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# New fixed links across the Öresund – what is the point?

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## 1. Abstract

During the last years, several investigations on new fixed links across the Öresund have been conducted and presented to the public. These new fixed links intend to supplement the already existing bridge between Malmö and Copenhagen, the Öresund Bridge. We review these proposals and outline their intended function in the regional cross-border transport system as well as the European transport system (TEN-T) in order to identify the objective(s) of the proposals. New fixed links are generally proposed as a “one-solution-only” alternative, focusing more on the proposed alternative, than identifying the transport problem. The overall aim of the paper is to achieve a deeper understanding of the basic transport-planning question: What is the problem? Based on a review of reports, we conclude that four key-objectives exist for a new fixed link across the Öresund. Each proposal meets one or more of these objectives.

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## 2. Introduction

In July 2000, the Öresund fixed link between Sweden and Denmark opened in the southern part of the Öresund. In daily terms, called the “Öresund Bridge” - despite the fact that the fixed link consists of a tunnel, an artificial island (Peberholm) as well as a cable stay bridge. In total, the fixed link is 19 km long from Lernacken (SE) to Kastrup (DK). The fixed link is owned and operated by the Swedish-Danish company Öresundsbro Konsortiet, which is owned jointly by the Swedish and Danish Governments. The fixed link connects Malmö (300 000 inhabitants) with the city of Copenhagen (1 mil inhabitants), Denmark and Sweden and is an important link in the European transport Network, TEN-T. The fixed link provides a 24/7 highway access as well as the first ferry-free railway connection between Sweden/Norway and central Europe.

Originally, the fixed link between Denmark and Sweden was planned for the northern part of the Öresund, where the strait is only 5 km wide. But in the 1992-agreement between Sweden and Denmark it was decided to choose the southern location between Malmö and Copenhagen, at the same time linking Copenhagen Airport to the Danish railway network as well as the network in South Sweden. The distance between Malmö and Copenhagen is approx. 45 km, so the two cities became within commuting distance when the bridge opened. The bridge is a toll road and the railway fare is higher per km than national lines.

Over the years, the traffic volumes have varied significantly, but during the period of the economic boom in Denmark prior to the financial crises in 2008, the annual traffic growth rate across the Öresund exceeded any national road or railway line. If this growth had continued, the fixed link would have reached its capacity limit within 20-30 years.

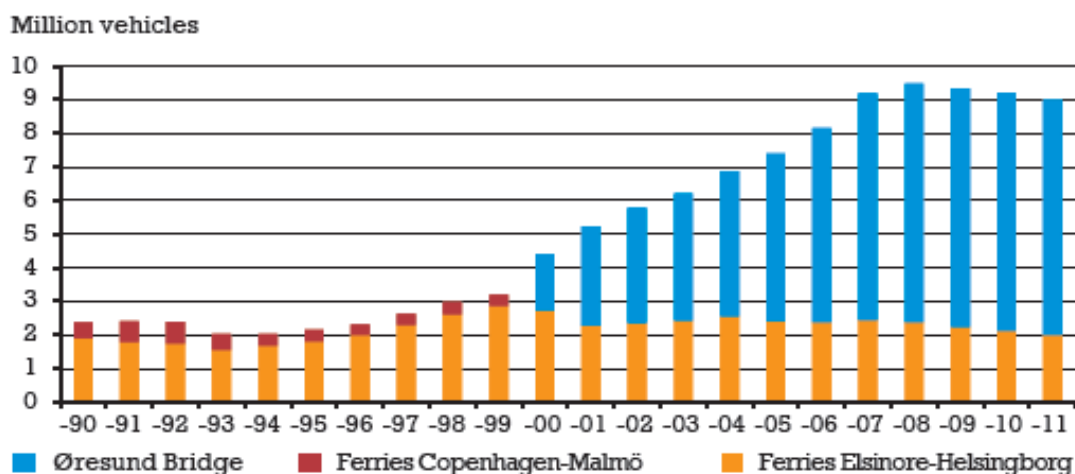
Already a few years after its opening, the discussion began for a new, second link, starting with the study of a passenger railway line between Helsingborg and Helsingör. In the last five years, several studies have been presented. These include combined road- and rail links, metro links and railway links within various geographical locations. With one exception, all of the studies have been conducted by local and/or regional authorities in the Öresund region. Proposals for a fixed road- and rail link between Helsingborg and Helsingör were presented in 2008-10 followed by a proposal for an urban metro link between Malmö and Copenhagen in 2012-13; and in 2014-15 a study concerning a railway tunnel between Landskrona and Copenhagen was presented. Parallel to this, various organisations have presented other proposals, most notably a visionary paper entitled “The Öresund 2070 vision” prepared by Skanska & SWECO 2014, where a vision involving six new fixed links prior to the year 2070 were proposed.

This paper is intended to focus on four studies: The IBU-Öresund published in 2010, the Swedish Government Study conducted by the Swedish Transport Agency, Trafikverket in 2011, the Copenhagen-Malmö study on a Metro link in 2013/14 as well as the study presented by the City of Landskrona in 2015. Other studies have also been conducted on a HH-link as well as overall studies of infrastructure in the Öresund region, but these will not be included.

The studies will be reviewed and analysed in order to determine what or which objectives are presented by the promoters of the different fixed link in order to attain an in-depth insight into the objectives articulated or perhaps not even articulated directly. Through this analysis, the intention is to address the questions: Do the proposals have the same objective or do they solve different transport planning problems? Is the need for new links different if the regional transport planning problems are addressed compared to a national/European perspective? In short: Why do we need more fixed links across the Öresund?

### 3. The impact of the first fixed link - the Öresund Bridge

#### Traffic across Öresund (1990–2011)



Source: Øresund Bridge and Shippax.

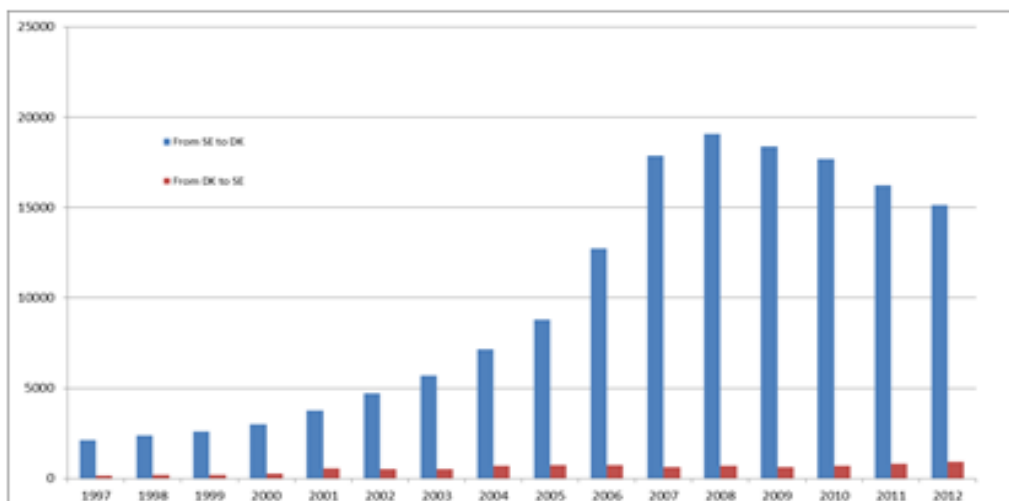
Figure 1 Road traffic across Öresund 1990-2011. Source: [www.orestat.dk](http://www.orestat.dk)

The Öresund Bridge provided dramatically improved accessibility between the south of Sweden and Copenhagen. In cases like this, it normally takes many years before travel reaches a type of equilibrium and follows the normal growth path of a region. Given the fact that the link is located in the midst of a huge urban region divided by administrative, legal, cultural and currency barriers, the driving forces for travel are different than for those of purely domestic travel. Road traffic is a good indicator of the change in the cross-border travel, much being introduced which did not take place before the year 2000. The first eight years with the bridge, the Danish part of the region experienced economic boom with high rises in housing prices and almost no unemployment within some sectors. One significant impact was a large resettlement of Danes to the Swedish side of the Öresund, whilst keeping their jobs in greater Copenhagen (Tendens Öresund, 2012). In general, wages are higher in Copenhagen than in Malmö, but due to very different taxation and social security payment systems, it is not a straightforward to compare net salary.

Approximately half of the cross-border commuters are Danes, who have resettled in Skåne (Öresundsbro Konsortiet 2010). Another special impact is the number of non-Scandinavian people moving from Copenhagen to Skåne, due to the Danish immigration policy ruling. Figure 2 shows the development in cross-border commuting. During 2005/06 the number of commuters from the Swedish side rose significantly, not only via the fixed link, but also on the ferries, as a result of the economic boom in Denmark.

The fixed link has had little impact on commuting towards Sweden. There are several reasons for this. The monetary exchange rate (DKK/SEK) and weekly working hours of 40h in Sweden versus 37h in Denmark are some of these reasons. There seems to be a strong link between the numbers of commuters and the economic development (in Denmark).

## Commuting across Öresund



**Figure 2** *Commuting across Öresund 1997-2012. (Blue: to DK. Red: to SE. Source: [www.orestat.dk](http://www.orestat.dk))*

The first 15 years with the Öresund Bridge has been a period with an extraordinary fast developing economy followed by one of the worst financial crises since the 1930's. So it is very difficult to predict,

which year the “equilibrium” concerning commuting will occur and what that level of commuting would be. Exactly how the commuting would have developed if the financial crises had not occurred can only be speculated.

For freight transport the development has been different. The number of trucks crossing the Öresund has only been showing a growth on the fixed link and much of this growth being due to smaller vehicles.

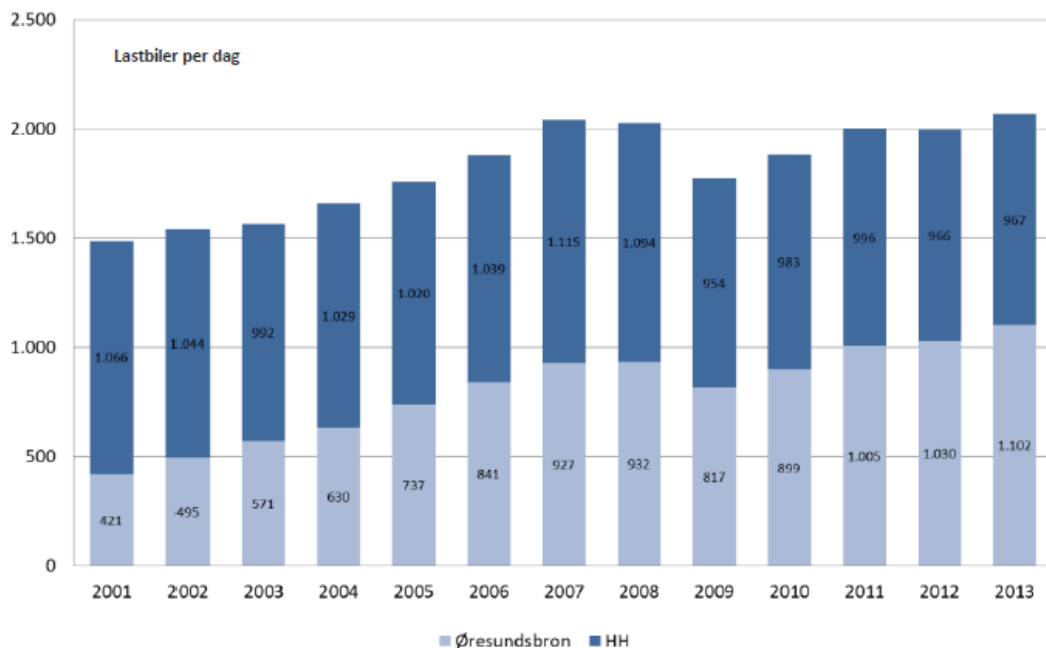


Figure 3 Trucks across Öresund 2001-2013 (top: ferries. Bottom: bridge). Source: IBU-Update (2014)

The fixed link across the Öresund has meant a significant growth in rail freight across the Öresund, in combination with more companies entering the market for rail freight.

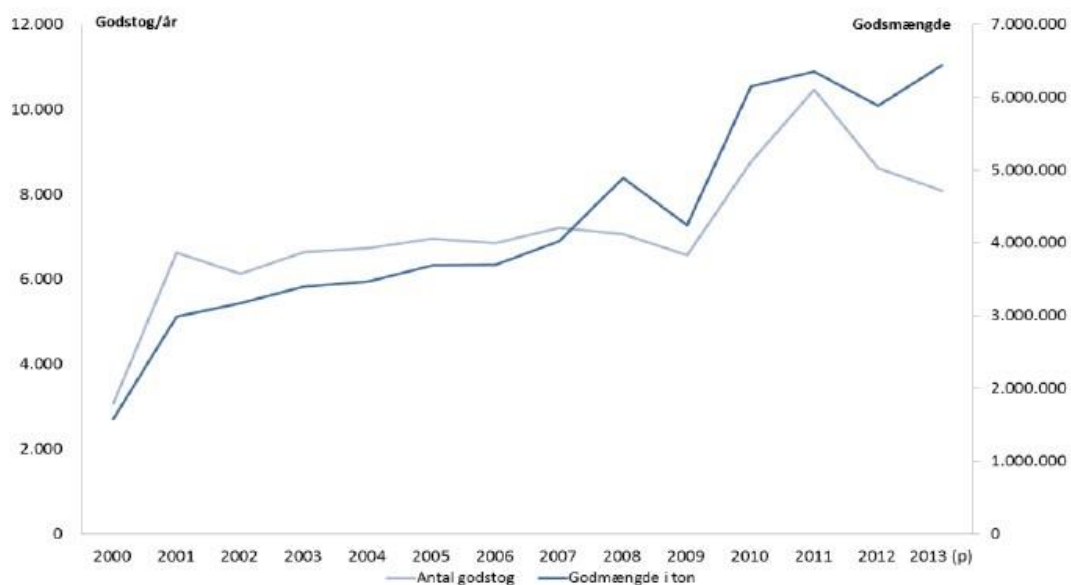


Figure 4 Number of freight trains/year and volume (tons) across the Öresund (fat line: volume) Source: IBU-Update (2014)

## 4. Proposals for a new fixed link across the Öresund

In this paper, three different proposals are examined for a new fixed link with different geographical locations: The Helsingborg-Helsingör fixed link (HH), the Öresundmetro Malmö-Copenhagen and the railway tunnel Landskrona-Copenhagen. These are both different alignments as well as different transport systems (road, rail, metro).

These proposals are the most studied alternatives for a new fixed link. However, other proposals have been made during the last decade. A road tunnel from Copenhagen to Landskrona was proposed by the managing director of the Öresund Bridge; a new freight tunnel across Amager to Kastrup was proposed by two DTU researches and a railway freight tunnel in an alignment from the south of Copenhagen to the south of Malmö (Stevns-Höllviken) proposed by the Danish Association for Construction contractors (Dansk Byggeri). Even more alternatives exist, but only the three alternatives reviewed in this paper have been subjected to pre-feasibility studies.

### Helsingborg – Helsingör (HH)

The fixed link between Helsingborg and Helsingör has been proposed as a link for road, passenger rail and freight trains (IBU Öresund 2010), incorporating the same functions as the Öresund Bridge. However, due to the geography and the depth of the strait between Helsingborg and Helsingör, constructing a combined bridge like the Öresund Bridge it is not possible. There was a need to study different technical solutions and alignments in order to demonstrate the technical feasibility of the project.



Figure 5 Alignment for the Ring 5 corridor in Denmark and a fixed link Helsingborg-Helsingör

The proposal not only included a fixed link coast-to-coast, but also a new road- and rail corridor on the Danish side, called Ring 5. It is nearly 80 km of new road and rail. The rationale behind this was to create a “by-pass” for international rail freight transport around Copenhagen and Malmö. The bypass runs from Hässleholm in northeast Skåne via Helsingborg-Helsingör down to Köge southwest of Copenhagen, nearly 170 km in length. The idea was to reroute international freight trains away from the heavily used passenger lines Hässleholm-Malmö and Malmö-Copenhagen-(Köge), providing capacity on these lines for domestic regional trains and cross-border regional trains as well as high-speed trains to Copenhagen Airport.

A fixed link for freight trains Helsingborg-Helsingör requires the construction of Ring 5 (or similar hinterland connections). A fixed link for road and passenger rail can be connected to the existing road- and rail network in Helsingborg and Helsingör, so these options do not require a Ring 5. When the proposal was updated with respect to traffic forecast and financial viability in 2014, the rail freight option was excluded from the study (Öresundskomiteén 2014).



**Figure 6 Alignment of a fixed rail and road link Helsingborg-Helsingör**

## The project

The proposal consists of 3 individual tunnels at a total cost of 32 billion DKK (4,2 billion €). Including road and rail in Ring 5 the cost would be 51 billion DKK (6,8 billion €). A tunnel for passenger trains and new underground stations at the existing stations in Helsingborg and Helsingör. The existing rail service Copenhagen-Helsingör would be prolonged to Helsingborg and further on into south Sweden. The travel time would be reduced from 20 minutes to 5 minutes between the two cities and at the same time connecting Helsingborg with direct trains to Copenhagen with a travel time less 1 h.

The road tunnel is placed some km south of the existing ferry harbours to avoid intense road traffic downtown and to connect to the existing motorways as easy as possible. The travel time savings for cars is expected to be approx. 30 minutes (IBU-Öresund, p. 29).

The freight tunnel would be placed parallel to the road tunnel and connect to the railway area in southern Helsingborg. On the Danish side it will follow the highway before being routed into Ring 5.

Traffic forecasts for 2030 were reported to have a total of some 16.000 vehicles on the fixed link (today 6.000) and 36.000 vehicles on the Öresund bridge. Public transport on the new fixed link would rise from 10.000 to 20.000 travelers per day compared to 58.000 on the Öresund Bridge in 2030.

A financial analysis has been carried out for the coast-to-coast connection showing a surplus for all 3 links of 20 billion DKK (Net Present Value) if the financing model is the same as the Öresund Bridge (IBU-Öresund 2010). This is later confirmed by the Öresund Committee (2014) Öresundskomiteen (2014).

### **The impacts and the objective of the project**

In IBU Öresund, the rationale behind a new fixed link is to strengthen rail transport in the entire Öresund region (IBU Öresund, p.22-23). This means introducing high-speed trains to Copenhagen and Malmö from the neighboring regions (Hamburg, Stockholm and Oslo), to introduce a regional Öresund train service, which covers more of the Öresund region, hence straightening the commuting possibilities, and last but not least to provide the capacity for growth in international railway freight transport as part of the EU transport policy and the objective of the Fehmarn Bält link.

To do so, extra capacity is needed across Öresund, or in other words, to relieve the potential bottlenecks on the Öresund Bridge and the lines that connect the bridge, by moving away the through going rail freight traffic from the main lines for passenger rail transport (Hässleholm-Malmö-Copenhagen).

The indirect objective of the project is to increase the intraregional accessibility as well as the international accessibility to neighbouring regions. A special issue is to strengthen the position of Copenhagen Airport through better accessibility via rail. This means more traffic on the existing bridge.

It is obvious that linking Helsingborg to the suburban railway network of Copenhagen and to get commuting times down to less than one hour by rail and road will increase the accessibility to jobs in northwestern Skåne dramatically. This objective however is only vaguely touched in IBU-Öresund (2010).

It seems as if there are two categories of objectives for a new fixed link: One linked to regional accessibility and one linked to international rail freight transport. How this traffic will develop across the Öresund as a result of the Fehmarn Belt link and the introduction of TEN-T corridors for freight is highly uncertain, but seems to be a central issue within the discussions of new fixed links.

### **Metro Malmö – Copenhagen**

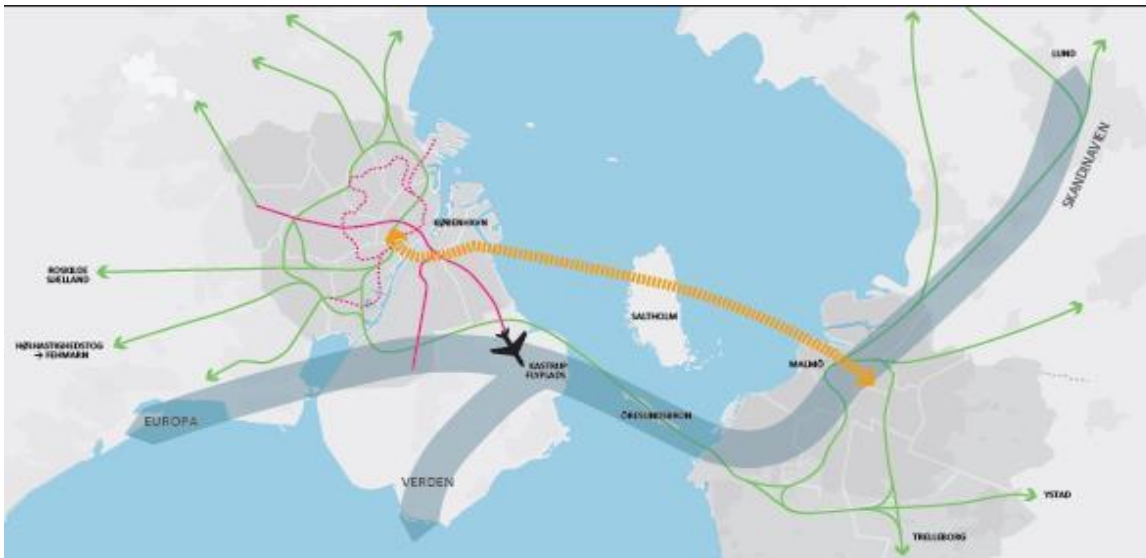
The metro proposal between Malmö and Copenhagen is called the Öresund Metro "Öresundsmetro". The proposed transport system is based on the concept of the Copenhagen metro, which is an automatic driverless metro system. The existing metro consists of two lines within the municipality of Copenhagen. A circle line is under construction. The City of Copenhagen owns half of the Metro Company; the other major owner is the Danish government.

### **The project**

A metro is normally a transport system within a metropolitan area with a high frequency of service. None of the Copenhagen metro lines extend more than 20 km outside the city, unlike Stockholm where the

metro/underground sometimes connects suburbs at a greater distance. Besides being a transport system, the name “Metro” associates travelling “inside the city” instead of “between cities” (Malmö 2013).

Besides being a transport system, the metro is also a brand of cross-border urban integration. Given the success of the Copenhagen driverless metro, the importance of global branding potential is obvious “One city - two countries”. This is also reflected in a common chapter of the Master Plans of Copenhagen and Malmö (Malmö Stad 2013).



**Figure 7 Proposed alignment for a cross-border Metro Malmö-Copenhagen. (Malmö Stad 2013)**

In 2012-13, the city of Malmö and Copenhagen conducted a comprehensive preliminary feasibility study of a 20 km long metro line from Malmö to Copenhagen. The study included technical alignment studies as well as studies on construction techniques (drilled tunnel, immersed tunnel and bridges); cross-border traffic forecasts for passenger and freight, studies on the existing railway system as well as a study on financial & organisational questions. Even a cross-border cost-benefit analysis of the project was reported, so conclusively, all aspects are covered in the study of the metro proposal.

The construction costs are estimated at being 22 billion DKK (approx. 3 bill. €). From a technical point of view, a metro tunnel is significantly cheaper to construct than a traditional railway tunnel, since metro cars are smaller in diameter than railway vehicles. The construction cost is thereby reduced, and the project achieves a higher socio-economic feasibility rate, since the construction costs are a dominant parameter in a cost-benefit analysis. Due to safety systems, a metro has a lower maximum speed than railway systems; the trade-off between travel speed and construction costs however, is not exposed in the study.

The basic idea is to connect the downtown areas of Malmö and Copenhagen with the shortest possible travel times combined with the high frequency of a metro. The present travel time from Malmö Central to Copenhagen Central is 35-37 minutes, since the regional service “Öresundståg” calls not only at Copenhagen Airport but also at the new suburb of Hyllie in Malmö, the home of Malmö Arena and the largest shopping centre in Scandinavia (Emporia). In total, a travel distance of 45 km. According to the study, the city-to-city travel times can be reduced from 35 minutes to 15-20 minutes with a Metro. Taking into account the perceived travel time by travellers, the reduction is even greater (the passenger considers the waiting time to be twice the time of the actual travel time). According to the study even travellers from Lund to downtown Copenhagen could gain time by changing to the Metro, despite the perceived discomfort of changing trains. The metro is supposed to operate at a much higher frequency than trains,

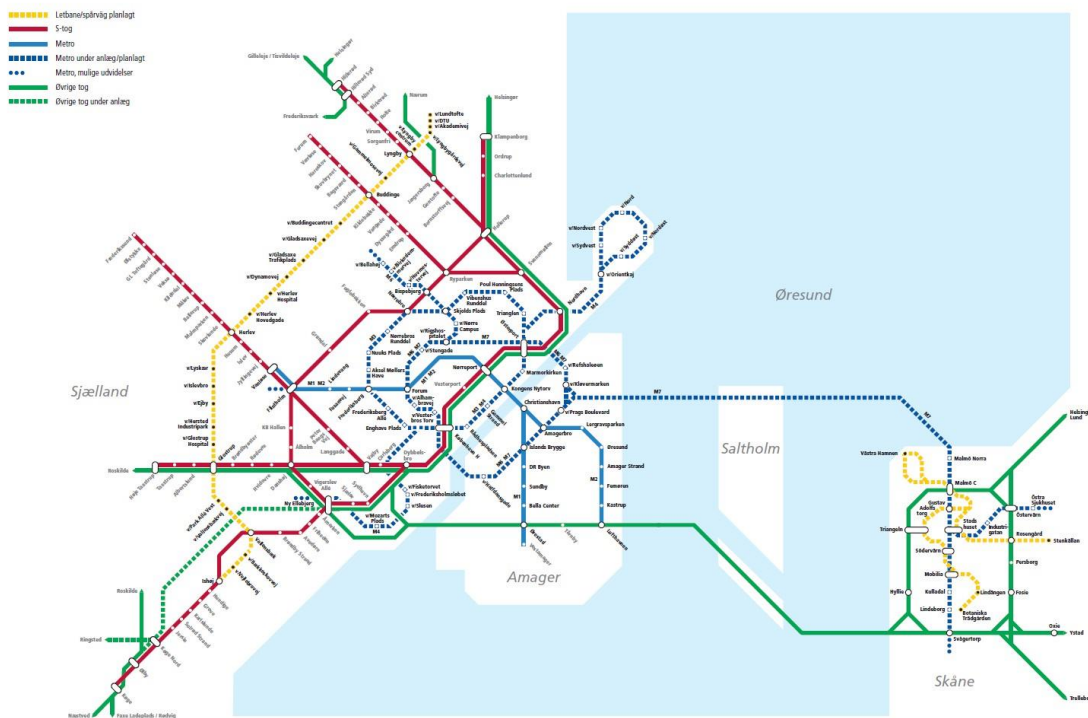


down to headways of 2 minutes. Travel times to Copenhagen Airport will be the same as today, but with a lower frequency due to the concept of relieving, which is not reported.

### The impacts and the objectives of the project

According to the traffic forecasts, the metro will transport approx. 50 % of the passengers across the Öresund from the regional trains. Today's 30.000 daily rail travellers are expected to be approx. 54.000 by 2030, if the present annual growth rate of 4 percent continues (Malmö Stad 2013). Hence, if the metro is operational in 2030, the ridership would be 27.000 daily travellers, i.e. nearly the same number of travellers as on the regional trains today. The socio-economic feasibility is calculated at being 3% whereas the requirement in Denmark is 4 %, however this is not unusual for large public transport projects.

As mentioned previously, the challenge in traffic forecasting is to predict the number of travellers in 2030 *without* any new fixed links. The travel patterns across the Öresund are driven by totally other factors than domestic travel in Denmark and Sweden. Differences in housing prices, wages/exchange rates, cultural and administrative barriers play a significant role. Predicting the future travel for 2030 is a challenge for the study of any new fixed link and in this case it is also a challenge to determine the impact on commuting between two (today) separated labour markets. The emphasis on relieving the potential pressure on the existing railway line from the expected traffic growth in the next 20 years seems to be the initial objective.



**Figure 8 The Öresundmetro in the Öresund public transport system (Malmö Stad 2013)**

The final report states “the need for a more robust transport system” as the main objective (Malmö Stad, p. 4). This is followed by reflections on how the metro can be a trigger for “the urban fusion” of the two cities, i.e. integration of the labour markets and creating the volume to attract international companies to create regional economic benefits (wider economic benefits). The study refers to the London Cross-Rail project, where the expected wider economic benefits are assumed to be larger than the traditional transport

benefits (time savings etc.). Hence, the reason for focusing on the dimension “robust” is to avoid the transport system being a hindrance to urban integration.

The meaning of “robust transport system” is two-fold. The metro offers a local transport system between Malmö and Copenhagen, which is isolated from the railway system. This creates an alternative transport opportunity if the Öresund Bridge is out of service due to incidents like train breakdowns, signal errors etc. Hence, the urban integration could be hindered.

The other dimension of robust is more inclined towards the classical capacity enhancement approach: Due to expected traffic growth towards 2030 from international rail freight from the Fehmarn Belt connection, regional/local travellers on the Öresund trains and the potential introduction of Scandinavian high speed trains, the Oresund Bridge will become a bottleneck. Instead of proposing a traditional expansion to 4 tracks on the existing line, the study proposes a complementary metro system in order to have two independent systems in order to have a redundant passenger transport system.

Conclusively, relieving potential bottlenecks on the existing fixed link and creating a more redundant passenger transport system is the main objective of the Öresund Metro proposal. However, it is articulated indirectly that creating a larger labour market by reducing travel times, is a major objective.

## **Railway tunnel Landskrona - Copenhagen**

The Landskrona tunnel is a proposed railway tunnel covering both passenger trains and freight trains. It was originally proposed as a passenger train only tunnel linking downtown Landskrona with a station in the eastern part of Copenhagen (Österport station). In the project, a road tunnel between Helsingborg and Helsingör (the same proposal as the HH link) was also included in order to create a financially viable investment package. In 2015, the City of Landskrona presented a new study on a tunnel for both passenger and freight trains and an extension to Copenhagen Central station and further on to the existing line for freight.

The project is proposed by the City of Landskrona. Unlike other proposals, this proposal is not a joint Swedish-Danish initiative, but a solely Swedish initiative.



**Figure 9 Proposed alignment for railway tunnel Landskrona-Copenhagen. (Landskrona Stad 2015)**

## The project

The coast-to-coast tunnel is 19 km in length and 26 km including land access, this is somewhat longer than the metro tunnel proposed above. The tunnel links the former railway station in Landskrona with Copenhagen Central, where a new underground station is proposed. The tunnel should be used for regional trains (Öresund trains), international freight trains and high speed trains. The project also includes a road tunnel between Helsingborg and Helsingör. The total cost is estimated at being 72 billion SEK (7 bill €), 48 billion without the road tunnel Helsingborg-Helsingör.

The expected travel time from Landskrona to Copenhagen is 14 minutes compared to 1 hour by train today, giving Landskrona the best accessibility of the Swedish cities to Copenhagen. Helsingborg is expected to get large travel time savings; from 1h 15 to 30 min. This is faster than the proposed HH link, since the route via Landskrona to Copenhagen will be operated at maximum railway speed. The travel time from Lund to Copenhagen would also be faster than via the Öresund Bridge (Landskrona Stad, p. 19). High speed trains from Stockholm would save approx. ½ hour compared to the route via the Öresund Bridge.

The project also proposes a tunnel under central Copenhagen and a new underground station at Copenhagen Central as part of the project. Thereby the congested central railway line (Copenhagen-Österport) is relieved and extra platforms at Copenhagen Central are provided. Extra capacity at the Central Station is needed due to a new railway line west of Copenhagen which is due to open in 2018 and the Fehmarn Belt link. The Danish authorities have studied various solutions to the Copenhagen problem, but no solution has as yet been chosen (Landskrona Stad, p. 12).

The project will reroute international freight trains from the Öresund Bridge and the line Malmö-Lund to the Landskrona tunnel. This is achieved by extending the tunnel to the point west of Copenhagen that

connects with the freight network. Thereby the Öresund Bridge and the congested line Copenhagen-Kastrup are, as a result, relieved.

### **The impacts and the objective of the project**

A passenger traffic forecast for 2030 is presented. Approx. 20.000 travelers will use the Landskrona line and 40.000 will use the existing Öresund Bridge in 2030. The total number of travelers of 60.000 crossing the Öresund corresponds with the forecasts from the Öresund Metro and the HH-link. The study focuses on the financial analysis but presents a preliminary socio-economic cost-benefit analysis. If the project should be financed via loans (like the Öresund Bridge) the payback time will be less than 40 years with an interest rate of 3,5 %. (Currently the interest rate is approx. 1 %). The socio-economic calculation presented shows a benefit of 16 billion SEK (Net Present Value) during the project's lifetime.

The main objective of the Landskrona proposal is to provide extra railway capacity between Sweden and Denmark, i.e. to relieve the expected congestion on the Öresund Bridge and the hinterland connections (Landskrona Stad, p. 5). The future need for capacity is triggered by the development of the European TEN-T network (international freight corridors), the Fehmarn Belt link; the economic development in the Öresund region (increased commuting) as well as the ambition to raise the number of travelers at Copenhagen Airport from 25 to 40 million annual travelers (high speed trains). Hence, the study concludes that the Öresund link cannot facilitate the growth in rail travel. Relieving upcoming bottlenecks across Öresund is the means to maintain the cross-border mobility as well as provide capacity for international freight transport.

A specific objective of the proposal is to relieve the already existing bottleneck in the Copenhagen railway network.

However, it is rather obvious that Landskrona will achieve extremely good accessibility to the labour market in Copenhagen. With a travel time of 14 minutes, Landskrona will have better accessibility than most Copenhagen suburbs. Centrally located in the city is a major industrial zone that could be converted into housing (providing more homes is currently a major issue in the Swedish infrastructure planning process regarding new high speed lines). The impact on the housing market and employment in Landskrona and western Skåne would be significant. The fact that this benefit is of a more local nature, might be the reason why enhanced labor market and agglomeration effects are not highlighted in the report.

## **5. Identifying the key objectives for a new fixed link.**

The three proposals reviewed in this paper have been studied over a period of 5-7 years and the studies are not directly comparable; since, for instance, the cross-border transport forecasting models have been developed over the years. Yet there are many similarities. They have all investigated more deeply the construction costs, provided a passenger transport forecast, elaborated on the rail freight development and have performed either a socio-economic analysis or a financial analysis based on user payment as the existing Öresund Bridge. None of the studies have examined alternatives or benchmarked against other proposals. They all follow the same concept: 1) The solution is proposed 2) The benefits of the project are presented 3) The transport planning problem is addressed, directly or indirectly.

Given the effort spent on these studies, the absence of government studies on the capacity of the *existing* link is striking. Assessing the capacity situation in 2030 is done both in Sweden and Denmark, but is absent between Denmark and Sweden. However, this might be a key question, since the expected bottlenecks or on the existing link Copenhagen-Malmö is a core objective for any of the proposed links. There could be several reasons for this absence, besides the obvious difficulties in forecasting international freight transport.

Providing extra rail capacity across the Öresund is a core objective for all proposals. The solutions are different but the objective is the same. The need for extra capacity is motivated for different reasons:

- More capacity for rail freight across the Öresund to meet the impacts of the Fehmarn Belt and to comply with TEN-T development
- Improving accessibility to Copenhagen Airport with high speed/fast trains from Hamburg/Stockholm/Oslo and regional trains (Expanding CPH)
- Capacity for more cross-border commuting on regional Öresund trains, in turn gaining regional economic benefits from a larger metropolitan area

From a functional point of view, these reasons should be separated when alternatives are discussed, since a proposed alternative might not be the best in all three cases. For obvious reasons improving accessibility to Copenhagen Airport will result in more traffic on the existing Öresund Bridge. But rail freight across the Öresund is not dependent of a specific alignment and more alternatives exist. The objectives are the same in all proposals. The solutions are different: The Landskrona and HH studies propose a new railway tunnel; the metro project proposes a new local transport system, which reduces the need for Öresund trains and the spare capacity could be used for freight traffic.

Increasing the cross-border regional labour market is a common feature for all of the proposals, maybe not highlighted as much as capacity in the reports. There seems to be a common understanding of the need to have a more integrated cross-border region in order to be more globally competitive, to attract global companies, more research based industries etc. in order to reduce travel times across the Öresund, thus making it possible for more people to commute between the densely populated shores of the Öresund and create a larger labour market for the individual as well as for the companies involved.

Basically the objectives of the proposals are all very similar –they are all concerned with connecting to the large labour market in Greater Copenhagen. However, the proposals differ as to which municipality in Skåne would receive the improvement: Helsingborg, Landskrona or Malmö. This impact is difficult to access, since cross-border commuting is driven by other factors than domestic commuting. During the last 15 years the region has experience a period with excessive growth in employment and housing prices followed by severe economic depression (mostly on the Danish side). Few regions in Europe experienced this dynamic, and it makes it very difficult to predict the development towards 2030. Seen from a regional point of view, creating a more integrated labour market might be a key objective. In Swedish literature this is often referred to as “regionförstoring” (regional expansion).

A third objective is the robustness or the vulnerability of the transport system. This objective is not touched equally in all the studies, but there seems to be a development over the last five years making this objective more important. The Öresund Bridge has provided short travel times and 24/7 access between Copenhagen and the Malmö-Lund region. The vulnerability became more visible during a strike involving the Öresund trains in 2014 and a week’s closure of the international rail freight service due to a derailment in 2012. In

principle this transport system has a back-up. The extensive ferry lines between Helsingborg-Helsingör are accessed by road and rail. However in a situation where the bridge is closed, a detour involving 2 hours travel time is necessary. For the international rail freight a ferry line between Sweden and Germany exists, but does not have the capacity to deal with all rail freight during a closure of the railway over a period of several days.

The metro study highlights the need for a robust, urban passenger rail system to promote urban fusion and the Landskrona study highlights the need for two way access across Öresund in case of disruption on the existing bridge. Once the Fehmarn Belt link is opened, there will be two routes for rail freight through Denmark, the same on the Swedish side, but only one across the Öresund. Assessing the impact of reduced vulnerability is not part of a standard transport appraisal (cost-benefit) and could be difficult to assess. However given the situation with only one fixed link in the middle of the region, is one of the reasons to propose new fixed links.

## 6. Conclusion – what is the point?

A traditional infrastructure planning method consists of the steps:

- Define the transport problems (the objectives)
- Identify relevant alternatives, infrastructure as well as non-infrastructure measures
- Assess the alternatives
- Recommend one or more alternatives as the solution

The study on new fixed links follows a nearly opposite method: Present the solution, present the impacts, and present some objectives that the proposals meet. Since no study has compared the three proposals or examined other alternatives, there has not been a need for the standard infrastructure planning method. However, a good indication of the transport problem definition can be derived from the review studies.

Based on the review of study reports of the three proposals we consider these four objectives as important for a new fixed link to fulfil:

- To increase the regional accessibility for cross-border commuting
- To provide more capacity for international freight transport (by rail)
- To increase the catchment area of Copenhagen Airport
- To make the cross-border transport system less vulnerable (passenger and/or freight)

Besides these general regional wide objectives, of course more local objectives exist for these proposals.

These four objectives can serve as criteria for the assessment of any proposal of a new fixed link.

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