec

With the opening of the FBFL Business Park Falster could be a relevant location to switch between train and truck for some of the international rail freight that has end or start point in Region Zealand (see section 2.2).

But especially the existing combined terminal in Høje Taastrup will be a competitor as it will be closer to large parts of the Region than Business Park Falster will. Based on simple straight line measured distances for determining the influence area of Høje Taastrup versus Business Park Falster 52% of Region Zealand will be closer to Høje Taastrup than to Business Park Falster.

Figure 24 - Influence areas based on simple straight line distance

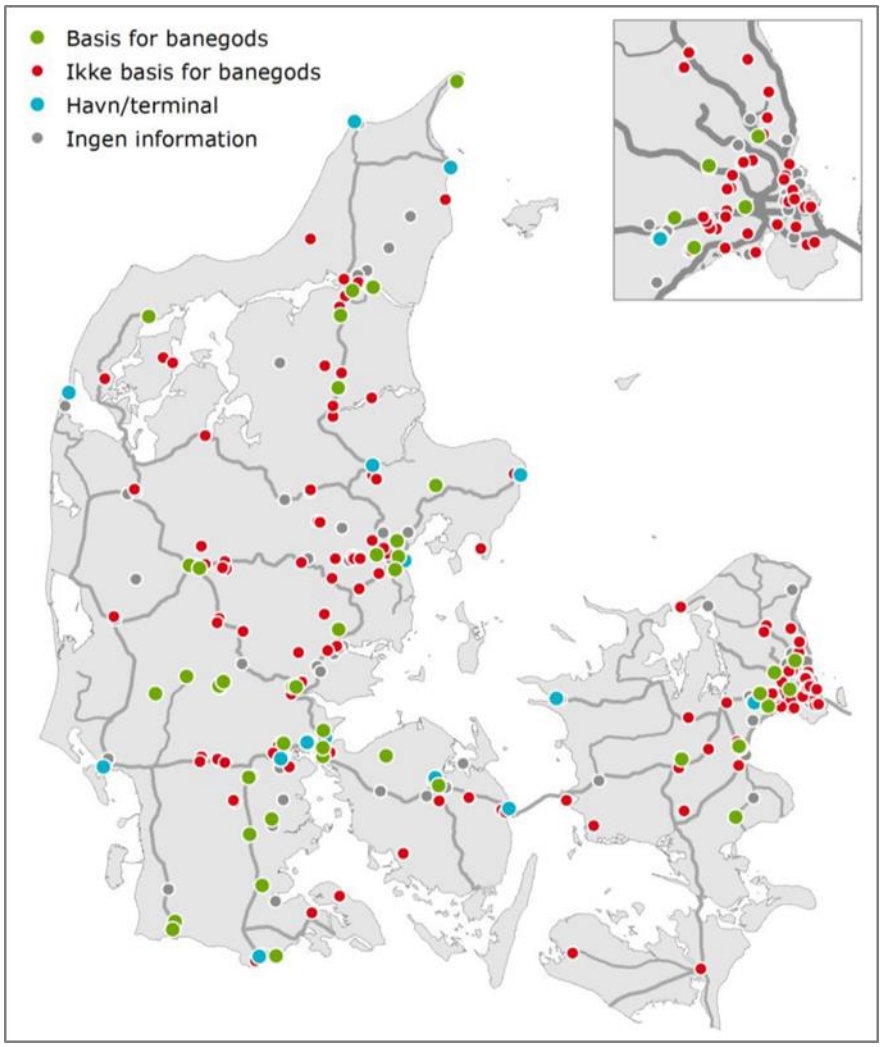


So a very simple estimate would be that about half of the total international rail freight with end point in Region Zealand could be brought to use at Business Park Falster as an exchange hub between rail and truck. In 2010 this would have been about 83 thousand tonnes a year. With an estimated average of 20 tonnes per truck this will equal about 4.150 trucks a year or a little more than 10 trucks on an average annual day.

The share between Høje Taastrup and Business Park Falster can of course be changed by the price policies used and the services supplied.

Will it be possible to make more local business use rail freight? According to Figure 25 below the options seems limited, as companies on Lolland and Falster are evaluated to have no potential. No explanation for this conclusion is given:

Figure 25 - Danish companies with large transport needs and the potential for use of rail. Red is no potential, while green is an existing potential



Source: "Fremme af gods på bane". Trafik- og Byggestyrelsen, januar 2016

But the opening of the Fehmarnbelt Fixed Link is a radical change in the rail network, which may change the volumes transported.

Below are the estimated rail transport volumes in 1,000 tonnes across Fehmarn Belt from the transport model scenario shown (Case B – main scenario):

Table 15 - Rail freight volumes from transport model scenarios (Case B – main scenario)

YEAR	SITUATION	RAIL FREIGHT VOLUME [1,000 TONNES PER YEAR]	GROWTH FROM 2011	*YEARLY GROWTH FROM PREVIOUS SITUATION*
2011	BASE YEAR	5,617*	…	…
2022	OPENING YEAR	8,320	48%	3.6%
2025	FULL EFFECT OF TUNNEL ACHIEVED	8,788	56%	1.8%
2030	EIGHT YEARS OPENING	9,464	68%	1.5%
2035	13 YEARS AFTER OPENING	10,140	81%	1.4%

* Across the Great Belt

Thus the rail freight crossing the border is expected to grow 48% from 2011 to the opening year and to continue to grow a couple of percent every year after the opening.

As earlier noted, a large part of the rail freight is transit through Denmark and especially the transit rail freight has been growing. In the plan for the Danish rail network 2012-2027[15] separate growth expectations for rail freight volumes are listed:

- National rail freight: 1.0% a year from 2012 to 2027
- International rail freight: 2.0% a year from 2012 to 2027
- Transit rail freight until opening of FBFL: 5.2% a year from 2012 to 2022
- Transit rail freight from opening of FBFL until double track is established in Germany: 5.5% a year from 2022 to 2027

Thus the expectations are that only the transit rail freight is affected by the opening of the FBFL whereas the international rail freight, which is relevant to Business Park Falster, is expected to grow 2% a year with or without the FBFL.

So best estimate on rail freight relevant to the Business Park Falster is that the relevant volume in 2010 of 83,000 tonnes will grow 2% a year as well.

This will lead to the below estimated volumes of rail freight exchanged at Business Park Falster (Table 16):

15 *"Trafikplan for den statslige jernbane 2012-2027", Trafikstyrelsen*

Table 16 - Expected volumes of rail freight to/from Business Park Falster and its hinterland

YEAR	SITUATION	RAIL FREIGHT TO/FROM BUSINESS PARK FALSTER [TONNES PER YEAR]	APPROXIMATE NUMBER OF TRUCKS PER AVERAGE DAY [20 TONNES FREIGHT EACH]
2010	EUROSTAT DATA	83,000	11.4
2016	PRESENT	93,000	12.7
2028	FIRST OPEN YEAR OF FBL	118,000	16.2
2031	EIGHT YEARS OPENING	125,000	17.1
2038	10 YEARS AFTER OPENING	144,000	19.7

As the table shows, the growth in freight volumes to and from Business Park Falster and its hinterland is estimated to be 27% from 2016 to 2028 and 55% from 2016 to 2038.

So in 2038 it is expected that a volume of 144 thousand tonnes will be exchanged between rail and truck at Business Park Falster. This equals about 20 trucks a day.

It must be noted that the Danish transport authority *Trafik- og Byggestyrelsen* in their report "Fremme af gods på bane", from January 2016 concluded (own translation to English):

"The quantities in the total freight transport is expected to grow significantly across the Fehmarnbelt … to more than a doubling compared with the current goods flow (Source: Fehmarnbelt Forecast 2014). In light of the expected increase in transit traffic across the Fehmarn Belt connection, it is relevant to assess whether some of this traffic could get a stop in Denmark by establishing a terminal with a hub function on Zealand.

Based on this analysis and previous analyses ***there is at present not identified a potential for creating a multi modal terminal with a hub function in Eastern Denmark…."***

But it is also added that the time frame is very long and possibly some stakeholders have not yet considered how they will utilize the fixed link. So similar analyses made later may conclude different.

4.5. Freight transport by sea

The transport forecasts from the Fehmarn Belt link does not include freight transport by sea and other prognoses has not been found.

Very recent data from Statistics Denmark[16] reveals that the year 2016 has been very bad for Danish sea transport. The earnings from sea transport have fallen by 17.6% in 2016 - a very big decline in one year. The reason should be fallen prices due to a large over-capacity of ships. With such big recent changes it does not seem possible to give a reliable prognosis reaching more than 20 years ahead.

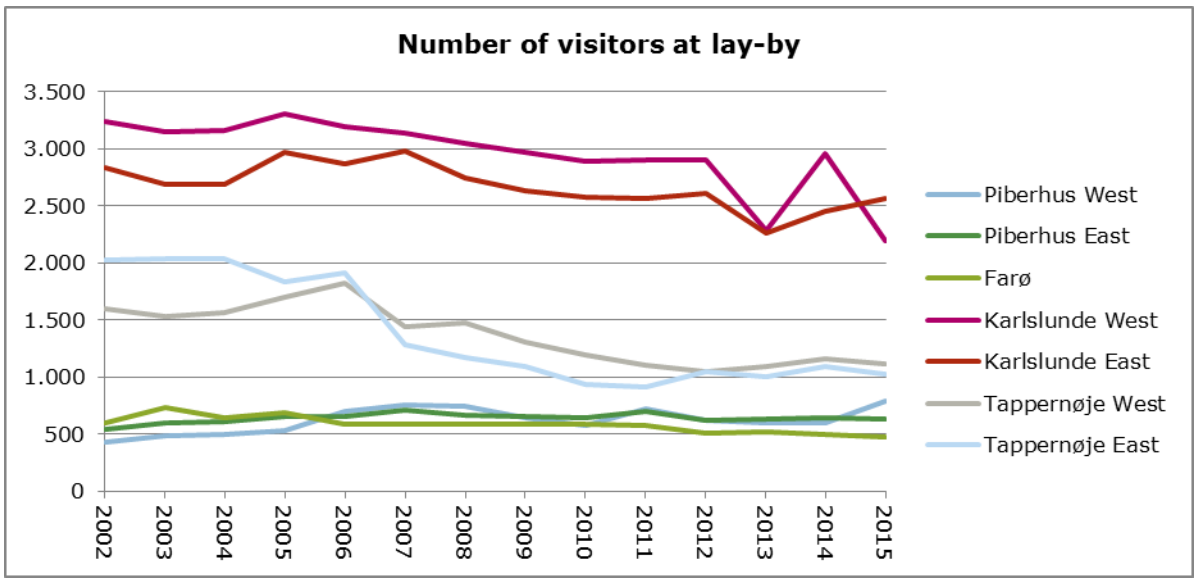
[16] http://www.dr.dk/nyheder/penge/krise-i-skibsfarten-er-blevet-barberet-med-en-femtedel-paa-et-aar

5. Exit 43 as a lay-by on the Danish highway network

Business Park Falster may also offer services not strictly related to freight transport like restaurants, toilets and petrol filling. In this section the number of visitors for these kinds of services is estimated.

The Exit 43 can also have a potential to attract visitors that could be using the transport centre as a lay-by. The figure below displays the number of persons visiting four selected lay-bys close to the Exit 43. According to the statistics, the highest number of visitors is observed at Karlslunde – this place was visited by 4,765 persons in 2015.

Figure 26 - Number of visiting vehicles at lay-bys close to the Exit 43



Source: The Danish Road Directorate, 2015.

The percentage of visiting vehicles related to the average daily traffic passing by the lay-bys at the four locations varies from 2% to 8% as presented in Table 17. Applying the same percentages visiting Exit 43 will lead to an estimate of 500 to 1,800 visitors a day in 2016.

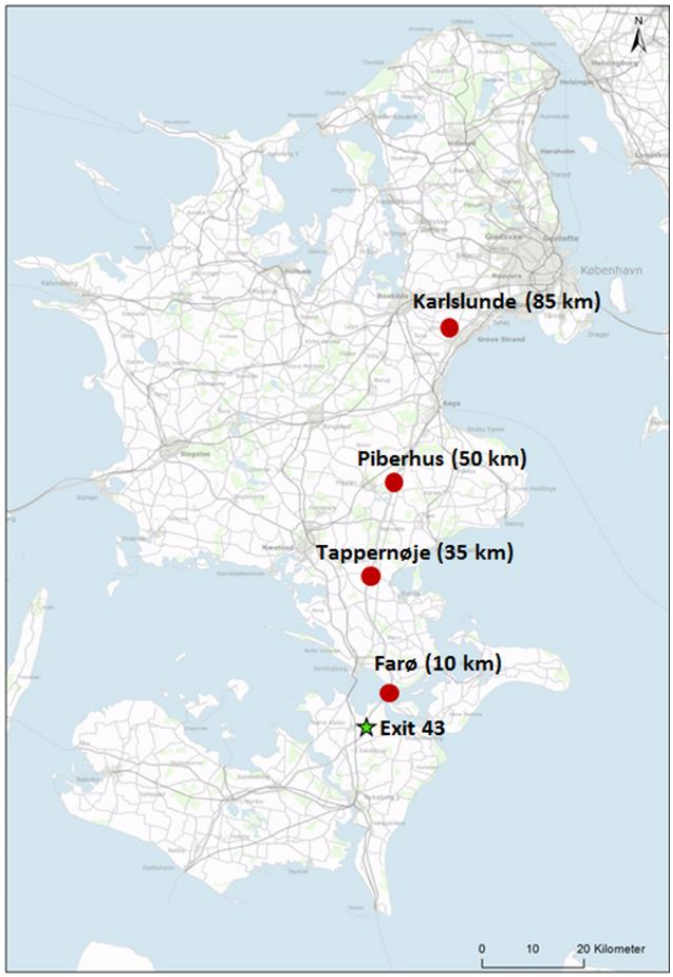
Table 17 - Share of visiting vehicles of Annual Average Daily Traffic (AADT) in 2015 at lay-bys at Sydmotorvejen and Køgebugtmo-torvejen

LAY-BY	SHARE OF VISITORS OF AADT (2015)	AADT	YEARS OF AADT
PIBERHUS (WEST AND EAST)	5%	30,689	2013
FARØ	2%	24,000	2016
KARLSLUNDE (WEST AND EAST)	5%	100,000	2013
TAPPERNØJE (WEST AND EAST)	8%	28,300	2017

Source: The Danish Road Directorate

The lay-bys close to the Exit 43 have a potential of ”stealing” the customers from the Exit 43. Particularly, the lay-by at Farø and Tappernøje can be considered as competitors for the new transport centres use as a lay-by (see Figure 27):

Figure 27 - The selected lay-by places close to the Exit 43



6. Transition period

The process of deciding and finally building the Fehmarn Belt link has been and will still be a process running over many years.

To make things work and run at the opening day of the link an early start up and planning ahead is probably wise. But it also asks for other business cases for the transition period until the link is being opened.

One business case can be the construction of the Fehmarn link in itself. Large amounts of materials will have to be transported and many persons will get temporary jobs in the region.

A similar business case can be the construction of the new Storstrøm Bridge, which will take place very close to the Business Park Falster.

As an example on the potentials the expected use of materials for the Fehmarn Belt tunnel is shown in Table 18 below:

Table 18 - Estimated volumes of materials for the Fehmarn Belt tunnel

Råstof type	**Mængde**
Beton	3.175.000 m^3
Stål	310.000 t
Asfalt	200.000 t
Sand, sten og skærver	8.580.000 m^3
Forsyninger	
Vand (betonproduktion og mandskabsfaciliteter)	1.350.000 m^3 i alt
El (strøm og opvarmning i anlægsfasen)	130 mio. kWh i alt
Brændstof i anlægsfasen	100.000 m^3 i alt

Source: Fehmarn Belt EIA[17]

It must be expected that as much as possible of the materials will be sailed to the construction areas but still some part may be expected to come on truck and pass by Business Park Falster.

[17] http://Vvmdokumentation.Femern.Dk/Kapitel15cb30.Pdf?Filename=Files/Vvm/Kapitel15.Pdf

7. Other transport centres

The Exit 43 in Guldborgsund Municipality has competitive transport centres and hubs in other parts of Denmark. Below those competitors are listed and described very briefly.

Køge (Scandinavian Transport Center)

Køge transport center is one of the biggest business and transport areas on Zealand. The area of 1300,000 m^2 has been extended by a further 500,000 m^2 to the north between Ølsemaglevej and Lille Skensved in order to meet the demand from companies that want to place their business activities here. The Scandinavian Transport Center operates Køge Harbour, which is one of the major ports in the country and is often called the gateway to the East due to the ideal location for the entire Baltic region[18].

Høje-Taastrup Transport Center (HTTC)

The transport center in Høje-Taastrup has many service facilities including a multimodal transport hub[19]. HTTC is located close to motorways, main roads and rail. The transport center also has direct motorway connection to the Øresund Bridge and the Great Belt Bridge.

Taulov

Taulov transport centre is a transport centre located in Jutland, close to Fredericia. The EU has picked Taulov as a part of the European Core Network, probably giving this centre more focus in the future. Taulov has good conditions for competitive distribution and production and with the present transport structure transport flows between the Nordic countries and the continent pass through the area where Taulov is located. The transport centre has access to road, rail, harbour and airport[20] [21].

Exit 41 - Bakkebølle

Vordingborg municipality is expanding a new business area close to Exit 41 at Sydmotorvejen. The new business area is located west of Stensved on the east side of the highway. The first site of the new business area is already sold. At this moment there are five sites available[22].

Exit 48 - Knuthenborg MT Højgaard

Exit 48 is located close to Maribo and the existing business areas on Lolland-Falster. The area has a good connection to the business harbours in Bandholm and Nakskov. The plan of the area is to provide space for storage and service facilities plus domiciles etc. However, the Danish State has not yet given funds to finance the necessary upgrading of the Exit 48. According to the Lolland municipality where the exit is placed, the interest in the business area is great[23].

Transport Centre Summary

In the regional context, Scandinavian Transport Center in Køge and transport centre in Høje Taastrup must be considered as the biggest competitors to Exit 43. The major advantage of the

[18] http://stc-koege.dk/om-stc/
[19] http://www.httc.dk/servicefaciliteter.html
[20] http://www.dr.dk/nyheder/regionale/trekanten/virksomheder-vilde-med-taulov
[21] http://www.taulovtransportcenter.dk/
[22] http://site.vordingborg.dk/cms/site.aspx?p=31272
[23] https://www.lolland.dk/Erhverv/Femernforbindelsen/Afkoersel-48.aspx

HTTC is its location in the region as well as close distance to the railway and the highway. As regards Køge Transport Center it has a good location close to the harbour.

In the local context, the two other exits on the highway E47/E55 are the local competitors for Exit 43. Both of those exits have a similar good location regarding the access to the highway as Exit 43.

8. Local impacts

As Business Park Falster will be located in rural area very close to the highway any negative impacts from the transport (like noise, air pollution, traffic accidents) must be expected to be small as the traffic changes will be small in relation to the existing transport on the highway.

Business Park Falster can offer positive impacts in the form of services to local companies and to private persons using the facilities like petrol filling or restaurants.

Possible impacts other than traffic impacts will be described later in this project in the analysis of potentials for the development and the stakeholder analysis.

On the eastern side of Exit 43 the new state prison on Nordfalster will soon open at Blichersvej in Nørre Alslev. The prison will have a capacity for 250 prisoners and with around 250-300 permanent jobs[24] some extra traffic will be generated also using the ramps of Exit 43. But this extra traffic is not expected to affect the traffic flows on the ramps.

[24] https://da.wikipedia.org/wiki/Statsf%C3%A6ngslet_p%C3%A5_Nordfalster

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