INTERNATIONAL FUTURES PROGRAMME

TRANSCONTINENTAL INFRASTRUCTURE NEEDS TO 2030/2050

GREATER COPENHAGEN AREA CASE STUDY

COPENHAGEN WORKSHOP
HELD 28 MAY 2010

FINAL REPORT

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30 June 2011
FOREWORD

OECD’s Transcontinental Infrastructure Needs to 2030 / 2050 Project

The OECD’s Transcontinental Infrastructure Needs to 2030 / 2050 Project is bringing together experts from the public and private sector to take stock of the long-term opportunities and challenges facing macro gateway and corridor infrastructure (ports, airports, rail corridors, oil and gas pipelines etc.).

The intention is to propose a set of policy options to enhance the contribution of these infrastructures to economic and social development at home and abroad in the years to come.

The Project follows on from the work undertaken in the OECD’s Infrastructure to 2030 Report and focuses on gateways, hubs and corridors which were not encompassed in the earlier report.

The objectives include identifying projections and scenarios to 2015 / 2030 / 2050, opportunities and challenges facing gateways and hubs, assessing future infrastructure needs and financing models, drawing conclusions and identifying policy options for improved gateway and corridor infrastructure in future.

The Project Description includes five work modules that outline the scope and content of the work in more detail.

The Steering Group and OECD International Futures Programme team are managing the project, which is being undertaken in consultation with the OECD / International Transport Forum and Joint Transport Research Centre and with the participation of OECD in-house and external experts as appropriate.

The Steering Group includes representatives from: OECD Ministries of transport, mobility and public works, environment and energy, sustainable development and the sea – as well as from other departments and agencies; non-OECD members (Chinese Taipei and India), international organisations (EC, EIB) and private enterprise.

The project is exploring the future opportunities and challenges related to infrastructure in some key gateway areas.

The Greater Copenhagen Area was chosen as a target for consideration, following discussions with the Project Steering Group members.

Copenhagen Workshop

The Copenhagen Workshop was organised jointly by the OECD International Futures Programme (IFP) and Denmark’s Department of Transport – and held in two parts. An afternoon meeting with the Capital Region of Denmark Organisation was held on 27 May 2010. The main Workshop was held on 28 May 2010, hosted by the Ministry at its premises in Copenhagen and attended by 20 participants from the OECD, Department of Transport, Transport Agencies and others.
The participants list and meeting Agenda are provided in Annexes A and B.

The purpose of the Workshop was to allow the OECD project to focus on the:

- Current situation of the Greater Copenhagen Area
- Expected future growth and development including as a hub between Germany and Sweden
- Planned infrastructure and related funding and financing arrangements
- Opportunities and challenges related to the current position and the outlook.

An Outlook paper prepared by the OECD’s International Futures Programme was circulated prior to the meeting. This outlined the global outlook for economic growth, trade and development; the European Region outlook; and other important developments bearing on the Gateway area – including maritime developments such as possible new trade routes. The paper drew on forecasts and projections prepared by other responsible bodies – e.g. IMF, World Bank and International Energy Agency on economic aspects; UNCTAD, IMO etc on maritime aspects; and independent experts. The paper noted that all forecasts and projections prepared before or during the Global Financial Crisis need to be treated with some caution.

**Workshop Report Structure**

The first part of the Report outlines the OECD project and expectations for the Workshop (as set out above).

The second part of the Report provides the context for the work, including insights on the Greater Copenhagen Area, its current situation and outlook – together with advice from Danish authorities on Danish transport and infrastructure policies and strategies and infrastructure investment over the period to 2020.

The third part of the Report focuses on the Opportunities and Challenges facing the Copenhagen Gateway Area, as assessed by the OECD project team, including in relation to expected hub and transit developments.

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The OECD IFP would like to extend special thanks to Ute Stemmann of the Danish Transport Ministry for her collaboration on the report.
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CHAPTER 1
INTRODUCTION AND SUMMARY

Greater Copenhagen Area

The Greater Copenhagen Area is relatively small by comparison with many of the major European metropolitan areas but similar in size to other competitive cities in the Region – e.g. Oslo, Stockholm and Helsinki.

Copenhagen is ranked relatively highly in respect of its transport infrastructure, with good quality road and rail infrastructure, relatively high average speeds on its roads (despite some increase in road congestion) and good quality public transport (despite some crowding on public transport systems in peak periods). Copenhagen also has one of the highest rates of bicycle use, including for work travel.

Mobility within Copenhagen is relatively high by comparison with many other cities. However, there are concerns about increasingly crowded roads and the possibility of reduced mobility. As a result, there are plans to significantly improve public transport usage up to 2020 and reduce traffic congestion on the roads in future.

The authorities are aiming to protect the metropolitan area from the types of serious traffic problems confronting most other cities.

Green Transport Agreement

The Agreement on “A Green Transport Policy” reached in January 2009 by the Government and other parties (all in all seven out of eight parties in the parliament) has provided remarkable opportunities for moving forward in the desired directions.

The Agreement recognises the need for road improvements where this is the best approach: e.g. on circular routes and approach roads in the highest density areas (i.e. Copenhagen). It appears to give more weight to collective transport improvements than previously – within a balanced modal approach. Noteworthy is the objective that: “Public transport shall absorb most of the future growth in traffic. The railways shall be reliable, safe and ultramodern”.

Funding

Related to the Green Transport Agreement, there is an agreed and fully funded infrastructure programme for the Copenhagen Metropolitan Area over the period to 2020, with Decided Projects encompassing infrastructure and other investments in all land transport modes.

Denmark’s Infrastructure Fund with its many different sources of funds ensures sufficient funding for all the “Decided Projects” over the period to 2020. For the previously approved large Fehmarn Belt fixed link and Copenhagen Metro projects, their funding models rely on user charges with financing supported by state guarantees. In overall terms, the arrangements on which the very
large infrastructure investment programme in Denmark is based are widely supported and working well.

**Strategic Issues**

Previous studies drew attention to the importance of Denmark’s gateways for transport to and from the rest of the world. The Case Study highlighted the contributions that efficient and reliable strategic infrastructure can make to overall objectives, including the effective linking of the key regions to the major hubs and international corridors and meeting the growing needs for efficient international passenger movements and goods flows.

The Case Study gave consideration to the opportunities and challenges associated with strategic infrastructure, related to Copenhagen itself, Copenhagen’s international connections via land, sea and air transport and also to international transit connections across Denmark (e.g. between Sweden and Germany) – all of which could impinge on the future infrastructure needs of the Greater Copenhagen Area.

Attention was paid to both external mobility with reference to the rest of the country and the connections to surrounding countries – as well as internal mobility within the Greater Copenhagen Area itself.

**Strategic Infrastructure post 2020**

One of the strategic problems to be addressed is that the demand for transport and mobility is rising at the same time as other demands (e.g. related to health, environment and ageing populations) are increasing.

The strategic analyses being undertaken by the Danish Transport Ministry for the period beyond 2020 provide very good opportunities to identify and explore projects which can make valuable contributions to desired transport outcomes in the period to 2030 and beyond. In this context, it will be important to clarify what the desired outcomes for Copenhagen and Denmark as a whole are, as well as the desired outcomes for the transport sector itself. Some important priorities will then need to be set for the long run.

The completion of the Fehmarn Belt link in 2020 will provide very good opportunities to strengthen external mobility. The Case Study gave some consideration to a number of opportunities that might be of significant benefit to the Greater Copenhagen Area in the medium term to 2030 and in the longer term.

Clearly, across the projects identified, there are many strategic opportunities over the period beyond 2020. The highlights appeared to be:

- in conjunction with the Fehmarn Belt fixed link, the creation of a future Fehmarn region, including Denmark, Northern Germany and Southern Sweden
- an inner harbour tunnel that would improve road connections and facilitate urban redevelopment in Copenhagen
- further improvement of the public transport system in Copenhagen e.g. automatic suburban rail trains and new suburban rail services
• options for improving the connections between western and eastern Denmark, among others by improving domestic rail transport connections from Copenhagen to other Danish cities in accordance with the “One-Hour” rail policy

• improvements in air and land connections to Copenhagen Airport and rail connections to the relocated port

• a fixed link between Aarhus and Zealand (Kalundborg) that could greatly improve connections between Copenhagen and Aarhus – as well as between Jutland and Zealand generally and is the most expensive project currently under consideration.

• a possible Elsinore – Helsingborg fixed link across the Sound, which is being discussed by a Danish-Swedish group of government officials

• the possible need for a western Ring 5 bypass of Copenhagen – separately from or in combination with any Elsinore – Helsingborg link.

Of course, there are many other infrastructure-related opportunities as well, too numerous to mention here. All will require significant time and resources to analyse fully.

Some time was spent on the opportunities for better connecting the largest population and employment centres. The important opportunities that stand out for doing so include:

• better integrating the very large population and employment centres on the Danish and Swedish sides of the Øresund Sound

• better connecting the population and employment centres in Copenhagen and Funen/Jutland.

Strategic transport projects that can significantly improve accessibility in these two settings in particular would appear likely to offer both the transport improvements needed as well as contribute to the productivity and wider benefits that are being sought for the Greater Copenhagen Area.

One option that attracted attention was the possible Aarhus – Zealand (Kalundborg) fixed connection. Although it would be very expensive, it would offer prospects for significant improvements in passenger and freight rail services between Denmark’s two largest cities (Copenhagen and Aarhus). If travel times could be improved sufficiently, such a link could make public transport commuting possible and considerably improve general transport and travel between the two cities.

Strategic priorities to be set

Overall, it seems clear that all the strategic infrastructure projects under consideration could make some or even important contributions to overall objectives for transport and contribute to the development and growth of the Greater Copenhagen Area.

Of course, the major projects are quite expensive: e.g. a western bypass of the Copenhagen area or a harbour tunnel could cost several billion Euros; and a Kalundborg link possibly around €16 B. This means that, even with the benefit of Denmark’s very good infrastructure funding arrangements, the key strategic projects will need to be prioritised and staged carefully over time.
Clearly, the strategic choices to be made will be rather difficult, and the implications for the Greater Copenhagen Area of choosing one or the other of the major infrastructure options could be quite different. While some will improve the daily travel conditions for Copenhagen residents and commuters, others will improve Copenhagen’s and Denmark’s international connections and possibly their longer term competitiveness as well – both of which will be increasingly important in future.

The parties involved in infrastructure planning and those responsible for decisions on infrastructure priorities, funding and development will therefore need to be well advised on the outcomes of the strategic analyses currently being undertaken, including in terms of the ways in which each of the major projects would contribute to all of the overall objectives – as well as each of the transport objectives.

In the meantime, the decisions that the Danish government has taken on infrastructure investment to 2020 – supported by fully approved funding from secure funding sources – will make important contributions towards achieving the objectives of the Agreement on Green Transport Policy.

The overall arrangements are widely supported and should help ensure that major current issues and problems are addressed with the best approaches and latest technology while planning is under way on how best to ensure Denmark and the Greater Copenhagen Area continue to benefit from high quality infrastructure beyond 2020.
CHAPTER 2
REGIONAL CONTEXT AND TRANSPORT TASK

2.1 Regional Setting

The regional geographic layout and setting for Denmark is shown below:

Figure 1. Geographic layout and setting for Denmark

Facts about Denmark

Population density: 126.4 pr. square kilometre  
Gross domestic product: DKK 1 658 billion (2009)  
Capital: Copenhagen 1 167 569 (2010)

Area: 43 098 square kilometres  
Geographic region: Scandinavia  
GDP pr. inhabitant: 300 241 DKK (2009)
Other major cities: Aarhus 237 551, Odense 158 163, Aalborg 100 873 (2010)
Currency: Danish Kroner, DKK. 1 Krone = 100 Øre (5.42 DKK = 1 USD; 7.45 DKK = 1 EUR 2010)
Source: Danish Ministry of Transport.

2.2 Current and Future Transport Task

Transport Drivers

Figure 2. Forces of traffic – Traffic and GDP go together


Figure 3. Annual amount of goods traffic expected to increase

Goods growth of 75% is expected from 2000 to 2025

Domestic Traffic

Roads

Denmark’s Infrastructure 2030 report published in 2008 advised that traffic on those Danish roads under the government’s responsibility (see section 3.2) in 2005 amounted to 18.7 billion kms. The growth in traffic on state roads was expected to be approx. 70 per cent over the period from 2005 to 2030 – an average annual growth in road traffic of 2.2 per cent. On this basis, expected road traffic in 2030 was expected to be around 32.1 billion kms.
Figure 4. Expected Annual Average Daily Traffic in 2030

Note: without Fehmarn Belt Link.
Source: Infrastructure 2030, Infrastructure Commission 2008 (page 130, Figure 7.2).

Rail

The Infrastructure 2030 report’s projections for rail passenger traffic anticipated that the number of trips by train (all other things being equal) would rise by between 5 and 10 per cent from 2005-2030 – see below:

Figure 5. Historical development 1970-2005 and projections 2005-30 (excluding metro passengers in Copenhagen)

Note: without Fehmarn Belt Link.
Source: Infrastructure 2030, Infrastructure Commission 2008 (Figure 7.7, p143).

Rail traffic increased by around 50 per cent in the years 1979-81 (when gasoline prices increased greatly) and the relatively high levels achieved then have been maintained. Total passenger transport by rail doubled in the period 1970 to 2005. Long-distance and regional traffic increased the most. The S-train traffic recently declined slightly after a major expansion at earlier stages. Experience shows that economic growth gives rise to increased ownership and use of vehicles which reduces use of public transport –
especially at a local level (as evident in S-train traffic in Copenhagen). The early projections for passenger rail traffic to increase 5 to 10 per cent over the period to 2030 – like projections for road based traffic – were based on economic growth and took into account forecast changes in vehicle operating costs.

**Freight Traffic**

Every year, there are over 200 million tonnes of cargo carried on journeys starting and ending in Denmark. This volume equates to over 37,000 kg of cargo every year for every Dane from infants to old people.

Freight transport everywhere has changed in line with more open borders and new technological opportunities, with a large part of the growth being international freight that involves increasingly long chains and many modes.

Trucks are often the last link in the transport chain when goods are delivered to factories and stores or directly to the individual. Denmark’s national freight is dominated by the trucks, which account for approx. 80 per cent of total freight transport in Denmark. Ships and ferries account for about 19 per cent while rail accounts for approx. 1 per cent.

**Road Freight**

For around the next 15-20 years, trucks are expected to remain the dominant form of transport in Denmark, although other transport modes are expected to carry a greater share of the growing transport task. It is therefore important that trucks are as effective, traffic safe and environmentally friendly as possible.

The graphic below shows where the increase in international freight flows by truck over the period 2000-2025 (without the Fehmarn Belt link) was expected to be greatest.

**Figure 6. Increase in international road freight flows over period 2000-2025**

*Note: without Fehmarn Belt Link.*

*Source: Infrastructure 2030, Infrastructure Commission 2008 (Figure 7.10, page 143).*
The report advised:

The largest growth rates in cargo volumes were expected to be concentrated in the corridors of the Triangle Area down through Jutland to Hamburg and Bremen. Furthermore, flows around the metropolitan area were expected to grow significantly, not least in the corridor Helsingborg-Elsinore-Copenhagen Koege. Simultaneously, road freight was expected to continue to grow significantly over the Fehmarn Belt (Roedby-Puttgarden), although the analysis did not account for the establishment of a permanent connection.

The expectation of increasing congestion on the roads stresses the importance of the other modes, including ports and railways, in intermodal transport chains. With the greater demand for transport, ports will be able to play a larger role as transportation centres, especially for international freight.

In the case of rail, especially the longer journeys are likely to generate the largest benefits. The establishment of a fixed link across the Fehmarn Belt is expected to enhance freight by rail in the form of both Danish exports and imports, and transit between Scandinavia and the continent.

Source: Infrastructure Commission 2008 (p. 143).

**International Maritime Road and Rail Freight**

Shipping is the dominant mode of transport in international freight transport, encompassing imports and exports of goods to and from Denmark, and transit through Denmark. Shipping carries around 67 per cent of international freight traffic to and from Denmark, when measured in tonnes carried. Trucks account for approximately 28 per cent of international freight transport. Rail accounts for approx. 5 per cent at present.

Looking to the expected future growth in freight, shipping and rail transport will be expected to carry a larger share of international freight transport tasks in the future. Increased goods traffic will increase pressure on rail freight demand and services.
CHAPTER 3
INFRASTRUCTURE PLANNING AND FUNDING

3.1 Introduction

Infrastructures are not an end in themselves. Rather, they are a means for ensuring the delivery of goods and services that promote prosperity and growth and contribute to quality of life including social well-being, health and safety of citizens, and the quality of their environments. Transport infrastructure responds to people’s needs for mobility and supports a functioning labour market and the related specialisation of the workforce.

Infrastructure has been important to the world economy. It has been important as well in supporting the trade and economic growth that permits the high standards of welfare expected in many nations. Clearly, such infrastructure provides significant social and economic benefits.

Looking to the future, infrastructures will continue to play a vital role in economic and social development, not least because the networked economy is becoming increasingly important, and society ever more dependent on the smooth running of a growing range of infrastructure services.

3.2 Infrastructure Planning Responsibilities

Infrastructure planning is an important responsibility that needs to be handled extremely well, to ensure the potential benefits of infrastructure are realised.

Like many countries, Denmark has recently revised its infrastructure planning responsibilities.

Prior to 2007, the responsibility for infrastructure planning in Denmark was divided between the three levels of authority: the state, 14 counties and 271 municipalities. Following political reforms, while reducing to 5 the number of counties, the national government took over responsibility for 2200 kms of the road infrastructure previously under the counties’ responsibility. That means that the national government is responsible for the principal road network, i.e. European highways and the majority of the primary routes. The 98 municipalities created following the reforms assumed responsibility for local infrastructure planning, taking over approx. 7600 km of the prior counties’ road infrastructure. In this context it should be mentioned that although the Danish state only manages 5 per cent of the road network, the principal road network accounts for nearly half the total traffic volume.

As to the development of the public road network, in practical terms the national government – acting through the Road Directorate – is “road manager” for the government’s roads, just as the municipalities are “road managers” for the local road network. This usually includes full responsibility for the planning and decision-making for construction and maintenance of the roads managed.1

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1 With the exception of the fixed links over the Great Belt and the Sound, with their construction and operation defined in the law for the Sund & Bælt Holding A/S, a government-owned company. The subsidiaries Storebælt A/S and Øresund A/S have constructed the Great Belt bridge and the Danish land-based facilities respectively. A/S Øresund has in co-operation with the corresponding company on the
The main part of the rail network is owned by the national government and managed by Rail Net Denmark (Banedanmark). Most expenses linked to operation, maintenance and renewal on Rail Net Denmark’s net are financed via the government’s budget. In addition, there are also rail infrastructure charges. As to the rest of the net, the so-called private railways, the responsibility for them has been passed to the regions and regional transport authorities (“trafikselskaber”) following the decisions on changes in infrastructure planning responsibilities in 2007.

The harbours are usually owned by public authorities, as the relevant municipalities often form a central part of the ownership. There are today only a few governmental harbours and some private harbours without municipal ownership.

The government owns approx. 1/3 of the stocks in Copenhagen Airports A/S. The government also owns the airport in Roenne on Bornholm. The provincial airports today are owned by local authorities.

The guiding principle for investment in a specific infrastructure project is that it should be the authority (government or municipality) that is responsible for the existing infrastructure to which the new infrastructure investment will primarily be related. This is a consequence of the general distribution of assignments between the Danish Government and the municipalities. There are good examples of projects the State and the municipalities have carried through jointly though, e.g. the Copenhagen metro project.

As to the concrete investments in infrastructure the government wishes to carry out in its fields of responsibility, there are precedents as the government works out an investment plan for infrastructure investments covering a number of years. The most recent ones are the Agreements on a Green Transport Policy of 2009, described in section 3.3. The government is not obliged to devise a comprehensive investment plan. Actually, the Danish government decides on each single project through a law of construction.

Denmark’s infrastructure is based on the so-called Big H. This H connects the individual regions via a number of road and rail corridors. There are two north-south-corridors in Eastern Jutland and on Zealand respectively and an east-west-bound corridor from Esbjerg in Jutland, across Funen and to Copenhagen in Zealand, continuing over the Øresund Bridge to Sweden. Moreover, Denmark has a number of ports and airports of high international standard.

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2 Swedish side taken care of the construction of the coast-to-coast connection. A corresponding concept will also be used for the Fehmarn Belt project.

Municipalities are not allowed to subsidise the harbours.
3.3 Green Transport Policy Agreement

With the political agreement on “A Green Transport Policy” of 29 January 2009, the Government, the Social Democrats, the Danish People’s Party, the Socialist People’s Party, the Danish Social-Liberal Party and Liberal Alliance agreed on a number of overall principles and concrete initiatives. The agreement can be called historic as to its economic scope and its broad political support.

Principles in the agreement on a Green Transport Policy

- CO₂-emissions from transport shall be reduced, and a green reorientation of the existing car taxation scheme shall be carried out.
- Public transport shall absorb most of the future growth in traffic. The railways shall be reliable, safe and ultramodern.
- Road capacity shall be extended primarily in the most congested areas at present, but also where the future growth in traffic as a result of economic and industrial development will require an upgrading of the infrastructure.
- Bicycling shall be promoted – the bicycle as a choice of transport mean is preferred, where it is realistically possible.
- Denmark shall be a green test bed for transport.
- Bridges, roads and railways must not spoil irreplaceable nature.
- Noise and air pollution in urban areas shall be reduced.

Note: Directly translated from the Agreement of January 29th, 2009.

The Agreement on the “Green Transport Policy” was reached in January 2009. The Agreement has wide political support and sets out important principles. In many cases these principles reinforce on-going
priorities in the different areas (e.g. bicycling, CO₂, noise, air pollution), and emphasise the roles of all transport modes in the transport system. With road capacity to be provided in the above-mentioned circumstances, it is emphasised that roads have an important function within the transport system. “Public transport shall absorb most of the future growth in traffic. The railways shall be reliable, safe and ultramodern”.

It is moreover noted in the agreement that ports/sea transport may act as a measure to reduce congestion and provide a sustainable transport alternative. Better hinterland infrastructure can contribute to strengthening the basis for a growth in sea transport, and with the agreement a number of projects, to strengthening the connections to harbours of considerable national or regional importance.

The political Agreement of January, 2009 confirmed decisions on constructing the new city subway line ("circle") and the fixed Fehmarn Belt link as well as the funding needed for all the Decided Projects.

The Agreement on Green Transport Policy was followed by further Agreements between the Government, the Social Democrats, the Danish People’s Party, the Socialist People’s Party, the Danish Social-Liberal Party and Liberal Alliance between October and December 2009.\(^3\) There were some supplementary agreements in 2010.

The full list of policy and funding Agreements reached between the parties is as follows:

- A green transport policy in 2009 (29 January, 2009)
- A modern railway (22 October 2009)
- New initiatives under the sign of pools (22 October 2009); and Addendum to Agreement of 22 October 2009 on new initiatives part of the implementation of pools (2 December 2009)
- Some road projects (22 October, 2009)
- Better roads, (2 December 2009)
- Advancing the effort with reference to cycling and gigaliners in 2010 (1 September 2010)
- Better mobility (26 November 2010)
- Increased effort aimed at motorists driving in the wrong direction on motorways and better security at railway crossings (16 December 2010).

These further Agreements provided a modal perspective with greater detail on the Decided Projects.

In terms of the responsibilities described, the Agreement covers by definition only investments in land transport. Nonetheless, looking at Denmark’s international connections, it also covers substantial measures in favour of Denmark’s ports, with road connections to some of the harbours being improved. These followed earlier initiatives in support of aviation, e.g. investment in road and rail connections to the Copenhagen Airport. In 2005, the government also released a strategy on aviation, called “Dansk luftfart 2015”, which translates as “Danish aviation in 2015”.

\(^3\) The Danish Social-Liberal Party is not a party to the last of the Agreements in 2009 (Better Roads).
**Longer-Term Infrastructure Planning**

With the “Agreement on a Green Transport Policy” it was also decided to initiate a long-term planning effort to analyse future large-scale infrastructure demands and identify major strategic options for developing Danish infrastructure beyond 2020.

Two strategic analyses of the long-term infrastructure needs for Jutland and the Copenhagen Metropolitan Area will roughly speaking form the framework for this long-term planning effort. They will entail analysis of possible future road and rail investments in Jutland and Copenhagen as well as strategies for strengthening the links between the different parts of Denmark with new fixed links. Focus is on projects that could be relevant in the decades following 2020, which is the time limit of the current transport agreement.

Several investment scenarios will be evaluated and will form the basis for a political and public debate, on how to set forth a comprehensive strategy for meeting the long-term challenges to national infrastructure development beyond 2020. As part of the analyses a number of specific major road and rail projects will be considered.

*Source: Ministry of Transport.*

### 3.4 Sources of Funding

The total infrastructure programme approved by the Danish Government required funding of DKK 160 billion (around €22 B) for all the individual transport projects over the period to 2020 – which was also approved. The investments are to be funded from a number of different sources; including traditional tax based public expenditures and a number of alternative approaches to finance infrastructure investment.

A major Infrastructure Fund with approx. €12 B in total funding was created. The Infrastructure Fund will be financed partly by tax revenues and partly by other sources such as one-off returns from the sale of public assets and savings in the project costs for approved projects. The intention is that the infrastructure fund will be replenished with additional resources as new sustainable sources of funding are identified.

The Fehmarn Belt Bridge connecting Denmark to Germany (to be financed by future user fees) and the construction of the new city subway line (“circle”) were decided before the Green Transport Agreement. Separate funds were created for these two large projects, with a total expenditure of around €10 B.

In the longer term, other sources of funding are expected to become available.

The Green Transport Agreement and subsequent Agreements signed in 2009 represented a transformational change in the approval, development and funding processes for Denmark’s infrastructure investment programme. They also led to a very ambitious and fully funded multi-year infrastructure programme, to be undertaken over the period to 2020.

### 3.5 Major Transport Projects – Decided Projects to 2020

In the context of the Agreement on Green Transport Policy, the Government and other parties to the Agreement decided a fully funded listing of major infrastructure projects in Denmark over the period to 2020.
A complete listing of “Decided Projects” across Roads, Rail, Ports and Airports are set out in Attachment A – at the end of this chapter. The Decided Projects expected to be conducted to 2020 are shown in the graphic below. Total committed infrastructure investment over the period to 2020 amounts to €22 Billion.

**Figure 8. Denmark’s transport system around 2020 – major projects**

*Note: The map includes all projects that most likely will be conducted by 2020 (in blue: road projects, in red: rail projects, in black: realisation of the Danish signalling programme).*

*Source: Ministry of Transport, 2010.*

**Decided projects in the Zealand Area**

Decided projects in the Zealand area over 2010-2020 are shown in more detail in the graphic below.
International Connections

The most important international transport connection project is the Fehmarn Belt fixed link across the Baltic Sea between Denmark and Germany. This will enhance cross-border road and rail transport services and mobility between Scandinavia and continental Europe, which has been a vision for decades.

The rail link will allow direct rail services between Sweden, Denmark and Germany – as well as the possibility of services to points beyond (as shown in the graphic below). It will form a part of the TEN-corridor B.

The road link will allow greatly improved connectivity in the region, including between Copenhagen and Hamburg – and between Sweden and Germany.
The international transport corridor from Germany through Jutland to Sweden (Gothenburg) and Norway will also continue to be a very important corridor in the future.

Another international transport corridor goes from the west coast of Jutland (Esbjerg through Funen and Zealand and further on to Sweden).

The Nordic partners operating on this corridor won economic support from the EU Commission in 2010 to investigate and to promote the corridor.

### 3.6 Infrastructure Commission

The Danish Infrastructure Commission was an important step in the historical process up to devising a more long-term oriented infrastructure planning approach in Denmark. The Commission was appointed in November 2006 following a government decision to improve infrastructure planning processes. The Commission’s work was followed by the Green Transport Agreement described above which is now the most authoritative summary of infrastructure policy in force.

The terms of reference for the work of the Commission stated that “the overall objective is for Denmark to maintain and develop its position as one of the countries in the world with the best transport systems, despite the fact that growing traffic volumes are increasing the requirements in the long term”.

The Commission’s main tasks were:

- To analyse and assess the key challenges and development potential for the infrastructure and national traffic investments until 2030.
- To identify and assess the strategic options and priorities and to put forward suggestions to strengthen the basis for the national investment decisions in the transport area.

Furthermore, the Commission was given the task of analysing and assessing proposals for strategies for handling a number of selected issues. These include the issue of cost-effective organisation and management of construction projects, the handling of preservation, climate and environmental concerns, the opportunity for better utilisation of the infrastructure by means of modern IT, and the significance of the long-term physical planning.
Given the terms of reference and the timeframe of the work, the Commission mainly focused on the national road and rail infrastructure, which is managed by the government and for which parliament makes decisions through construction laws and the annual budgets.\(^4\)

The Commission reported in January 2008. Its report concluded that transport infrastructure will be a significant focus area for the next decades, if Denmark is to maintain its economic growth and develop its position as one of the best countries in the world in the transport area. The Commission commented that: We know that the transport system faces large challenges, but where should we concentrate our efforts if we want to prepare for the future in the best possible way? The Commission recommended:

\[
\text{…a targeted effort which will strengthen the public as well as the individual transport system. We must concentrate our efforts where the economic return is the highest.}
\]

It outlined six focus areas as the starting point for planning the future transport system:

- Transport is about quality of life and prosperity – about connections between people, families and businesses.
- Infrastructure contributes to ensuring that we can get to work, and that products and goods can be transported to their destination in the shops and to the consumers. This makes infrastructure a vital cornerstone for our welfare and prosperity.
- Mobility is a key element in the competitiveness of businesses – and thus also for the growth conditions of Danish society. Efficient transport systems contribute to ensuring that goods can be produced in the best and least expensive location. The production and distribution of goods become simpler and less expensive, because faster and more reliable delivery to the consumers is ensured; and
- High mobility contributes to businesses being able to attract the right manpower.
- At the same time, it is important to be aware that the development in the climate and environmental areas may influence our planning of infrastructure as well as urban planning.
- We must also expect that the measures available to us are constantly being developed, and that technological possibilities which we cannot imagine today will be developed.

\(^4\) The Commission did not analyse all proposals in detail, but assessed a number of different options, which were recommended as forming part of the further prioritization of infrastructure. In this connection, the Commission noted that government would prepare a traffic investment plan in 2008.

The terms of reference of the work of the Commission included that "…the intention is not for the Commission to provide analyses of or recommendations for the organisation of the traffic sector or its concrete structure …" On this basis, ownership structures and taxes within the transport sector, including road pricing as well as the financing of the public infrastructure were outside the Commission’s scope.
The findings and recommendations as set out in the Infrastructure Commission’s *Infrastructure 2030* report included a number of more specific recommendations on international goods transport and freight connections, including:

- The Danish gateways towards the rest of the world must form a central part of an effective transport network
- Copenhagen as an international metropolis depends on an efficient and reliable infrastructure to attract businesses and manpower
- Effective linking of all regions to the overall transport corridors and hubs must be ensured, because
  - effective connections to the overall infrastructure will support the grown conditions
  - relatively small investments cannot replace large investments, but may often provide significant improvement of passability
  - certain competence clusters are located at some distance from the main corridors.
- The Danish gateways towards the rest of the world must form a central part of an effective transport network, because
  - the possibility of reaping the benefits of globalisation increases if it is easy for people and goods to get to and from Denmark
  - the growing goods transport will increase the pressure on the international connections and goods hubs, as well as the need for effective collaboration between the transport modes
  - there is expected to be increasing focus on infrastructure and the quality of the international connections, in terms of localising businesses.


The former Minister for Transport noted at the time of its presentation that the Commission's report was supposed to form a kind of “starting point” for the government's work with a new investment plan.

In addition, the government’s transport politics reflected in the initiative “Denmark in balance within a globalised world” is important. It is especially aimed at securing better connections and transportation possibilities that can strengthen labour-market flexibility and improve conditions for the enterprises in the local areas.

### 3.7 Regional Planning

The *Capital Region of Denmark Organisation* was created 3 years ago in the wake of the regional administrative reforms. It is a political organisation and has an Elected Council with regional tasks in health, social services, regional development and public transport.

Like each of the Regions, the Organisation is required to prepare a Regional Development Plan. The plan is intended to present a common regional vision targeting the challenges and options across authorities, sectors and geographies. However, like other regions, its Regional Development Plan is advisory only. The regions do not have any direct responsibility for infrastructure and they do not finance or build any infrastructure.

The Capital Region Organisation’s Regional Development Plan finalised in June 2008 was prepared against the backdrop of international competition amongst metropolitan regions. The Plan notes that, in the Europe of the regions, to an increasing extent, the metropolitan regions are the central points of growth and development.
The Capital Regional Development Plan’s findings and conclusions on infrastructure priorities need to be seen as advisory in nature. The Region itself has no power in relation to the decision-making processes for infrastructure investments which fall within the responsibility of the national and municipality governments respectively.

**The Øresund Committee**

The Øresund Committee brings together members from the Zealand Region in Denmark and the Skåne region in Sweden. Having no political power, its view on infrastructure planning only has advisory character. On 28 May 2010, the Committee published its proposals for an Øresund Regional Development Strategy (ORUS 2020). The ORUS 2020 Strategy focussed, inter-alia, on international connectivity as provided by the Øresund link construction in 2000 – and prospects for similar strategic infrastructure in future. The Øresund Region Strategy drew attention to:

- the possible need for a fixed Elsinore-Helsingborg link for trains and vehicles across the Sound – in the north of the Øresund region.
- the importance of the Fehmarn Belt
- link south to Germany (currently expected to be completed by 2020).

**Figure 11. Infrastructure and Urban Development in Øresund Region (Denmark/Sweden)**

Source: Region Skåne, published in Tendens Øresund.

**Figure 12. Planned Fehmarn Belt link south to Germany with connections to Hamburg**

Source: Femern A/S.

It should be noted that the Øresund Committee’s proposals are international, but based on regional initiatives/co-operation. The committee does not have decision-making power and does not dispose of any funding resources required. Implementation and possible development of concrete projects based on the ØRUS Strategy are currently being discussed. The process concerning the implementation of any new projects was expected to start late 2010.
3.8 **Future traffic trends in Denmark**

A report on “Future traffic” identified the outlook and the expected effects on traffic, as summarised below.

| Economic Growth and Globalisation: | A continuing increase in economic wealth as well as an expanding international trade spanning longer distances will add to the demand for transport for both individuals and goods, inter alia on the corridors in the “Big H” and the largest commuting corridors. |
| Population Growth: | Population growth, amongst others in the cities and the surrounding areas, will increase the intensity of the traffic in those areas. With a larger proportion of the population being outside the labour market, the traffic will be more spread out over the day, but will increase the demands made on the productivity of the labour force. |
| Urban Development: | Integrating urban development and infrastructure development will contribute to limiting the demand for transport and strengthening public transport. In the metropolitan areas, the “finger plan” serves as a frame for infrastructure planning. In Jutland, however, infrastructure planning until now has been less integrated. |
| A better connected Denmark: | It is increasingly important to have efficient connections between the different parts of Denmark. From a regional perspective regions should have efficient connections to the “Big H” to support local business and industry, and efficient connections to metropolitan areas improve the competitiveness of labour markets. |
| New Technologies: | The continuing technological development in the fields of new intelligent traffic systems and energy-efficient cars will provide the possibility to make the most of the infrastructural capacity and at the same time reduce traffic pollution. Although it takes time to phase in new transport technologies, such technologies can substantially change the characteristics of car traffic. |

*Source: Ministry of Transport, 2010.*

3.9 **Competitiveness**

The Ministry noted that infrastructure, not least the gateways, is an important factor for a region’s competitive power. It is precisely here in the long-term strategic choices and priorities that the individual country can make a difference.

3.10 **International fixed link connections**

The Ministry noted the fixed links under development and under consideration form part of the EU-wide infrastructure network. The proposed and possible future links will better connect Denmark to the EU’s TEN-T core network and other international connections. The fixed links in place and planned for the future will contribute substantially to connecting the whole of northern Europe to the rest of the continent.

### Great Belt fixed link connection between Zealand and Funen

The Great Belt fixed link connects eastern and western Denmark and provides what was the missing link that completes the “Big H”. After more than five decades of speculation and debate, the decision to construct the link was made in 1986. It consists of a road suspension bridge and railway tunnel between Zealand and the island Sprogøe, as well as a box girder bridge between Sprogøe and Funen.

While it was originally intended to complete the railway link three years before opening the road connection, the link was opened to rail traffic in 1997 and road traffic in 1998. At an estimated cost of DKK 21.4 billion (2.8 B €, 1988 prices), the Great Belt link is still the largest construction project in
Danish history. The Great Belt fixed link reduced travel times from around an hour by ferry beforehand to around 10 minutes now, from one end to the other.

The link has been important in facilitating internal travel between Zealand and Jutland – as well as for international passenger and freight rail services that travel between Germany and Denmark via the Great Belt link. It will also be important in future for the implementation of the proposed “One-Hour”-model for rail services between Copenhagen, Odense, Aarhus and Aalborg.

The Great Belt Bridge has undoubtedly created new possibilities for mobility and increased dynamics between eastern and western Denmark. The resulting increase in traffic volumes across the Great Belt fixed link, forming part of the newly created “Big H” have led to more crowded roads though. The development in traffic volumes has therefore given rise to considerations as to how to strengthen the connections between eastern and western Denmark in the future.

**Fehmarn Belt Link**

Improving rail transport is one of the objectives and good news of a fixed link across the Fehmarn belt – throughout Europe there’s focus set on rail freight. In this connection an historic investment of around DKK 60 billion (8 B €) in the overall expansion of the entire corridor from the Sound through the Fehmarn Belt to Germany has been decided.

A recent decision favours establishing the fixed link as a tunnel. Consideration will be given to possible bottlenecks at Kastrup, near the Øresund Bridge on the Danish side. An extension of the rail capacity at Kastrup is one of the projects being investigated in an Environmental Impact Assessment (EIA) in connection with the Green Transport Agreement.

Infrastructure investments being made in the corridor from the Sound via Fehmarn Belt to Northern Germany are set out below:

**Figure 13: Investments along the Sound – Fehmarn Belt corridor:**

<table>
<thead>
<tr>
<th>Investment (bill. DKK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coast to coast connection across the Fehmarn Belt</td>
</tr>
<tr>
<td>Fehmarn hinterland connections (Roedby-Ringsted)</td>
</tr>
<tr>
<td>New railway Copenhagen-Ringsted</td>
</tr>
<tr>
<td>EIA regarding capacity at Kastrup</td>
</tr>
<tr>
<td>Source: Ministry of Transport.</td>
</tr>
</tbody>
</table>

According to the Danish-German traffic forecast concerning the Fehmarn Belt fixed link, it is expected that the Fehmarn Belt fixed link will only result in a minor extra volume of road traffic on the Koege Bay motorway south of Copenhagen. The extra volume is estimated to on average 1 100 vehicles per day (AADT) – which would make up approximately 1 per cent of the current AADT on this motorway stretch.

**Possible Elsinore – Helsingborg international fixed link**

Recently, there has been some consideration given to another new international link. At a meeting between the Danish and the Swedish Governments, it was decided to set up a Danish-Swedish group of
civil servants to exchange knowledge about and follow the Swedish investigations concerning a possible need for and the possibility of a new fixed link across the Sound between Elsinore and Helsingborg.

The establishment of such an additional connection across the Sound would cause major challenges as to the necessary hinterland connections on the Danish side in the area of Northern Zealand though. Both the existing motorway connection and the rail connection have high traffic volumes and would not be able to absorb the traffic that should be expected to follow the establishment of such a new fixed link. Such an increase in passenger and freight traffic would thus demand increased road and rail capacity on the Danish side. The question of a possible connection Elsinore-Helsingborg is therefore to be considered in connection with the need and possibilities for a western bypass of Copenhagen (international commuting, international freight transit traffic etc) – the so-called Ring 5.

3.11 Domestic Fixed Link Connections

As noted in Section 3.3, in the context of the “Agreement on a Green Transport Policy” it was decided to initiate a long-term planning effort to analyse future large-scale infrastructure demands and identify major strategic options for developing Danish infrastructure beyond 2020. One of these strategic analyses relates to the long term infrastructure needs for Jutland. This strategic work will entail analysis of possible future road and rail investments in Jutland that could help strengthen the links between western and eastern parts of Denmark.

In connection with the “One-Hour”-model, the principal options under consideration for new domestic fixed link connections between western and eastern Denmark, which are shown in the graphic below, are:

A. Little Belt – Vejle Fjord alternative
B. Odense – Horsens alternative
C. Kattegat alternative.

The existing Little Belt and Great Belt corridors (stylised) are shown in green.
Figure 14. Realisation of “One-Hour”-model – principal options

Option A would basically include a somewhat shorter layout including a new bridge across the Vejle Fjord in Jutland and upgrades on the existing rail-corridor via Funen/Little Belt. It might be called the “original” solution to the “One-Hour”-model. The model will be sufficient to reduce travel times between Odense and Aarhus to one hour as set out in the “One-Hour”-model. With the two first stages of the model (Copenhagen-Odense and Aarhus-Aalborg) in place this would contribute to realising the full “One-Hour”-model between the four cities – reducing the current travel times by train by approximately 30 per cent. A new fixed link would improve levels of service by both road and rail, with benefits to between Jutland and regions east, including the Greater Copenhagen Area. It would be the least expensive of the three options.

Option B would include a new link across the northern part of the Little Belt to shortcut the existing route between Odense on Funen and Aarhus in Jutland. It would provide significantly shorter road and rail travel times and distances between Odense and Aarhus (40 minutes instead of one hour) – with resulting improved public transport services between Aarhus and Copenhagen. It would improve reliability and levels of service for road as well as rail travel, with benefits to through traffic between Jutland and the Greater Copenhagen Area. It would be significantly more expensive than Option A.

Option C would be a direct Aarhus – Zealand (Kalundborg) fixed link. It would offer the possibility of a far more direct connection across the Kattegat between central and northern Jutland on one side and Zealand on the other. A fixed road and rail link would allow large travel time savings for both road and rail between Aarhus and Zealand generally and Copenhagen in particular. It would be a challenging project and would be the most expensive of the three options. The model would not give travel time benefits between Odense and Aarhus as originally envisioned.
Figure 15 shows the improvement in travel times with the different models A, B and C between the cities in question as compared to current travel times and the travel times in 2020 given already decided improvements.

**Figure 15. Travel times between large city pairs – in 2010, 2020 and under Options A, B and C**

![Travel times chart]

**Note:**
- A: Little Belt-Vejle Fjord alternative
- B: Bogense-Juelsminde alternative
- C: Kattegat alternative

**Source:** Danish Transport Authority.

Bearing in mind the potential costs of these projects, which could be substantial, and compared to other possible infrastructure development options in the region which figure among the strategic choices that will need to be made, the options will have to be considered carefully within the overall process of setting future priorities. With the Danish national transport model not ready yet, it is at the moment not possible to quantify such effects.
MINISTRY OF TRANSPORT: “DECIDED PROJECTS”

The tables below list already “Decided Projects” and decided further analyses in the decision-making process for other infrastructure projects considered over the period to 2020 that were agreed by the Government and other Parties to the Agreement on Green Transport Policy in 2009 and 2010. Further background is provided in Section 3.3.

Table 1. Projects concerning the Danish railway net5

<table>
<thead>
<tr>
<th>Decided projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>• A new rail freight corridor via Femern Belt as part of the North-South rail freight axis in Corridor B (Stockholm-Naples)</td>
</tr>
<tr>
<td>• Establishing a double track railway in the North-South TEN rail network corridor between South Denmark (Southern Jutland) and Germany</td>
</tr>
<tr>
<td>• Enhanced capacity on the main railway corridor between Copenhagen and Ringsted (west of Copenhagen)</td>
</tr>
<tr>
<td>• Upgrading of the railway between Ringsted and Vordingborg (“Sydbanen”)</td>
</tr>
<tr>
<td>• The first stages of a faster connection by train between the bigger cities in Denmark – the so-called “One-hour-model”</td>
</tr>
<tr>
<td>• Extension of the railroad line between Roskilde and Holbaek west of Copenhagen</td>
</tr>
<tr>
<td>• Installation of a new signalling system on the Danish railway net based on the European Rail Traffic Management System (ERTMS level 2)6</td>
</tr>
<tr>
<td>• Construction of a new city subway line encircling the old lines</td>
</tr>
<tr>
<td>• Modernising Noerreport, a central station on the suburban rail network of CPH and among others the suburban rail stations Enghave and Nordhavn</td>
</tr>
<tr>
<td>• Enhancing the capacity of the combi-terminals in Hoeje Taastrup and Taulov</td>
</tr>
<tr>
<td>• Establishment of a new shunting area and track at the port of Hirtshals</td>
</tr>
<tr>
<td>• Contribution of the Danish state to the realisation of the light-rail project in Aarhus and a public transport solution on the so-called ring 3 in Copenhagen</td>
</tr>
<tr>
<td>• Upgrading of the railway between Struer and Langaa in Jutland</td>
</tr>
<tr>
<td>• Optimising of the practical handling (inter alia signalling) of train traffic at Aalborg-Lindholm, Holstebro, Struer (Jutland)</td>
</tr>
<tr>
<td>• Other upgrades on the railway network, e.g. optimising of the ATC and an extension of the platforms on the so-called “coastal railway” between Copenhagen and Elsinore</td>
</tr>
</tbody>
</table>

5 With the subsequent Agreement on Better Mobility of November 26th, 2010 the decision was taken, based on the results of a market-analysis, not to continue with a preliminary analysis of the construction of a combi-terminal in Koege as previously planned

6 In connection with this, it is also decided to carry out a preliminary analysis of the possibilities for upgrading rail services as to speed.
Decided analyses

- Strategic analysis of further electrification of the Danish rail network
- EIA studies of the upgrading of the railway net between both,
  - Ringsted (Zealand) and Odense (Funen) and
  - Aalborg and Hobro (Jutland), and a
- Preliminary study on the upgrading of the railway net between Aarhus and Hobro as a part of the process of the realisation of the first to stages of the "One-Hour"-model
- EIA study of a fast lane on the suburban railway net between Hellerup and Holte
- Investigation of a light-rail solution as a possibility for an improved public transport solutions within the so-called “Ring 3”
- EIA study for the capacity across the Øresund, comprising a waiting track at the western end of Kastrup station
- EIA study of a light-rail system in Odense (Funen)
- Reservation of funds for a new rail freight connection between Esbjerg station and the port of Esbjerg, with *inter alia* an EIA study as a basis for a decision
- Preliminary study concerning a rail connection to Aalborg airport
- Updating of the previous EIA study for the upgrading of the railway in the northern part of South Denmark (Vojens-Vamdrup) to a double track railway
- Preliminary analysis of a rail connection to the airport at Billund (Jutland).
- Analysis of the possibilities to improve the capacity and the reliability of the railway between Aarhus and Skanderborg

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7 Funds were also reserved for establishing a new rail freight connection to the port of Nyborg but with the Agreement on Better Mobility of November 26th, 2010, the project has been dropped in the light of the results of – among others – an analysis of the market potential.
## Table 2. Road projects

<table>
<thead>
<tr>
<th>Decided road projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Expansion of the TEN Motorway E20 from Odense to Middelfart on Funen (1. step: Middelfart-Nr. Aaby)</td>
</tr>
<tr>
<td>• Expansion of the TEN Motorway E45 in the Triangle Area in Jutland (Skaerup-Vejle N)</td>
</tr>
<tr>
<td>• Completion of the Motorway between Aarhus and Silkeborg/Herning</td>
</tr>
<tr>
<td>• Completion of the Motorway between Vejle and Herning:</td>
</tr>
<tr>
<td>• upgrading the by-pass at Brande to motorway</td>
</tr>
<tr>
<td>• construction of a Motorway on the stretches between Brande and Give North and Riis-Oelholm-Vejle</td>
</tr>
<tr>
<td>• Expansion of the Ring Road 4 around Copenhagen</td>
</tr>
<tr>
<td>• Expansion of the TEN Elsinore Motorway E47 north of between Oeveroed and Isteroed (1. step: Oeverødvej – Hoersholm S)</td>
</tr>
<tr>
<td>• TEN Motorway E55 south of Copenhagen between Greve and Koege (1. step: Greve S – Søløed S)</td>
</tr>
<tr>
<td>• Completion of the motorway between Frederikssund and Copenhagen (1. and 2. step: Motorring 3 – Tvaerfeld)</td>
</tr>
<tr>
<td>• Extension of the Holbæk-Motorway west of Copenhagen between Roskilde and Floeng and a long term decision to extend the whole corridor to Kalundborg to Motorway</td>
</tr>
<tr>
<td>• PPP Motorway E45 Kliplev (Als) to Soenderborg (Soenderjylland).</td>
</tr>
<tr>
<td>• Construction of the “northern hinge” to Djursland south of Randers</td>
</tr>
<tr>
<td>• Construction of a northern by-pass at Naestved</td>
</tr>
<tr>
<td>• Construction of a by-pass at Slagelse, phase 2</td>
</tr>
<tr>
<td>• New by-pass at Goerloese between Elsinore and Roskilde</td>
</tr>
<tr>
<td>• Construction of a by-pass at Sands (Jutland)</td>
</tr>
<tr>
<td>• Improved connection of Djursland to the E45 in Eastern Jutland with an upgrade of the connection between Soeften og Skoedstrup to Motorway</td>
</tr>
<tr>
<td>• Construction of the expressway between Bredsten and Vandel in the direction of Billund</td>
</tr>
<tr>
<td>• Construction of an expressway on the route 21 (Holbaek-Vig) between Tuse and Kirkeaasvej north of Vig</td>
</tr>
<tr>
<td>• North- and south-faced ramps, bridge, etc. at Koege Nord station to/from the Koege Bugt motorway (in connection with the Copenhagen-Ringsted project)</td>
</tr>
</tbody>
</table>
Decided analyses

- EIA study on a new third Limfjord link on the TEN Motorway E45 near Aalborg
- EIA study on a new fixed link across Roskilde fjord – in the light of the results of this analysis it subsequently has been decided to analyse the possibilities for funding such a project by user charges
- EIA study on an expansion of the motorway E20 on Funen south of Odense (“The Funen Motorway”)
- EIA study concerning an extension of the motorway E20/E45 on the stretch between Fredericia and Kolding
- EIA study of the construction of a by-pass at Nykoebing Falster
- Preliminary study concerning an upgrade of the route 34 between Herning and Skive
- Preliminary analysis concerning an upgrade of the route 26 between Skive and Hanstholm
- EIA of an extension of the motorway Vejle-Herning to Holstebro (route 18)
- Preliminary analysis of the construction of a new by-pass route at Grenaa
- Preliminary study of an upgrade of the route 9 (connection between the Fehmarn Belt link and Funen)
- Preliminary study of an upgrade of the route 54 between Naestved and Roennede (Zealand)
- Economic analysis of an extension of the route 26 on the stretch between Aarhus and Viborg
- Preliminary analysis of an extension of the route 11 on the stretch between Toender and Esbjerg
- Preliminary analysis concerning a by-pass at Brovst (northern Jutland)
- Preliminary analysis of a better access to Thyborøen harbour with a by-pass at Klinkby (north-west Jutland)
- Preliminary analysis of a extension of the route 22 between Slagelse and Naestved
- Preliminary analysis for the route 15 between Ringkoebing and Herning
- Preliminary analysis of the extension of the Djurslandmotorway to Tirstrup airport (Aarhus)
- Analysis of the possibilities for user-charging in connection with a new fixed link across the Roskilde fjord at Frederikssund
- Preliminary analysis concerning a by-pass at Mariager (eastern Jutland)
- Analysis of a motorway junction at Oedisvej (Kolding) and an exit between Hobro and Haverslev

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8 With the Agreement on Better Mobility the aim has been stated in principle to establish such a new fixed link.
Table 3. Projects concerning the sea ports

<table>
<thead>
<tr>
<th>Decided projects in relation to the programme &quot;Better access to the ports&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Better road connection to the port of Esbjerg</td>
</tr>
<tr>
<td>• Upgrading the connection to the port of Kalundborg (motorway Holbaek-Kalundborg)</td>
</tr>
<tr>
<td>• Extending the Jutland Motorway between Noerresundby and Bouet (The port of Aalborg)</td>
</tr>
<tr>
<td>• Establishment of a better connection between the Elsinore Motorway and the “Ring 3”, a circular motorway west of Copenhagen (relevant for the connection to the port of Copenhagen)</td>
</tr>
<tr>
<td>• Construction of a by-pass at Nykoebing Falster (The port of Gedser)</td>
</tr>
<tr>
<td>• Upgrading the “Kongevej” in Elsinore (The port of Elsinore)</td>
</tr>
<tr>
<td>• Better access to the port of Roenne</td>
</tr>
<tr>
<td>• Establishment of a new shunting area and track at the port of Hirtshals</td>
</tr>
<tr>
<td>• Governmental contribution to the construction of a new connection across the channel of Odense (The port of Odense)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Decided analyses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• EIA study of a waiting track at the western end of Kastrup station</td>
</tr>
<tr>
<td>• EIA study of the establishment of a motorway between the Holbaek motorway and Kalundborg</td>
</tr>
<tr>
<td>• Preliminary study of the establishment of a by-pass at Grenaa between route 16 and the port of Grenaa</td>
</tr>
<tr>
<td>• Preliminary study of further upgrading of the route 94 on the stretch between Herning and Skive plus route 26 between Skive and Hanstholm</td>
</tr>
</tbody>
</table>

With the projects decided in 2009 under the so-called harbour-package I (havnepakke I), the focus was directed at improving the connections to the harbours. In 2010, further projects were decided under the umbrella of the so-called harbour-package II (havnepakke II). With these projects it is specifically aimed at strengthening the harbours in the more remote regions of the country. The projects concern various improvements at the harbours themselves, such as capacity extensions, increasing the depth of water, security issues etc.
### Table 4. Initiatives concerning aviation\(^9\)

<table>
<thead>
<tr>
<th>Danish initiatives for a more efficient aviation in Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Access to Airports</strong> Massive investment in road and railway connections to Copenhagen Airport in Copenhagen Metropolitan Area has been made in recent years, but also connections to Billund Airport and Tirstrup (Aarhus) Airport in the East of Jutland and to Aalborg Airport in the North of Jutland will be considered in the near future. Moreover, a new motorway between Soenderborg and the motorway E 45 at Kliplev is already under construction, which will provide a significantly improved connection to the Soenderborg Airport. According to the time schedule, the new motorway – Denmark’s first PPP-project regarding transport infrastructure – will be ready in spring 2012.</td>
</tr>
<tr>
<td><strong>Efficient Air Traffic Management (ATM)</strong> The ATM has been modernised and rationalised through a new ATM-system to support the “Joint Danish-Swedish Functional Airspace Block – FAB”.</td>
</tr>
<tr>
<td><strong>Abolition of airport passenger charges</strong> The airport passenger charge was abolished in 2006-2007 resulting in lower price tickets.</td>
</tr>
<tr>
<td><strong>New tariff model for airport charges</strong> An agreement between Copenhagen Airport and the flight companies on a new tariff model for airport charges commits Copenhagen Airport to invest massively every year to the benefit of the flight companies. Charges for heavy airplanes will be reduced by 25 pct., whereas the passenger charges are raised by 18 pct. This is to the benefit of long-distance flights.</td>
</tr>
<tr>
<td><strong>EU regulation</strong> The new EU rules regarding cost effective airport charges is implemented.</td>
</tr>
<tr>
<td><strong>Regulation of climate changes</strong> From 2012 the European Emission Trade System (EU ETS) will also include aviation, and a global agreement is expected to be discussed in the years to come.</td>
</tr>
</tbody>
</table>

\(^9\) Moreover, some investments as to strengthening Bornholm airport – the only airport owned by the Danish state, have been decided.
CHAPTER 4
GREATER COPENHAGEN

4.1 Greater Copenhagen Region

The OECD’s Territorial Review concluded that Copenhagen’s competitive position is essential to Denmark as a whole. The Review noted that:

Copenhagen is the largest city in Denmark, a country of approximately 5.5 million people. Within its administrative boundaries, the city of Copenhagen currently has around 510,000 inhabitants. With the municipality of Frederiksberg, which is located within the city of Copenhagen, this adds up to 603,000 inhabitants (2008; in 2010 the figure is 625,000 inhabitants), roughly twice as much as in Aarhus, the second-largest Danish city. This definition, however, understates the importance of Copenhagen, since the functional metropolitan area of Copenhagen is considerably larger.

Source: OECD Territorial Review, Copenhagen Denmark and Statistics Denmark.

4.2 Greater Copenhagen Area

The Greater Copenhagen Area, defined for the report’s purposes as a functional region, encompasses the Capital Region population of 1.6 million and the additional population in commuting zones on Zealand as well as on the islands Lolland and Falser, as well as the population in Skåne Region, in Sweden. Currently, there are a total of around 2.5 million people living in the Greater Copenhagen Area on the Danish side. There are around 1 million people living on the Swedish side. Taken together, there are currently around 3.5 million people living in the Greater Copenhagen Area, in Denmark and Sweden.

4.3 Urban Development – the so-called “Finger Plan”

Since 1947, Copenhagen’s urban development has followed a so-called finger plan – see below. The finger plan is a directive for country planning covering the Copenhagen metropolitan area.
The strategy behind the Finger Plan

The strategy behind the finger plan is to concentrate urban development in 6 urban fingers going from central Copenhagen (the palm of the hand) to the cities Elsinore, Hilleroed, Frederikssund, Roskilde, Koege and the Øresund region (an “extra” finger that was developed with the Øresund Bridge). The Koege finger plays an especially important role as a connection to the other parts of Denmark and internationally.

From a traffic viewpoint, as part of the finger plan concept, each finger is served by highway and railway between central Copenhagen and Elsinore and Hilleroed in the north, Frederikssund in the northwest, Roskilde in the west and Koege and Amager/Øresund in the south.

To facilitate traffic between fingers, certain circular corridors have been developed. Central Copenhagen is encircled by a Ring 2 corridor. Further out runs a Ring 3 corridor, a Ring 4 corridor and finally a future possibility for a Ring 5 has been established on a relatively short stretch. All ring corridors are served by public transport as well, though of varying quality. Ring 2 is served by a ring railway and there are bus routes on the other corridors. In principle, within The Finger Plan, the idea is to provide both public and private transport options along finger corridors and ring corridors.

A major principle of the Finger Plan is to encourage urban activities and development around the railway network according to the finger structure. Urban development, e.g. larger office building activities that generate traffic, should thus be located close to transport junctions in the finger structure. This “close to station structure” aims to promote the use of public transport in the central city and the other effected municipalities by offering commuters and other travellers an efficient public transport alternative to the car.

The co-ordination of urban development with the public transport system in the finger structure also allows the land in between the fingers to be reserved for recreational purposes, i.e. limiting urban sprawl.
and the take-up of green wedges for urban purposes. The Finger Plan strategy thus contributes simultaneously to the following:

- promoting public transportation;
- relieving the pressure on the road network and ensuring mobility
- limiting the environmental impacts of transportation and securing green wedges

**Finger Plan – Future trends**

It has to be pointed out that all future measures following the Green Transport Agreement described above are deeply rooted in the principles of the finger plan as the foundations for infrastructure planning in the Greater Copenhagen area.

Up to 2020 the focus is on strengthening the infrastructure in the fingers and in the palm, whereas in the context of the strategic analysis with the Fingerplan as a base it is aimed at securing an efficient mobility between the urban fingers – which is considered to be one of the major challenges for the planning of future infrastructure. Today, commuting between urban fingers often involves travelling in and out of Copenhagen instead of going directly from one urban finger to another, which means that roads and railways in the finger structure are under increased pressure.

4.4 Implementation of Agreement on “Green Transport Policy”/Subsequent Modal Agreements

Following the Agreement on Green Transport Policy, considerable work is being undertaken in the Greater Copenhagen Area to implement the policy and strategies set out in the Agreement on the Green Transport Policy and related Agreements. This includes:

- A number of concrete new investments – e.g. in railroads and in roads with heavy traffic
- New evaluations of the effects on the environment and preliminary studies of concrete projects in the coming years
- Extensive strategic analyses of the long-term infrastructure plans in Eastern Jutland and Copenhagen
- New funds for special measures (ITS, bicycles, light railways, innovative bus solutions, traffic safety, stations, noise, railway goods, CO₂-initiatives etc.
- Green Transport Vision DK (CO₂-initiatives)

The decided projects include road and rail investments in the individual fingers, e.g. the enlargement of the Koege Bugt motorway; and the expansion of the motorway to Roskilde and Holbaek. Figure 18 depicts all road projects in the Copenhagen/Zealand area.

The example of the Koege Bugt motorway shows that some of the fingers do not only serve regional and/or local traffic but also form an important part of the international connections. As far as the Koege Bugt motorway is concerned, it explicitly is a part of the European TEN-T-network.
According to the Danish law on planning of the fixed link across the Fehmarn Belt, necessary upgrading and environmental improvements of the motorway stretch between Sakskoebing and Roedbyhavn is being planned. The cost of planning is paid by the state-owned company Femern A/S that is in charge of the planning of the coast to coast connection across the Fehmarn Belt.

For the development of the public transport system in the palm, the construction of new Metrocityring (circular line) is a milestone. The ring is expected to open in 2018. One-third of the costs is likely to be covered by passenger revenues (following the agreement on the construction of the MCR – the so-called principiafale).

As can be seen in Figure 19, there will also be heavy investment in extending the corridor up to the new fixed link across the Fehmarn Belt (expected to open in 2018) with inter alia the establishment of a completely new railway line between Copenhagen and Ringsted. With supplementary investments in the railway stretch from Copenhagen to the Sound at Kastrup (EIA to be carried through as the next step), the Danish part of the new European rail corridor B will be completed.
Note: In red: decided investments in rail roads (for capacity at Kastrup: EIA first).
*As to the establishment of an extra track on the “Nordbane” (north of Copenhagen), Rail Net Denmark currently is carrying out an EIA.
Source: Ministry of Transport (2010).

All in all, there will be heavy investment in both rail and road infrastructure; for example, the costs for the installation of a new signalling system on the Danish railway net based on the European Rail Traffic Management System (ERTMS level 2) amount to DKK 24 B (3.2 B €).

In conclusion, up to 2020 the focus is on strengthening the infrastructure in the fingers and in the palm. Table 5 gives a summary of the projects in relation to either the fingers or the palm being carried through within the decade to 2020.
Table 5. Projects up to 2020 in Greater Copenhagen with relation to the fingers and the palm**

<table>
<thead>
<tr>
<th>The Fingers</th>
<th>The Palm</th>
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</thead>
<tbody>
<tr>
<td><strong>Decided projects</strong></td>
<td></td>
</tr>
<tr>
<td>- Expansion of the TEN Elsinore Motorway E47 north of between Oeveroed and Isteroed (1. step: Oeverødvej – Hoersholm S)</td>
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<tr>
<td>- TEN Motorway E55 south of Copenhagen between Greve and Koege (1. step: Greve S – Solorød S)</td>
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<tr>
<td>- Completion of the motorway between Frederikssund and Copenhagen (1. and 2. step: Motorring 3 – Tvaervej)*</td>
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<tr>
<td>- Extension of the Holbæk-Motorway west of Copenhagen between Roskilde and Fløeng and a long term decision to extend the whole corridor to Kalundborg to Motorway</td>
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<tr>
<td>- New by-pass at Goerloese between Elsinore and Roskilde</td>
<td></td>
</tr>
<tr>
<td>- Enhanced capacity on the main railway corridor between Copenhagen and Ringsted (west of Copenhagen)</td>
<td>- Construction of a new city subway line encircling the old lines (the so-called Metrocityring)</td>
</tr>
<tr>
<td>- North- and south-faced ramps, bridge, etc. at Koege Nord station to/from the Koege Bugt motorway (in connection with the Copenhagen-Ringsted project)</td>
<td>- Modernising Noerreport, a central station on the suburban rail network of Copenhagen</td>
</tr>
<tr>
<td>- Upgrading of the railway between Ringsted and Vordingborg (&quot;Sydbanen&quot;)</td>
<td></td>
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<tr>
<td>- Extension of the railroad line between Roskilde and Holbæk west of Copenhagen</td>
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<tr>
<td>- Other upgrades on the railway network, e.g. optimising of the ATC and an extension of the platforms on the so-called “coastal railway” between Copenhagen and Elsinore</td>
<td></td>
</tr>
<tr>
<td><strong>Decided analyses</strong></td>
<td></td>
</tr>
<tr>
<td>- EIA studies of the upgrading of the railway net between both Ringsted (Zealand) and Odense (Funen) as a part of the process of the realisation of the first to stages of the “One-Hour”-model</td>
<td></td>
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<tr>
<td>- EIA study of a fast lane on the suburban railway net between Hellerup and Holte</td>
<td></td>
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<tr>
<td>- EIA study for the capacity across the Øresund, comprising a waiting track at the western end of Kastrup station</td>
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<tr>
<td>- EIA study on a new fixed link across Roskilde fiord – in the light of the results of this analysis it subsequently has been decided to analyse the possibilities for funding of such a project by user charges</td>
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</tbody>
</table>

* Also important for the ring connection Ring 3.
** Relevant for the whole country: Installation of a new signalling system on the Danish railway net based on the European Rail Traffic Management System (ERTMS level 2).

Note: With the subsequent Agreement on Better Mobility of November 26th, 2010 the decision was taken, based on the results of a market analysis, not to continue with a preliminary analysis of the construction of a combi-terminal in Koege as previously planned. The project has therefore been dropped.
4.5 Strategic Analyses for the Copenhagen Area

Following the 2009 Agreement on “Green Transport Policy”, seven of the eight Parties represented in the Danish Parliament decided to move forward with a number of projects to improve the infrastructure in the Copenhagen area. Projects related to the Copenhagen Area are included in the listing of Decided Projects, which are set out at the end of the previous chapter, in Attachment A.

The Government also decided to initiate strategic analysis work on the long-term infrastructure needs for both the Copenhagen Metropolitan Area and Jutland.

The purpose of the Strategic Analysis work for the Copenhagen metropolitan area is to identify:

- the main future challenges for the Copenhagen metropolitan area as to potential bottlenecks on the rail and road infrastructure;
- possible solutions, i.e. different combinations of various policy measures regarding transportation, to enhance the development of Copenhagen as a European metropolitan area;
- Investment strategies (under different scenarios).

Based on the concept of the finger plan and with the challenges observed, the focus with respect to the upcoming projects after 2020 will move to strengthening the ring connections compared to the focus on the development of the fingers today. All in all, the finger plan as the ongoing fundamental concept for spatial and infrastructure planning in the Copenhagen metropolitan area and the strategic analysis approach together form the basis for a long-term planning approach in the area.

Above all, with the Agreement on Green Transport Policy the infrastructure’s contribution to integrating the individual Danish regions is also considered, one example being the “One-Hour”-model for rail traffic between the largest cities in Denmark with possible extensions to other cities in Jutland (particularly Herning and Esbjerg). Moreover, the improvement of the connections between Western and Eastern Denmark forms an important part of the strategic analysis for Eastern Jutland.

In this connection it should also be noted that a substantial part of the Danish industries is situated in Jutland, which means that there are considerable export and import activities but also transit traffic in that part of Denmark.

The Danish government emphasises with its initiative “Denmark in balance within a global world” (2010) the importance of strengthening transport connections in the whole Denmark. That is to say not only a better connection of the more remote regions to the “Big H” but also improving the infrastructure within those parts of the country.

Within the context of the strategic analysis, the Ministry will analyse several investment scenarios for how to tackle the expected challenges after 2020. In doing so, it will address six areas, as set out below:
The city centre (the palm of the hand)

1) A new Metrocityring (circular line) is expected to open in 2018. As part of the strategic analysis it is further more being examined how to strengthen public transport in the city centre and how to improve the interplay between different forms of public traffic. The projects investigated include possibilities to enhance the suburban rail network, i.e. fully automatic operation and extensions of the network.

2) The main corridors (the 6 fingers):
As part of the strategic analyses it is being analysed how to optimise the frequency of current railway trains in the finger structure, i.e. by building fast lanes between specific junctions or by developing automatic trains.

3) The ring corridors
With the Transport Agreement (2009) it has been decided politically to secure a better public transport system between the urban fingers and funds have been set aside to optimise public transport on the existing Ring 3 corridor.

As part of the strategic analysis, the optimisation of the ring ways is currently being examined. These analyses focus on the perspectives of building a new ring-connection: A western “Ring 5” between the Elsinore highway and the Koege Bugt motorway, or an eastern ring connection in the form of a harbour tunnel between the Elsinore highway and the Øresund region. Analyses of the possibility of optimizing the existing Ring 4 highway are also being undertaken.

4) Co-ordinated planning of construction possibilities in the municipalities
5) Concentrating traffic growth on the existing corridors
6) Strengthening possibilities for public transport

Note: It still has to be decided if a high-class bus system or a light rail system will be established on the Ring 3 corridor.


Figure 20. Focus areas for the strategic analysis (stylised)

Note: In black: railway lines; in red: motorways; in pink: other governmental roads.
In the course of the strategic analysis, a new coherent and country-wide model for traffic calculations will be used, the so-called “Landstrafikmodel” currently being developed at the DTU (Denmark’s technical university). This model will substantially improve the possibility to e.g. make long-term forecasts for traffic development, calculate the consequences of fixed links etc.

The Danish National Transport Model

As a part of the Green Transport Agreement (2009) it has been decided to establish a National Transport Model for Denmark, i.e. the first transport model covering the whole country.

It will enable politicians, government officials, and experts to look at the Danish transport system in its entirety, i.e. supporting and qualifying decision-making on transport infrastructure initiatives in a substantially improved way compared to today. This model will thus also be important for being able to prioritise future initiatives.

The first full version (1.0) is expected to be developed in 2013, the final version (2.0) in 2015.

The model will be composed of a system of models including both passenger and freight transport:

– A strategic model ensuring the generation of reliable traffic volumes in long-term prognoses, reflecting the general development of demographic and economic development, localisation effects etc.

– Partial models describing the transport system on the national and regional levels ensuring a reliable distribution of the traffic volume among transport modes, routes and time

With the model effects on traffic on decisions on among others the following types of initiatives and changes can be analysed:

– Investments in infrastructure with alternative setups of different projects

– Design of a transport system with timetables and use of ITS technology

– Spatial planning with localisation of dwellings and commercial areas

– Changes in the cost structure, e.g. due to changes in fuel costs

The model will especially include an improved modelling of overcrowding of infrastructure, e.g. in peak hours, a phenomenon of growing importance also in Denmark. As a consequence, particularly the effects on traffic of the extension of infrastructure at bottlenecks can be quantified.

The difference between the two versions covers especially an improved modelling of the effects of overcrowding on certain roads and the improved modelling of area use and localisation of persons and commercial activities in version 2.0.

A very preliminary version with somewhat reduced facilities (e.g. not being able to calculate modal split changes or immediate traffic increases due to the opening of new fixed links) will already be available in 2011, whereas the first actual “full” version of the model will be available in 2012. The final version of the model is to be expected in 2014.

A prominent strategic challenge will be how to connect the single fingers intelligently and to increase the mobility between those fingers – which will contribute to mitigating through-traffic in the inner city. The same can be said for interregional and international traffic that has no business in Copenhagen but today is forced to make use of local connections.

Moreover, one of the big challenges ahead is determined by the fact that, new urban activities (see Figure 21) are moving further and further out in the finger structure. In this context, it should be noticed that already today it can be seen that Zealand has become one big commuting area.
In addition, with the strategic analysis the further development of the public transport in the central city areas (the “palm”) after the establishment of the Metrocityring in 2018 is also being considered, with metro systems being the most space-effective solution for transport and pronouncedly applicable to densely populated city areas. The development of the public transport system also has to be seen in connection with the establishment of new city development areas. By keeping further development within the palm and the fingers and thereby employing the principle of keeping a low distance to (suburban) rail stations, improvement of public transport is facilitated. Increased rail service within the palm will cover both, optimising the existing infrastructure and scrutinising the possibilities for new infrastructure. Among the projects investigated as a part of the strategic analyses are e.g. possibilities to enhance the suburban rail network to Roskilde and Elsinore and possibilities for fully automatic operation.

Based on the concept of the Fingerplan and with the challenges observed, the focus with respect to the upcoming projects after 2020 will move to strengthening the ring connections compared to the focus on the development of the fingers today. In this connection, a substantial step has already been taken with the decision to establish a light rail or a high-class bus service on the so-called ring 3. It still has to be decided though, which of the two different alternatives will be realised.
With respect to the time frame for the strategic analysis, it was decided to present a partial report on the overall strategic analysis in 2011 with a view to discussing the results so far. The analysis will be finished in 2013, after which the parties are to discuss the results and the perspectives as part of the dynamic planning.

4.6 Greater Copenhagen as part of the Øresund Sound Region

The bridge between Denmark and Sweden, which in 2010 is celebrating its tenth year, rapidly evolved from the original concept of a mere transport corridor for long-distance traffic into a link that today binds the whole region more closely together. Taking into consideration the number of commuters from Zealand to Copenhagen, the commuting over the Sound is quite substantial.

Figure 22. Greater Copenhagen as part of the Øresund Sound Region

Greater Copenhagen as a part of the Sound Region

- All in all 3.5 mio. inhabitants
  - 2.5 mio. on the Danish side
  - 1 mio. on the Swedish side
- In 2008 more than 3,000 persons moved from the Danish to the Swedish side; (opposite direction: 2000)
- In 2008: 6000 Swedish employees got a job in Denmark. (2005: 1,500 persons)
- Nearly 1/3 of the Swedish students in the region will look for a job in Denmark (2001: 5 %)
- Commuters account for 40 % of all passenger traffic by car on the bridge across the Sound
- All in all 19,000 persons pr. workingday commute across the Sound

Source: Communication from Danish Ministry of Transport, 2010.

Looking at the access to the Sound region, i.e. external mobility, the international airport in Kastrup (Copenhagen) plays an important role. The airport is an important international hub, serving 140 direct destinations. Moreover it is also attracting a substantial number of transit passengers.

In relation to the fixed link connection, the Øresund Committee’s ORUS Report, May 2010 advised:

As a regional artery for road and rail traffic, the bridge became a crucial linchpin and the instrument that paved the way towards a closer union between Zealand and Scania, on the Danish and Swedish sides of the Øresund Sound respectively. This integration has created a strong, new region for growth in Northern Europe – the Øresund Region; and, when the fixed link across the Fehmarn Belt between Denmark and Germany is completed in 2020, the improvement this brings in mobility between Scandinavia and the rest of Europe will reinforce the position of the Øresund Region.

Source: ORUS 2020 – Øresund Region’s Regional Development Plan, Øresund Committee May 2010.

As of July 2010, data provided by the airport.
CHAPTER 5
FEHMARN BELT PROJECT

On 3 September 2008 the Danish-German treaty on the fixed link across the Fehmarn Belt was signed. The treaty was ratified in Denmark by the Danish Parliament on 26 March 2009. In Germany the treaty was ratified by the German Bundestag on 18 June 2010 and by the German Bundesrat on 10 July 2009.

The main points of the Danish-German treaty are:

- The fixed link will be owned by Denmark
- The fixed link will be paid by the users
- A state guarantee for the financing will be provided by Denmark
- Denmark gets all revenues from the fixed link
- Denmark has the authority to set the tolls and user fees
- Toll collection will take place on the Danish side.
- Denmark is responsible for the upgrading of the Danish hinterland connections that can be financed by yields from the coast to coast connection
- Germany is responsible for the upgrading of the German hinterland connections

A Danish state-owned company will be responsible for planning, design, construction, financing, operation and maintenance of the Fehmarn Belt fixed link.

Sketch projects of a cable-stayed bridge and an immersed tunnel were prepared by two rival teams of advisors for the state-owned company Femern A/S, which is in charge of the planning of the coast to coast connection across the Fehmarn Belt.

On 1 February 2011 the political parties backing the fixed link across the Fehmarn Belt decided that an immersed tunnel is the preferred technical solution in the further EIA process. This decision was based on a recommendation from Femern A/S. The final decision on the technical solution will be taken when the project has been approved by German authorities and a law on construction has been passed in the Danish Parliament.

The cost of construction of an immersed tunnel has been estimated to 37.9 billion DKK in fixed 2008 prices, equivalent to 5.1 billion EUR and the cost of construction of a cable-stayed bridge has been estimated to 38.5 billion DKK in fixed 2008 prices, equivalent to 5.2 billion EUR.
The EIA analyses are expected to be finalised in the autumn of 2011. An Environmental Impact Statement will be prepared and submitted to the public in the spring of 2012. The project will have to be approved by the Danish and the German authorities. This approval is expected to be ready in the autumn of 2013. A bill on construction is expected to be introduced to the Danish Parliament in 2013.

According to the current time schedule of Femern A/S, the fixed link across the Fehmarn Belt is expected to open in 2020.

The fixed link across the Fehmarn Belt will improve the transport infrastructure between Scandinavia and Germany. The fixed link will provide the following benefits:

- The fixed link will connect Denmark closer with Germany to the benefit of people and business in both countries. There will then be two direct links between Denmark and Germany: One through Jutland and one across the Fehmarn Belt.
- The fixed link will close a gap in the infrastructure and strengthen the connections between the Nordic countries and the Continent.
- The fixed link will provide greater flexibility and shorter travelling time for travellers. The travelling time across the Fehmarn Belt will be reduced by approximately one hour. In the first year of operation of the fixed link, travellers are expected to save about 3 million hours of travelling time.
- The conditions for railway transport will be improved. Especially rail freight will enjoy better and more direct services saving a detour of 160 kilometres via the Great Belt and Jutland.
- The Fehmarn Belt fixed link will contribute to the implementation of the European Single Market. The free movement of labour and goods will be strengthened. This is expected to result in increased competitiveness, growth, new jobs and new labour force opportunities across the Fehmarn Belt.

The fixed link will create easier access to markets for both trade and industry and for the consumers. Companies and consumers will benefit from improved mobility of goods. It will result in a wider choice of products and services and the consumers will be charged lower prices due to increased competition.

The local and regional authorities on both sides of the Fehmarn Belt are working on forming a Fehmarn Belt Region with the Øresund Region as a model. The Fehmarn Belt Region is defined as the area between Copenhagen/Malmö and Hamburg with focus on the regions located on both sides of the Fehmarn Belt. A Fehmarn Belt Committee has been formed with 10 members from Denmark and 10 members from Germany. The Committee is a joint Danish-German advisory and co-ordination committee aiming for developing and implementing a joint vision for the Fehmarn Belt Region.

Furthermore, a Fehmarn Belt Business Council has been formed on the initiative of the Confederation of Danish Industry and the Chambers of Commerce of Hamburg and Lübeck. The aim of the Business Council is to follow and support the process in relation to the construction of the fixed link across the Fehmarn Belt to develop to region of growth between the South of Sweden and the North of Germany. Members of the Business Council are trades and industries in Denmark, Northern Germany and Southern Sweden as the Fehmarn Belt fixed link is expected to contribute to further growth and integration in the Øresund Region.
Socio-economic benefits

An economic assessment carried out on behalf of the Danish Ministry of Transport showed that a cable-stayed bridge with a four lane motorway and 2 railway tracks across the Fehmarn Belt will yield a net benefit for Germany and Denmark as well as for the European countries as a whole compared to a situation with continued ferry operation.

The economic analysis undertaken for the Ministry found:

Economic evaluation of the construction and operation of a cable-stayed bridge across the Fehmarn Belt link could result in total benefits of approximately €2.3 B EUR in 2010 prices over a 50 year period with a project internal rate of return of around 7%. On the basis of a sensitivity analysis, the results for all countries are found to be relatively robust.\footnote{Economic Analysis of a Fixed Link across the Fehmarn Belt, 2004. COWI for Danish Ministry of Transport.}

A financial analysis of the coast-coast section showed that the debt will be paid back within 30 years and including the Danish hinterland connections the total project is expected to be paid within 36 years.

Further analysis was undertaken of the additional welfare gains from dynamic and strategic effects. The welfare gains from dynamic and strategic effects are additional to the benefits estimated using static benefit-cost analysis. The effects were assessed to have a value of approximately 3 billion DKK equivalent to 0.4 billion EUR.

For passenger traffic, the expected reduction of travelling time between the cities of Copenhagen and Hamburg/Berlin are of great importance. Travelling by train between Copenhagen and Hamburg nowadays takes approx. 4.5 hours. With a fixed link across the Fehmarn Belt and upgrading the German and Danish hinterland connections, the trip is expected to take 3 hours, which means a relative reduction by one third.

The upgrading of the railway hinterland connection on the Danish side will also improve the regional connections for commuters from Southern Zealand to Copenhagen. Moreover, a planned improvement of the rail capacity at Kastrup is in the regional perspective important for the connections between Copenhagen and Malmö (Sweden) but will also contribute to processing the traffic on the future international corridor via Fehmarn Belt.
CHAPTER 6
GLOBAL AND REGIONAL OUTLOOK

6.1 Global Maritime Market

Capacity Begins to Increase in 2010 as Steady Recovery Seen in Global Shipping

A press release from HIS Global Insights dated 7 May 2010 (just before the Workshop) provided the following forecasts for global cargo volumes for the short term as well as assessments of the prospects for the major routes and shipping operator capacity:

World trade by all modes of transportation will grow 8.5 per cent in 2010, rebounding strongly from a deep dive during the global economic crisis, according to the latest forecast from IHS Global Insight’s World Trade Service. Total world trade is expected to grow 7.8 per cent in 2011.

Trade volumes on the Far East to Europe routes are forecast to rise 8.0 per cent in 2010. The export trade from Europe to Asia grew in 2009 and is expected to grow in 2010. Trans-Pacific eastbound trade – from Asia to North America – began to recover in the third quarter 2009, though the downturn in 2009 was 18 per cent, and is forecast to grow 10 per cent in 2010. Solid growth is forecast for westbound trade after two years of decline. Eastbound trans-Atlantic trade from North America to Europe is forecast to return to 2007 levels by 2013. However, westbound trans-Atlantic traffic will not recover to 2007 levels until 2015.

Major container shipping operators recorded huge losses in 2009. However, in February and March 2010, the number of container ships in layup diminished and stood at 1.2 million TEUs, or 9.1 per cent of the container fleet on March 1, the lowest level since July 2009. Additional capacity is expected to be taken back into service in the near future as new services are opened and vessels reduce their cruising speed.

Source:  HIS Global Insight – 7 May, 2010

This early positive news on the recovery of global trade – after the deepest recession since the Great Depression – provided the first signs of optimism for countries involved in international trade. The increased trade expected in Europe to Asia and North America to Europe markets in particular was encouraging news for all countries in Europe that participate in international trade in the largest global markets, including Denmark.

6.2 Global Outlook to 2030 and beyond

Global Projections to 2030 and beyond anticipate continued global population growth for the period to 2050, with growth rates decreasing over time.

Global GDP is expected to increase 30% from 2007 to 2015 and could double over the period from 2007 to 2030. By 2050, global GDP could grow to over three times its 2007 level.

GDP per capita is expected to increase around 15% from 2007 to 2015, close to 60% by 2030 and around 140% over the period to 2050. The largest absolute increases in GDP per capita are likely to be in OECD developed countries – but the fastest growth rates will be in developing countries.

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6.3 Regional Outlook

**Projections for Asia.** By 2030, GDP in China could increase to well over 3 times its 2007 level – while in India it could increase to 3 times its 2007 level. By 2050, whereas global GDP could grow to over three times its 2007 level, GDP in China and India could increase to around seven to eight times 2007 levels. GDP per capita could increase to levels over seven times higher in China and over 5.5 times higher in India, over the period 2005-2050.

**Projections for Europe** anticipate a slowing in population growth over the period to 2050. GDP is expected to grow, but more slowly than previously: i.e. less than 10% from 2007 to 2015; around 40% over the period from 2007 to 2030; and a little over 60% from 2007 to 2050. In combination, these trends will contribute to continuing increases in GDP and GDP per capita for Europe as a whole and in most European countries.

**Projections for other Regions.** Higher growth than historic trend levels is expected in Turkey and in developing countries in other Regions, including the Middle East, Latin America and Africa.

**Impacts on Trade and Transport.** The global and regional increases in population levels and economic activity are likely to be associated with increasing trade and trade-related transport requirements. The largest increases are expected in intra-Asia trade and transport and on the major trade routes Asia-US and Asia – Europe. Trade and trade-related transport growth is also expected in other regions, including the Middle East/Turkey, Latin America and Africa.

For the **European Union**, the expected growth is fragile in the short term and the outlook is patchy for some time. However, the positive global growth and the stronger regional outlook in the short-medium term and longer term can be expected to make positive contributions to the overall levels of trade and maritime transport to and from the EU – and to increasing growth in maritime volumes handled by the N-W European and Baltic Sea ports in particular.

**Implications of possible new trade routes and infrastructure developments inside/outside Europe**

The OECD presentations highlighted a number of possible changes in trade routes and other expected maritime developments raised in discussions. Significant changes in prospect in the short term include:

- European TEN-T rail, road and waterway priority projects to be completed by 2015.
- Panama Canal enlargement – expected to be complete by 2014
- Larger container vessels (10 000-12 500 TEUs) currently being delivered – and on order
- Increasing liner shipping services from Asia/South Asia to Europe/North America via the Suez Canal.

Possible important changes in the medium term to 2030 would include:

- improved land transport connections between Asia and Europe, including possible upgrading of Russian, Trans-Siberian and Trans-Asian rail links (as proposed by UN ESCAP and other parties);
In the longer term (to 2050), new trade route possibilities could include:

- opening of the Northern Sea Passage for up to 3 months p.a. – and/or the Northwest passage.

All of these developments could be expected to have some impact on the European Region. The possible changes in trade routes in the medium term – e.g. following improvements in land transport connections between Asia and Europe – could have significant impacts on rail freight volumes. However, the land transport volumes that might be possible (e.g. between 0.5 and 1 Million TEUs) would be very much less than the volumes being transported by maritime containers (around 20 M TEUs). In the longer term, the expected opening of the Northern Sea passage for longer periods each year could also lead to some additional development opportunities, especially in the Baltic Sea Region. The more important aspects are considered further in the following sections.
CHAPTER 7
OPPORTUNITIES AND CHALLENGES

7.1 Outlook

Sources of growth

Expected growth in countries in Asia (China), South Asia (India) and South East Asia will lead to increasing trade and related transport requirements – with strong growth expected within the Asian region and between Asia and its largest markets, including Europe in particular. The stronger growth expected in other developing regions – including the Middle East, Central America (including Mexico), Latin America and Africa – will also contribute to changing trade patterns and increasing transport volumes.

The Regional outlook for Europe is not as robust in the short term. However, the OECD Economic Outlook May 2010 advised a gradual recovery is under way driven by economic policy stimulus, a rebound in world trade and improving financial conditions, despite the recent significant financial market volatility.

Outlook for Denmark and its gateways

Opportunities

European container volumes could grow around 2% per annum above GDP growth, for a number of years. However, lower growth rates are possible in the short term – given the post-recession financial and fiscal difficulties expected – and in the medium to longer term as well, given the increased financial, environmental and social risks. The changing patterns of economic growth, trade and development can be expected to have some impacts on the outlook for Denmark and its major gateway ports.

Once the Fehmarn Belt rail and road link is completed, Copenhagen will be much closer by rail and road – both in distance and time – to Hamburg and the important German economic areas nearby. Copenhagen will be well placed to benefit from increasing regional economic activity and trade with Germany. It will also be well placed in relation to the expected increases in trade between Sweden and Germany, due to its improved position as an inland hub between the two countries. Following the completion of the Fehmarn Belt link, rail freight is expected to capture an increased share of trade between Germany and Sweden – even though maritime services will continue to carry the major share.

In the short to medium term, there will be many opportunities for Denmark and Copenhagen in particular to benefit from the growing integration in the Øresund Sound Region – and between the 1 million people on the Swedish side and the 2.5 million living on the Danish side of the Øresund Sound.

In the medium term to 2030, above average growth is expected in the newer European member countries bordering the Baltic Sea i.e. Poland, Lithuania, Latvia and Estonia. However, even more important to the Baltic Sea Region will be the expected growth in the economy of the Russian Federation, which will recover as commodity demand and prices increase. Increasing GDP per capita (i.e. incomes) in these countries – and in the Russian Federation in particular – is likely to spur increasing merchandise trade and imports. Denmark generally and the Port of Copenhagen Malmo are well placed to take advantage of the trade and tourism growth opportunities. The other Danish ports serving the Copenhagen
Region (e.g. Kalundborg, Koege and Aarhus) are specialised in different market segments and can be expected to have increasing opportunities as well. Aarhus is currently the biggest container port in Denmark and so would seem to be well placed, given that container markets are expected to grow the fastest.

Aviation demand is expected to recover more quickly than maritime demand. Globally, Airbus expected air passenger traffic (in RPKs) to double in 15 years from 2009 – and for air freight to triple in the 20 year period to 2030. International air passenger demand is likely to concentrate at key international gateways. Given its reliance on belly hold cargo and also on air freighter aircraft, air cargo demand is likely to be even more concentrated on the gateways located in proximity to major centres of population and industrial activity. There will be opportunities for Copenhagen Airport to compete in these markets.

Challenges

Despite the positive outlook, there are important risks and uncertainties that could affect Denmark’s ports and Copenhagen in particular. For example, there could be:

- lower economic growth in the older European member countries than other developed countries
- a lower elasticity of trade and transport demand with respect to economic growth, in some markets, which, if it did occur, would mean, with the same economic growth, trade-related transport demand not being quite as high as currently expected
- changes in the composition of Denmark’s most important trading partners
- lower demand as a result of strategies and measures introduced in Denmark and Europe to promote low carbon economies/reducing CO₂ emissions and pursuit of “green growth” objectives.

In relation to aviation and airports, the challenges will come from the large and increasing size of air transport markets in countries close to Denmark – and from international gateways in those countries that are embarked on and able to sustain ambitious enlargement and infrastructure investment programmes e.g. Berlin.

Taken together, the scenarios and risks suggest a fairly positive outlook – but with a heightened level of change and associated uncertainty – both for Denmark and the Greater Copenhagen Area.

7.2 Agreement on a “green transport policy”

Framework and Principles

Denmark’s groundbreaking Agreement on the “Green Transport Policy” was reached in January 2009. The Agreement outlines principles which are the most authoritative recent summary of government policies and priorities.
Content

The Agreement (see Section 3.3) sets out the directions and principles in some more detail, including:

- a green transportation vision that will both ensure high mobility and also reduce pollution and the other negative effects of transportation. Priorities include: More and better public transport; and improving conditions for bicycles;

- additional road capacity shall be extended primarily in the most congested areas at present, but also where the future growth in traffic as a result of economic and industrial development will require an upgrading of the infrastructure;

- agreement to strengthen the foundations of a long term and holistic infrastructure planning through the development of a nation-wide traffic model, to better assess transport policy initiatives;

- a plan for faster journey times between the major cities with a journey time of “one hour” on the lines Copenhagen – Odense, Odense – Aarhus, and Aarhus – Aalborg;

- improved road links to ports and strengthening of freight on rail; construction of a motorway in the Frederikssund finger;

- a pool of funds for initiatives to improve the level of service on the core rail and road links.

Funding

With the political agreement of January, 2009, subsequent political agreements in autumn 2009 and 2010, and the separate and previous decisions on constructing the new city subway line (“circle”) and the fixed Fehmarn Belt link (agreed before the Green Transport Agreement), the Danish Government has approved allocating around DKK 160 B (EUR 22 B) in total for transport projects over the period to 2020.

The total amount of funding is to be delivered from three sources: the new Infrastructure Fund [around DKK 98 B (€ 12 B) and the two project specific funds for the Metro line and Fehmarn Belt (DKK 60 B – € 10 B)]. The overall allocation from the Infrastructure Fund to different transport modes over the 10 years to 2020 is as follows:

<table>
<thead>
<tr>
<th>Area</th>
<th>DKK Billions</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Transport</td>
<td>58</td>
<td>59</td>
</tr>
<tr>
<td>Roads</td>
<td>36</td>
<td>37</td>
</tr>
<tr>
<td>Multimodal/ Not specifically defined yet</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>Infrastructure Fund total</strong></td>
<td><strong>98</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

*Source: Ministry of Transport.*

Data from the Infrastructure Commission report and recent spending projections suggest that investment levels in the decided public and collective transport infrastructure projects 2010 to 2020 are higher than for the previous decade.
Opportunities

Copenhagen differs markedly from other metropolitan areas in terms of its current transport performance. Mobility is relatively high. Average speeds on the roads appear to be higher than in other European cities. Rail systems provide good levels of accessibility and reliability too. However, public transport systems are becoming quite heavily used in peak periods – and there is evidence of increasing congestion and lower travel speeds on the roads, particularly close in on radial routes to the city and along some sections of the close ring corridors around the city. At the same time, transport within Copenhagen is already relatively “green” with cycling used for a relatively high proportion of trips – meaning that cycling, vehicles and public transport have fairly equal mode shares.

Copenhagen also differs in terms of its transport aspirations. Copenhagen aspires to greatly improve public transport, reduce traffic congestion on the roads and maintain high levels of mobility by road and rail systems as well. Most cities could not hope to achieve the three objectives, let alone at the same time.

The Green Transport Policy has provided remarkable opportunities for moving in the desired directions. Considerable progress has already been made with a fully funded transport infrastructure programme to 2020. The strategic analysis being undertaken for the period beyond also provides very good opportunities to identify and explore projects which can make valuable contributions to desired transport outcomes.

In looking to the future, it will be important to clarify what the desired outcomes for Copenhagen are, as distinct from the desired outcomes for transport. Within the framework of the finger plan strategy, will Copenhagen become more or less centralized? If more so, how will transport infrastructure needs change? If less so, will there be precincts for decentralized employment? Does housing density need to increase – and if so where – or is it likely to anyhow, and if so in which locations?

There is also a pressing need and a timely opportunity to consider the impact of wider developments on Copenhagen and its traffic plans, including the Fehmarn Belt project which will increase international traffic. In these circumstances, do the authorities wish to have significantly increased through passenger traffic and transit road and transit rail freight channelled through the Greater Copenhagen Area on its way to and from the Fehmarn Belt link – and can the expected increases be handled principally on the Øresund link? If not, what are the origins and final destinations of the increased transit flows – and will additional by-pass capacity be required for such road and rail freight? For transit traffic for example, the authorities consider that the extension of the Koege-Finger (road and rail) will be important.

In overall terms, there is an opportunity to develop an integrated transport plan which reflects the policy priorities and can help deliver the desired outcomes for Copenhagen itself as well as for the transport system. An integrated plan could also clarify where it may not be possible to achieve the objectives for rail and roads in full, at the same time – and where some priority setting between the modes could be required.

Challenges

When undertaking the strategic analysis for the period beyond, there are three key policy issues that will need further clarification. These relate to the extent to which: “Public transport shall absorb most of the future growth in traffic”; Mobility is to be promoted; and Traffic congestion is acceptable.

The Green Transport Policy includes that “Public transport shall absorb most of the future growth in traffic”. The challenge will be to see the extent to which this is possible to achieve, at reasonable cost and while maintaining high levels of accessibility and mobility. In some cases, achieving the aim of public
transport absorbing most of the future growth in traffic may only be possible if the public transport improvements required in a corridor are undertaken first. The character of the decided projects clearly indicates the government’s focus on extending the rail and road connections in the fingers, e.g. Koege finger and Roskilde/Holbaek direction. In the inner city, there is a focus on strengthening public transport including e.g. the Metrocityring project. Possible improvements of the suburban rail network are being investigated as well. In many cases where public transport improvements are undertaken first, one of the benefits of doing so would be allowing the timing of any roads improvements in the corridor or area to be assessed in the light of performance on the roads after public transport has been improved and can absorb a good share of the growth in traffic.

Mobility is also to be promoted, but to what extent? Generally, acceptable levels of congestion rise somewhat as cities grow. In large urban areas, road congestion generally needs to be managed as demand increases, to prevent congestion becoming “excessive” and unacceptable. Not doing so can lead to chronic congestion or wasteful infrastructure investment (e.g. to meet peak hour demand).

The challenge in this area is to find the right balance between infrastructure investment (e.g. to remove bottlenecks) and the key actions available to protect the capacity of the roads from excessive congestion – and the resulting reduction in road traffic volumes when congestion is excessive. These key actions are access controls (such as limiting through traffic), parking controls (to moderate and spread demand) and road / congestion pricing (if and where appropriate).

Whichever approaches are taken to manage traffic congestion, from a policy and public acceptability viewpoint, public transport needs to be improved first, to ensure it can provide the high levels of accessibility needed – and the capacity and reliability of public transport services required by users – at the time road traffic congestion management measures are implemented in the most congested areas.

7.3 International and regional fixed link transport connections

Until 2000, most of Denmark’s international connections were handled by ferries. Denmark’s only fixed transport links to other countries were along routes via southern Jutland to Germany.

Until 2000, many of Denmark’s internal connections between island regions were also handled by ferry. The Great Belt fixed link was the exception. The Great Belt suspension bridge and rail tunnel – both completed in the late 1990s – provided the first internal transport fixed link connections, allowing traffic to travel across the Great Belt water channel between the Danish islands of Zealand and Funen by road and rail.

The opening of the Øresund Bridge fixed transport link in 2000 was another major milestone, allowing international connections by road and rail across the Øresund Sound between Denmark and Sweden – and direct connections between Copenhagen and Malmo.
Studies undertaken in connection with the Fehmarn Belt project highlighted the importance of improved international and internal fixed links for the Danish economy and for the Greater Copenhagen Area in particular. As noted in one report:

Current users of the ferries can benefit from a faster and more flexible transport service. A faster and more flexible transport connection can also attract new users. Improvements in transport services can furthermore foster regional integration leading households to commute more, to shop more across borders and they may even want to migrate across the border. Finally, firms can benefit from better accessibility to foreign markets leading to higher sales and it may induce them to reorganise their business and re-group some of the activities in the geography. Lower transport costs imply more trade and more production.


A. Øresund Bridge

In 2000, the opening of the Øresund Bridge created the first fixed link between Denmark and Sweden.

The Øresund Committee’s Øresund Regional Plan (May 2010) emphasised the importance of the Øresund Bridge not only for traffic but also in terms of integration and development.

As a regional artery for road and rail traffic, the bridge became a crucial linchpin and the instrument that paved the way towards a closer union between Zealand and Scania, on the Danish and Swedish sides of the Øresund Sound respectively. This integration has created a strong, new region for growth in Northern Europe – the Øresund Region.

Opportunities

There is little doubt that the Øresund Bridge – with the road and rail connections between the Danish and Swedish side of the Sound that it provides – has been a transformational infrastructure investment.

In future, there will be opportunities for the Øresund Bridge connections to promote further integration of the previously separate urban development areas in Denmark and Sweden on both sides of the Øresund Sound.

For the Øresund Bridge, the period before the Fehmarn link opens provides an opportunity to explore and implement all the changes that might need to be made. By 2020, the road and rail systems will have to be well prepared for the heavier demands on the Øresund Bridge, once the Fehmarn Belt link opens. Given its strategic importance, it will have to be ready for the longer term.

Clearly, the Øresund Region, including the Øresund Bridge, would benefit from more integrated planning processes on both sides of the Sound. As the OECD Territorial Review noted, “planning of infrastructure is in the hands of two authorities in two different countries and at different levels. Consistent planning on both sides could prove beneficial”. There will also be opportunities to review the bridge tariffs to ensure they make the best contributions possible. The reviews will need to consider possibilities for better contributions to transport objectives – including congestion management during peak periods, where needed, encouraging its use during other periods of the day – as well as wider objectives, such as continuing integration in the Øresund region.
B. Fehmarn Belt Project

The planned Fehmarn Belt fixed link will provide a direct connection between Puttgarden, Germany and Roedbyhavn, Denmark – and is expected to be operational by 2020. As noted earlier, its economic importance is illustrated in an economic benefit-cost analysis undertaken for the Ministry, which found:

Economic evaluation of the construction and operation of a cable-stayed bridge across the Fehmarn Belt link could result in total benefits of approximately 1.9 B EUR over a 50 year period with a project internal rate of return of around 7%. On the basis of a sensitivity analysis, the results for all countries are found to be relatively robust.12

The further analysis undertaken for the Ministry identified additional benefits arising from the dynamic and strategic effects. These relate to: more trade (leading to increased competition and lower prices); and business dynamics (leading to increased productivity and lower costs). The importance of these dynamic benefits – additional to the €1.9 B euro estimate using static benefit-cost analysis is shown in Figure 23 below.

Figure 23. Welfare gains from dynamic and strategic effects of a Fehmarn Belt link

![Figure 23](image)


The graphic highlights the importance of the expected benefits of this strategic transport infrastructure investment that accrue to other countries as well as Denmark. The findings reinforce the importance of undertaking benefit-cost evaluations on an international basis, rather than from a national perspective alone.

Opportunities

Development and operation of the Fehmarn Belt fixed link between Denmark and Germany will greatly improve freight and passenger connections. There will be opportunities for more efficient transport services between Denmark and Germany, including improved rail freight and passenger services.

Clearly, the Fehmarn Belt fixed link will offer improved connections between Sweden and Germany – and its international transport connections. The majority of freight transported between Sweden and Germany currently goes directly by ship and this is expected to continue. However, more direct rail freight services are likely to result in increased rail transit traffic between Sweden and Germany via Denmark and to reduce the modal share carried by road. This is likely to take some of the road transport pressure off the roads between Germany and Denmark (via Odense to Zealand) that could otherwise be expected.

The Danish-German treaty (see Section 5) provides that the fixed link will be owned by Denmark and paid for by the users – with Denmark providing a state guarantee for its financing. Under the Agreement with Germany, Denmark has the authority to set the tolls and user fees and will receive all revenues from the Fehmarn Belt fixed link. The former Minister for Transport’s Statement on Freight Transport in 2009 confirmed that increased transit traffic will help pay for this important new infrastructure, with a substantial share of the revenues expected to be paid by foreign carriers.

From the time the Fehmarn Belt fixed link expectedly opens in 2020, Denmark stands to benefit significantly from its enhanced hub position and the trade-related opportunities this will offer. Sweden and Germany are expected to benefit as well.

The Fehmarn Belt fixed link is expected to result in a significant increase in rail transit traffic across Denmark and via Copenhagen and the Øresund Bridge. The Swedish authorities expected rail freight across the Øresund Bridge to grow by around 75% by 2020. Increased rail transit volumes in future will add to the importance of international links in the rail system network.

At the same time, the Danish Government has recognised that the longer term growth in freight transport is fundamentally a healthy sign of a strong economy – and that with the anticipated growth in freight over the next 20 years, freight transport needs to be greener.

Challenges

- Increased rail transit traffic

Related to expected increases in rail volumes, the challenge will be to ensure that cargo is carried more sustainably, with energy, environment, accessibility and road safety centrally important.

In response to an expected increase in transit volumes, the specific challenge will be to ensure rail transport investments are made where rail freight has the greatest potential – including international shipments and transit freight over relatively long distances (e.g. 300-500 kms or more).

A further possible challenge in the medium term and long term could be the degree of competition between passenger and freight rail for use of rail tracks.

The Agreements on a Green Transport Policy included approval for the construction of a new railroad between Copenhagen and Ringsted, which will mean the rail capacity on Zealand will be increased substantially. The new Ringsted rail is an important part in the creation of the future rail corridor via Fehmarn Belt, as it will release capacity on the existing connection between Ringsted and Copenhagen. This new Ringsted rail will also be an important element in the realisation of the “One-Hour”-model for services over Copenhagen-Odense, Odense-Aarhus and Aarhus – Aalborg routes.

A further challenge to improving international connectivity will be the connections still needed on the German side before Denmark has unimpeded access to the European high speed rail passenger system.
C. **Possible Fixed Link: Elsinore-Helsingborg**

In connection with the 10-year anniversary of Øresund Sound Bridge, the Swedish and Danish governments have recently decided to establish a Danish-Swedish group consisting of government officials to exchange knowledge about and follow the Swedish investigations concerning a possible need for and the possibility of a new bridge over the Sound between Elsinore and Helsingborg. This possible second international fixed link across the Sound would link Denmark and Sweden where they are closest (north from the Øresund Bridge).

Any need for a second fixed link across the Sound will likely be determined by its expected positive contribution to further integration in the Øresund area, taking into account: expected road and rail transport demand; any need to divert transit traffic from the Øresund fixed link; and the benefits of reduced traffic on the Øresund link if this is done. At the same time, a new crossing could need improved feeder links through the Elsinore area on the Danish side – as well as a possible western bypass of Copenhagen (international commuting, international freight transit traffic etc). The aims would be to reduce some of the additional through traffic and road transport volumes that would otherwise cross the Greater Copenhagen Area.

The timing for any northern Øresund Sound link would depend on the cost-benefit studies that would need to be undertaken; and related to this, project costs and funding availability.

D. **Possible Fixed Link: Odense-Aarhus or Aarhus-Zealand**

Possible new fixed link connections between Funen and Jutland – and between Jutland and Zealand – are currently under consideration by the Danish authorities. The work on these possible connections – which could have important impacts on the Greater Copenhagen Area – is as follows:

- In connection with the “One-Hour”-model, consideration is being given to how best to reduce the travel time to one hour for train services between each neighbouring pair (Copenhagen – Odense, Odense – Aarhus, and Aarhus – Aalborg) of the four biggest cities in Denmark.

- The Ministry is also investigating the longer term infrastructure needs for Jutland as part of its Strategic Analysis of Jutland.

The three principal options that the Ministry currently has under consideration – as outlined and shown graphically in Figure 14 in Section 3.11 – are

- **Option A:** a somewhat shorter layout including a new bridge across the Vejle Fjord in Jutland and upgrades on the existing rail-corridor via Funen/Little Belt.

- **Option B:** a new link across the northern part of the Little Belt to shortcut the existing route between Odense on Funen and Aarhus in Jutland.

- **Option C:** a direct Aarhus – Zealand (Kalundborg) fixed link, regarded as the most ambitious option under consideration.

The intention is that any new fixed link would contribute to reduced travel times for domestic travel and aim to bring western and eastern Denmark closer together.
As highlighted in Figure 14 in Section 3.11, Options A and B would provide improved connections between Funen and south Jutland. Option C – which is shown graphically in Figure 24 below – would provide a more direct link between Aarhus and Copenhagen.

**Figure 24. Possible fixed link Aarhus – Zealand (Kalundborg)**

As noted earlier, the Ministry’s Strategic Analysis will establish the transport benefits and costs for each option and based on detailed evaluations, draw conclusions on the best of the options from a transport network point of view. Wider assessments will be required as well to establish the extent to which each of the options contributes to all the other economic, social, regional and international objectives.

Before any results from the Strategic Analyses were available, the OECD project team gave some consideration to the options under consideration. The project team’s focus was on strategic infrastructure aspects, including the nature of their possible contributions to the Greater Copenhagen Area and some of the broader objectives identified such as external mobility and international competitiveness.

**Opportunities**

Each of the Options under consideration would offer numerous opportunities and would make some useful contributions to the Greater Copenhagen Area in particular – as well as to the broader objectives for such infrastructure. In this respect:

- **“One-Hour”-model.** Options A and B would contribute to realising the “One-Hour”-model for public transport. Option C would not make a direct contribution to the “One-Hour”-model in the form originally conceived. However, it could add an additional city pair (Copenhagen-Aarhus) that could be served in one hour. All options would improve public transport access to the Copenhagen Metropolitan Area.

- **External Mobility.** Options A and B could contribute to improving external mobility, from Copenhagen’s viewpoint. Option C with its far more direct Copenhagen-Aarhus services could
be very beneficial. The increases in accessibility would be significant across the two cities and their populations.

- **Absorbing the future growth in traffic.** The Fehmarn Belt link will reduce demand on the roads via Funen / Odense from 2020. Options A and B, which would continue to channel and concentrate road and rail traffic from and to Jutland via Funen, could be expected to increase rail frequencies (which would benefit public transport passengers). Road improvements and reduction in road congestion would be aimed at maintaining high levels of mobility along the Jutland – Funen – Zealand corridor. Both could be of some benefit to the Greater Copenhagen Area. Option C could be expected to attract direct Aarhus and north Jutland traffic and thus reduce through traffic demand on the roads via Odense to Copenhagen and Zealand. Further calculations on these effects will be made by the Ministry with the new national traffic model.

- **Savings in currently expected infrastructure expenditures.** Opening of the Fehmarn Belt link in 2020 should actually reduce road traffic via Funen. Options A and B would add substantial further capacity. Option C would probably to some extent take further traffic off the Funen roads. Further calculations on these effects will be made by the Ministry with the new national traffic model.

- **Integration of markets.** Options A and B would significantly improve travel times between Denmark’s largest cities, and would ensure that all four cities are interconnected via the “One-Hour”-model. Option C would directly connect Denmark’s two largest cities by a relatively high speed rail service. It would create commuter rail travel opportunities between Aarhus and Copenhagen for the first time. The improved transport network would improve the integration of markets and the workforces in Zealand and Jutland and also across the Øresund region, including southern Sweden.

- **International passenger services.** Each of the options would offer improved services for international passengers travelling between Jutland and Copenhagen. Option C would offer substantial improvements in connections to Copenhagen Airport and via the Øresund to Sweden – and greatly improve the overall network’s connections and performance. Consideration would need to be given to the impacts of each option on connections to high speed rail services in Europe.

In these ways, each of the fixed link options could contribute in some way to important objectives for the Greater Copenhagen Area. But the extent to which they would do so would be quite different. The contributions they would be likely to make to broader transport objectives, such as those set out in the Green Transport Agreement, would also be quite different.

**Challenges**

Of course, there would be many challenges. The principal ones would include technical and financial. Technical challenges are matters for design and construction experts and other technical specialists. The financial challenges might depend more on policy. As well, given the current focus on a “greening of transport” – and the Green Transport Agreement’s principle that “public transport shall absorb most of the future growth in traffic” – another major challenge will be to establish how best this can be done.

Strategic infrastructure investment is generally intended to improve national and regional competitiveness, productivity, economic growth and employment and quality of life and a sustainable environment. In the context of the Greater Copenhagen Area, the contributions of the different projects and options to such purposes could be very different. Their contributions to other objectives such as
improving international competitiveness would also be very different. It will be important to explore sufficiently the challenges that the infrastructure projects under consideration may face in making the best possible contributions to these broader objectives.

Further – and more forward looking – financial approaches could raise new possibilities for financing large-scale projects. One such forward looking option could be to explore the opportunities for Denmark to move from a self-sustaining and standalone project financing model for major new transport infrastructure (as Finance departments support) to a financially self-sustaining transport network funding model instead, of the type that transport professionals might favour – and as Germany currently appears to be putting in place for its autobahn and national roads network.

Conclusions

Although proper assessments will depend on detailed planning and evaluations, Options A and B would clearly make better contributions to the “One-Hour”-model – reducing travel times between Aarhus and Odense and helping achieve the successive one hour travel time that the “One-Hour”-model is seeking between the four successive pairs of major cities.

From a strategic viewpoint, however, there would seem to be little doubt that a direct Aarhus-Zealand fixed link would make a better contribution to connections to Copenhagen – and would serve many strategic purposes better. It could, for example, be expected to improve Copenhagen’s connectivity and centrality in Danish and Øresund transport networks; improve the integration of markets and workforces; and provide better connectivity between northern Jutland and Zealand. A direct road and rail link (if economically feasible) could be very much faster for passengers travelling between Copenhagen and Aarhus than routes via Funen or by ferry services. The rail service could be faster than any road based option and be expected to attract quite a lot of the existing road based travel as well as generate new travel by commuters and other passengers. Given the greater reductions in distances and travel times between Aarhus, Aalborg and northern Jutland to Copenhagen than offered by Options A and B, the benefits could be considerable. Of course, it is also the most expensive project under consideration.

With such important and quite different contributions, the overall economic and financial feasibility of all the options needs to be fully assessed. Of course, this is what the Ministry’s Strategic Analyses of Jutland and Copenhagen is proposing to do.

7.4 Vision and plan for greater Copenhagen area

In many countries, metropolitan planners are guided by a vision for the metropolitan area and prepare integrated land use and transport plans that capture the nature of the city and the metropolitan area that is desired (e.g. in terms of density, liveability, accessibility, housing, transport etc).

In the Greater Copenhagen Area, the 2007 reforms split planning responsibilities between the national Government (which assumed the main infrastructure and planning responsibilities) and the Capital Region Organisation (which was given responsibility for the Regional Development Plan, advisory in nature).

The Capital Region of Denmark’s Regional Development Plan outlines that organisation’s ideas, landmarks, qualities and challenges for the Capital Region. The Capital Regional Plan doesn’t include a real vision for the Greater Copenhagen Area in a way that could be readily translated into a Transport Plan. Nor is there any “inter-related traffic plan for all forms of traffic” (as favoured by citizens at the Capital Region Organisation’s citizen dialogue meeting) available from any source.

The Capital Regional Development Plan identifies the challenges as the Organisation sees them – but recognising the Government’s responsibilities, it has not made any rigorous assessment of the most
desirable strategies, priorities and projects – as these aspects are outside its mandate. There are now great opportunities for the government and responsible Ministries to do so.

Opportunities

The new “Strategic Analysis” concept for long term planning by the Ministry of Transport provides opportunities for a fresh approach. As outlined in section 3.3, the strategic analysis of the Copenhagen Metropolitan Area will include analysis of possible future road and rail investments in Copenhagen. The focus of the strategic analysis is on projects that could be relevant in the decades following 2020, which is the time limit of the current transport Agreement. Several investment scenarios will be evaluated and will form the basis for a political and public debate, on how to set forth a comprehensive strategy for meeting the long-term challenges to infrastructure development beyond 2020.

At present, there are many transport infrastructure options – offering growth and development opportunities – that are under consideration for the Greater Copenhagen Area. These include:

- Promoting increased public transport and cycling, in accordance with the Green Transport Policy,
- Better roads to maintain high levels of mobility and help relieve congestion
- Ring road improvements and road bypasses, which could be important in separating “through” traffic from Copenhagen “destination” traffic
- Possible need in the longer term for additional capacity or a rail freight bypass to handle the increasing rail freight transit traffic expected, including between Sweden and Germany.
- Fixed links that could help transform passenger travel to and from Copenhagen, especially from the north-west Jutland region (e.g. Aarhus) and Helsingborg in Sweden (as covered already).

The OECD Territorial Review 2009 identified some of the options available in relation to concentration of development (e.g. centralisation versus a focus on clusters in less central locations) – as well as the alternative locations and options for the density of the new housing stock that will be required.

For the long time periods under consideration, there could be real advantages in exploring broad land use and transport options across the Copenhagen Area. Characteristics that are generally part of the land use and transport mix include: expected levels of population and employment in central areas and the wider metropolitan area; population density and employment concentration close to activity centres; the proportion and location of different housing types; accessibility throughout the metropolitan area; and the infrastructure and services which will be best able to meet metropolitan transport needs.

Of course, such broad assessments cannot be made on the basis of strategic transport analysis alone. Other factors that generally need to be considered include impacts on: productivity; liveability of the city; preservation of open space and the built environment; quality of metropolitan and transport infrastructure; and retention of desirable features (e.g. high levels of bicycle riding for work and leisure) etc.

Scenarios reflecting possible policy changes (e.g. CO₂/climate policy measures) and expected developments (e.g. commuter rail vs. road share etc) could be used to help with assessments of the different strategies and options and could point to the most robust approaches.
As suggested by OECD participants at the Workshop, three illustrative longer term scenarios could be used to get to grips with problems and assess the strategic choices linked to the broad objectives beyond 2020:

1. *a market solution*. Under this scenario, the current patterns and modal shares could generally be expected to continue, although public transport shares may increase along corridors where planned public transport improvements can be expected to attract increased patronage.

2. *balanced growth between car and public transport*. This could anticipate some further increase in public transport usage, consistent with the Green Transport Policy and increasing priority in infrastructure funding as well as some traffic management on the roads.

3. *swing the balance more to public transport*. This could assume that priority is given to most of the major options for improving public transport. It might also anticipate that options for improving public transport in different corridors are implemented in advance of road improvements; and that traffic congestion is actively managed (to ensure reasonable levels of service on the roads), including where appropriate by the use of green congestion pricing on arterial roads leading to the centre of Copenhagen.

It would be important for the analysis of these three scenarios to focus on:

- the best way(s) of handling destination passenger traffic to the Greater Copenhagen Area
- the best way(s) of handling “through” portions of local passenger and freight traffic across the Area

In looking for solutions, consideration would need to be given to the performance of transport “networks”– rather than focussing on project assessments alone. When the projects are complete, network performance from the viewpoint of users is the crucial test of the competed infrastructure development and financing.

In the context of the expected increase in freight transit between Germany, Denmark and Sweden, it seems that any future problems for the Greater Copenhagen Area will be minimised by the planned establishment of railway corridor B as a part of the TEN-net and the extension of the Koege Bay motorway.

Analysis of the three scenarios could identify the implications, including consistency with the “Green Transport Policy” and other objectives; likely impacts on levels of “destination” and “through” traffic; impacts on mobility and accessibility; implications for rail and road infrastructure needs; consistency with future financing etc. Of course, the strategic analysis undertaken could also help provide a better developed vision for the future as well as helping identify the integrated Metropolitan Plan needed.

**Challenges**

Most large cities find it difficult indeed to maintain previous levels of mobility of road travel as the city grows and traffic volumes and traffic density increase. Instead, the approaches adopted in large cities generally recognise that traffic congestion will increase as cities grow – and look to improve (public transport) accessibility while managing traffic congestion to ensure it is not excessive i.e. unacceptable.

The Capital Development Plan – although only advisory – raised expectations on mobility which would be challenging for any transport authority: i.e. “mobility for all citizens, irrespective of where they come from and where they are going to, and irrespective of income, as well as to lower the strain on the
environment”. Matters related to mobility, infrastructure provision and management of nationally important infrastructure are now the national government’s and the Ministry of Transport’s responsibilities.

The “Green Transport Policy” Agreement – which relates to the period to 2020 – sets out principles that seem more balanced and – in conjunction with the Decided Projects in the Copenhagen Area – provides a clear picture of the planned and funded infrastructure projects to be undertaken over the period to 2020. Many other actions are going to be taken as well. Of course, while impressive, all these actions don’t by themselves demonstrate how well the Copenhagen transport system as a whole will operate on a network basis in 2020 – from the viewpoint of its users (i.e. for both passengers and freight).

The larger challenge that remains will be the development of a vision and integrated transport plan for the Greater Metropolitan Area in the longer term, to guide planning and development in the period to 2030 and beyond.

Of course, the development of major transport infrastructure is usually quite a long process and absorbs considerable resources. In Copenhagen’s case, it would be important to involve the key stakeholders in order to discuss the development of such an integrated plan for the transport system for 2030 and beyond. Analysis of the above-mentioned illustrative longer term scenarios for public and private transport is only one part of the analyses that will be required for informed assessment of the policy choices available.

A further challenge is to ensure the vision and the transport plan are fully integrated with the Øresund Region and the future Fehmarn region, which as functional regions clearly will be important to the further growth and development of the Greater Copenhagen Area.

Now that the Government and the various Ministries have responsibility for planning and infrastructure for Copenhagen, they will be expected to take the lead on a vision and integrated plan for the Copenhagen Metropolitan Area over the period to 2030 and beyond – in consultation with other parties, the general public and key public and private sector stakeholders.

7.5 Gateway Airport – Copenhagen Airport in Kastrup

Copenhagen’s international airport is located in Kastrup on the island of Amager, around 6 kilometres south of Copenhagen’s city centre, and 24 kilometres west of Malmö city centre which is on the other side of the Øresund Bridge. The airport is the main hub out of three used by Scandinavian Airlines

The Territorial Review noted the Airport is very significant to Copenhagen’s international position:

<table>
<thead>
<tr>
<th>Thanks to its airport, Copenhagen represents a gateway between Scandinavia and the rest of Europe. Copenhagen Airport is the largest and busiest airport in Scandinavia and an important link to other parts of the world. A well-connected airport is critical in attracting international businesses. In terms of passenger traffic, it is the 14th largest airport in Europe and the leading airport in Scandinavia. In January 2008, it serviced 130 international routes and 9 national routes. Copenhagen Airport has received several awards for its amenities.</th>
</tr>
</thead>
</table>

It is important not only for tourism, cruise ship tourism and congresses in the city but also for the international business life of the entire Region. Copenhagen Airport’s passengers are drawn primarily from Denmark; but a significant proportion comes from the southern part of Sweden. The growth in international passengers has been rapid, from about 6 million in 1996 to more than 9 million in 2006.
(Statistics Denmark, 2008). The number of passengers has remained relatively steady since, despite the financial crisis.

With regards to airline connectivity, the largest operator, Scandinavian Airways (SAS), plays a key role in maintaining international and intercontinental routes. The Territorial Review noted that:

Copenhagen scores between 16th (Choi et al., 2006) and 24th position in terms of the number of airline connections it has with other cities (Derudder et al., 2007). Even though it is relatively weak when it comes to transatlantic flights, it offers a large diversity of European destinations (58), with more than one flight per day. In this respect, it ranks sixth in Europe, after Amsterdam, Paris, Frankfurt, Munich and Brussels.


In relation to inland connections, the completion of the Bridge over the Sound cemented the airport’s role as a regional hub. The airport is now linked to Denmark’s railway system through Copenhagen and to the Swedish railway system through Malmö. The airport can be accessed by rail via the airport station located underneath Terminal 3:

- Rail services connect directly to the city centre, Elsinore as well as Malmö and other Swedish cities. There are intercity trains to places in Denmark such as Esbjerg, Aarhus, Frederikshavn and Padborg, where connections are available for trains to Germany. There are also high-speed trains north to Stockholm and Gothenburg in Sweden.

- Copenhagen Metro Line M2 connects the airport with the city centre.

There are also road based connections:

- Bus – Copenhagen Movia buses stop at the airport and an express-bus to Jutland stops at the airport. There are long-distance buses to Sweden.

- Motorway – the E20 runs by the airport and then over the Øresund Bridge to Sweden. The airport has 8 600 parking spaces which can be booked online.

The airport’s role for the whole Denmark is also substantial. There are many domestic flight connections, particularly to destinations without fixed links to the rest of the country, such as Bornholm.

Opportunities

International air passengers have been increasing quite strongly for a number of years. International passenger numbers could be expected to increase as Denmark’s GDP recovers and GDP per capita income levels in Denmark and other countries increase – as long as Copenhagen Airport can retain its competitiveness.

The Øresund link provided a real boost to Copenhagen Airport, with faster, more reliable travel from parts of southern Sweden. Expected improvements in accessibility with the completion of the Fehmarn Belt link in 2020 could provide some further opportunities for a strengthening Copenhagen Airport’s competitive position. Moreover, the airport benefits from the Copenhagen metro line connecting it to the city centre. The new Metrocityring expected by 2018 will further improve connections. There’s also a motorway connection connecting the airport to the international arterial roads (e.g. to the Sound/Sweden).
The possible solutions to the challenges identified include optimising land transport access to Copenhagen Airport and taking advantage of opportunities offered by the “Green Transport Policy” Agreement to ensure that trains providing connections to and from the airport are reliable, safe and ultra modern.

Copenhagen Airport recently completed its new low-cost facility CPH Go, which has the potential to offer additional destinations to passengers at competitive prices. The establishment of the low-cost facility is part of Copenhagen Airport’s development plan to ensure its future importance. The new low-cost facility will be an integral part of the existing terminal structure with six flight gates and two bus gates. Passengers will therefore have free access to the same facilities as other passengers. CPH Go will have the capacity to handle and board flights faster and passengers will increasingly check in through self-service facilities.

**Challenges**

There are concerns about the competition the Airport faces. Copenhagen has a relatively low population density in its market capture areas (compared with Berlin and other larger cities). Berlin is building a new airport which could take business away from other airports in the European region including Copenhagen’s (and Hamburg’s) airport. While Copenhagen Airport has good regional air service connections in Europe, it is still not as well placed for intercontinental services as some of its European competitors. Although the number of transfer and transit passengers decreased over several years, January to August 2010 data shows an increase relative to 2009 data for the same period.

A further concern is that if SAS merges or is taken over by another airline, Copenhagen Airport’s role as regional hub could be endangered. This could make it more time-consuming to connect Danish companies to international businesses and have the potential to hamper frictionless travel for employees, tourists and students educating themselves abroad. A decreased number of flight connections to the rest of the world could potentially result in a less attractive position for foreign investments and tourism in the Copenhagen Area and in Denmark in general.

It is therefore important to focus on the competitiveness of the air transport sector in Denmark. The economic soundness of airline companies based in Denmark needs to be considered as well as the competitiveness of Copenhagen airport in relation to other European airports. In this connection, further increases in overall and transfer passengers, destinations and domestic flights would help Copenhagen Airport remain an airport with extensive European and intercontinental reach.

### 7.6 Gateway Ports – Harbours with relevance for the Greater Copenhagen Area

#### Port of Copenhagen Malmo

Shipment and logistics are among Denmark’s most important exports. Copenhagen has traditionally been one of the major Danish ports, building up its volumes in a wide range of areas. It has become the biggest Nordic port for cars, North Europe’s largest cruise ship port and cruise destination, and an important terminal for ferries (combined ro-ro and passengers) and has also handled containers for many years. It is also a major dry and liquid bulk port, including for quite large volumes of oil shipments.

The ports of Copenhagen and Malmö have been managed jointly by the Copenhagen Malmö Port (CMP) since 2001. The CMP is equally owned by the Copenhagen Port Authority (owned by the City of Copenhagen and the Danish central government) and the Malmö Port Authority (consisting of the City of Malmö and private entities). CMP aims to be the regional hub port for the Nordic and Baltic regions, given its strategic location.
The OECD Territorial Review noted there are some port accessibility issues at CMP:

The same issue of good traffic-related accessibility applies to the Copenhagen Harbour. Measured by passengers, Copenhagen is presently the largest cruise destination of Northern Europe with a continued growth potential for the coming years. The coming years’ urban development in the Nordhavnen (Northern Harbour) means that the Harbour is planning to relocate its commercial activities and to construct new cruise docks and a new cruise terminal opposite to the new urban development area. The cruise industry today is important to Copenhagen as every fourth tourist in the City is a cruise guest.


Ports of Koege, Kalundborg, Aarhus and Elsinore

Of course, there are other important ports in Denmark, and some of them also play a significant role for the freight transport to/from the Greater Copenhagen Area. On Zealand, the ports of Kalundborg and Koege also play a role in serving the Greater Copenhagen area. Both harbours are primarily bulk cargo ports, In addition, the port of Elsinore plays a role in ferry transport to Sweden.

A substantial part of the Danish industries is situated in Jutland, which means that there are considerable export and import activities and also transit traffic in that part of Denmark. Aarhus is Denmark’s most important container port. Here, as well as its general relevance for Greater Copenhagen, the recent establishment of a freight train route from Aarhus port (APM terminals) to the Hoeje Taastrup combi-terminal in the Greater Copenhagen area is a noteworthy development. In this regard, within the Green Transport Agreement, a special fund amounting to DKK 200 Million (26.7 M €) was established to improve rail freight transport. Initiatives include, inter alia, investments in the combi-terminals in Taulov (Jutland) and Hoeje Taastrup.

Opportunities

Cruise passengers are an important part of CMP’s market as well as for tourism to Copenhagen. Around 25% of the tourists to the city were still cruise visitors before the financial crisis. With increasing incomes expected in many countries and an ageing population expected in most OECD countries, there should be good future prospects for the cruise market at the CMP. Similar conclusions would apply to cargo, with vehicles as an important category. In the future, increasing volumes of vehicles are likely to be built in Asia and imports from Asian countries are likely to increase. The IEA anticipates that oil consumption in European countries is likely to fall a little over the period to 2030. This would suggest that oil volumes through CPH are likely to be flat, all other things being equal. Of course, decisions on refinery locations could have some impact.

Containers will probably be a very important category but one that is the least certain. In 2008, CMP handled around 0.2 M TEUs, which is a very small amount by comparison with the volumes handled in Rotterdam (10.7M TEUs) and Hamburg (9.7M TEUs). At present, CMP operates as a feeder harbour for the Øresund region from where containers are primarily sailed to the larger Hamburg and Bremerhaven ports in northern Germany.

In the future, increasing volumes of containers are expected to be handled by Baltic Sea ports. A lot of the increase is likely to come from container traffic to and from Russia. So although the overall volumes along the Baltic Sea will increase, CMP will need to offer the services shippers need to be able to attract and retain increasing volumes and enhance its position as a primary hub.
Challenges

Clearly, there are challenges associated with the current recession and patchy recovery. One issue is the larger container vessels entering liner fleets and whether these larger container vessels are likely to lead to changes in liner shipping service patterns. It seems likely that the larger container ships could be attracted more to the major container ports nearby – e.g. Rotterdam, Zeebrugge and also Hamburg – which will have the deep water capability and high container volume handling capabilities needed to handle the largest container ships being delivered. Those ports have better inland freight connections and are closer to larger centres of population and industrial activity. These factors are likely to continue to over-ride Copenhagen’s undoubted geographical advantages in some markets.

Officials did not expect any of the possible trade route changes outlined to have much impact on the Greater Copenhagen Area and its outlook. The Northern / polar routes would seem likely to be marginal from the viewpoint of the Danish ports, even if the routes are open two or three months a year.

In relation to the maritime container traffic market, which is expected to be the maritime category that shows the strongest growth globally over the period to 2030 and beyond, the Port of Aarhus is currently the largest container port in Denmark. Recently, the Port of Hamburg has been under pressure from its terminal operators (including the Chinese controlled Cosco) to dredge the port access channels to make them deep enough to handle the largest container ships.

In relation to the Copenhagen container port activities, it has been decided that the container port will be moved to outer Nordhavn in 2018. Challenges for the new container port will include ensuring as many containers as possible are carried by barges where practicable, the share of remaining containers being carried by rail is as high as practicable and efficient and road transport carries the rest along routes that impose the least adverse impacts.

The Rotterdam Workshop report provides some good insights into some of the best practices available on how the port owner and terminal operators can increase the port’s contributions to green growth.

7.7 Infrastructure funding and financing

As noted earlier, Denmark decided some time ago to implement its own Infrastructure Fund. The Infrastructure Fund was established as a dynamic (or rolling) fund able to receive revenues from existing sources. An important feature is that if a project turns out to be cheaper than planned, the unused funds will be returned to the Infrastructure Fund and thus be available for financing of other/new projects.
The sources of funding are important and help provide funds at the level and with the stability required

- The long-term strategic Infrastructure Fund is financed out of general tax revenues, sale of state-owned assets (e.g. Scanlines), and savings on approved projects where there is investment under-spend (e.g. for rail signalling improvements and where network modernisation leads to savings in expected future maintenance).

- **Metro funding.** There is separate funding for the Metro project. It comes from user fees and from sale of public assets (power stations) as well as from land value capture and property taxes. For the Metro project, around half the funding is expected to come from “other” (i.e. non-user) sources.

- **Fehmarn Belt fixed link.** There is separate funding for the Fehmarn Belt project. The model used for the Danish fixed links has been quite successful i.e. a government-owned corporation established under the corporations’ law, a government-secured loan and fully financed via user fees. The European Commission supports the project. Up to 30 per cent of the costs for constructing the fixed link may be granted. The fixed link costs will be repaid by road and rail users.

The Infrastructure Fund and its many different sources of funding – together with the special standalone project funds for the large Fehmarn Belt and Metro projects – are ensuring adequate funding and assuring the security of funding for all the “Decided Projects” over the period to 2020. In the case of the general Infrastructure Fund, while budget funding from general tax revenues is an important source, a significant share of the funding is in fact “Earmarked” funding from other identified non-budgetary sources.

With these sources of funding, there probably has been less pressure to explore alternative organisational models such as Private-Public Partnerships (PPPs). In Denmark, PPPs are considered as an organisational model, not a funding model, as the underlying project funding has to be sourced from either users or general or specific taxation. PPPs are in use (the first road project being the South Jutland motorway) but in Denmark their potential is probably limited.

**Opportunities**

The Infrastructure Fund and the special standalone funds for the Fehmarn Belt link and the Metro projects are providing the secure, stable and sufficient funding that Denmark needed to embark on its very ambitious infrastructure programme over the period to 2020. The Infrastructure Fund and the two standalone major project funds are also providing a supportive climate for the Ministry’s current longer term planning and strategic analysis work, which is considering many major strategic infrastructure options for the period beyond 2020.

Beyond 2020, there may be opportunities for user-pay revenues to be channelled into the Infrastructure Fund. This could allow more major projects in future to be funded in part or mostly by user charges (as has been the case with the Øresund Bridge). The possible Harbour Tunnel might benefit – and the new fixed links that could be required might also benefit from such an approach.

There appear to be further opportunities for land value and other funding sources as well, for some of the projects under consideration. For example, in the case of the Harbour Tunnel, there would seem to be plenty of potential land available. Possibilities could include unused land like at the Osterbro area,
stretches that are disused such as near the harbour, or where old industry is moving out and re-development could take place. Such land value capture schemes could offer considerable potential beyond 2020.

In overall terms, Denmark’s funding arrangements on which the very large overall infrastructure investment programme is based are widely supported and working well.

**Challenges**

The strategic problem is the demand for transport and mobility is rising at the same time as other demands are increasing (e.g. health, environment and ageing populations).

The major challenge will be to assure the future security of funding that will be required post 2020. Significant challenges also lie ahead in prioritising options.

Road user charges have been identified as a possible source of future funding that could help provide funding security beyond 2020. The history of road charging schemes in neighbouring countries (i.e. the Netherlands and Germany) shows that they are complex and likely to encounter technical difficulties and public acceptability challenges at first. However, Austria has a good working model and Germany’s truck charging is now working well on autobahns and has recently been extended to include national highways.

Denmark has been giving consideration to such approaches. As a first step, it is the plan to introduce a km-based road charging scheme for all trucks. Denmark will thus opt out of today’s Euro-vignette – a time based scheme covering all trucks above 12 T driving the main international road connections in Sweden, the Netherlands, Luxembourg, Belgium and Denmark.

Denmark has already implemented schemes for funding large-scale infrastructure projects by user charges in the concrete cases of the Great Belt and the Øresund bridges. Also the Fehmarn Belt link is expected to be paid by its users. It has been decided in principle to establish a new fixed link across the Roskilde fjord – and the potential of completely or partially funding it by user fees is currently being analysed.

In general, further potential of introducing user charges could form a substantial part of the discussion of funding Denmark’s future infrastructure investments.

In this context, a forward looking financial policy option might be to explore the opportunities for Denmark to move towards a financially self-sustaining transport network funding model, of the type that transport professionals might favour.

**7.8 Organisation models**

**Government Authority**

Denmark is generally using a traditional government authority or fully government owned corporation model as the organizational structure adopted to oversee projects and deliver the investment or funding needed.

**SPV Model – the Øresund Link**

In 1992, the governments of Denmark and Sweden established a special purpose vehicle (SPV), Øresund Bridge Consortium. Its responsibility was to plan, design, finance, construct and operate the project, which was to be environmentally sustainable, technically feasible and financially reasonable. The project was not financed by taxes and was supposed to be self-financing.
The Øresund Link model

*The Øresund Bridge Consortium* had net liabilities of DKK 19.6 billion (2.6 B €) when the bridge was completed in 2000. Because of the size of the debt, fluctuations in interest rates and foreign exchange rates influence the repay period and the project had a high risk. Financial management is particularly dependent on general market trends.

Both the Danish and Swedish governments have assumed responsibility for the general risks, including not only weather and geological risk but also risk caused by the requirement for environmental and safety standards. Both governments issued guarantees to the bonds issued by the SPV in the domestic and international financial markets. They gave lenders the right to require immediate repayment of a loan, if the Øresund Bridge Consortium ceased to exist as an independent company. In exchange for assuming these risks, this public-private partnership (PPP) scheme afforded the governments several advantages that a purely private infrastructure project could not have offered.

- The highest possible long-term credit rating on the debt (Standard and Poors; AAA), resulting in lower financial costs. Note: The lenders judged that the joint guarantee would be stronger than an individual guarantee.
- Long-term financial picture. Note: The Øresund Bridge Consortium sets the financing plan, based on the relationship between the economic situation, traffic development and interest rates.
- Project flexibility, in contrast to locking in the project at a very early stage.


Denmark and Sweden retain a 50% share (DKK 50 million, i.e. 6.6 B €) in the consortium. Due to the positive traffic trend and recent favourable interest rate levels, the repayment period was reduced compared to the expected repayment period at the opening of the fixed link in 2000. According to the latest annual 2010 report of the Øresund Consortium, the Øresund fixed link will be paid for after approximately 33 years of operation (Øresundbron, 2010).

**The Fehmarn Belt fixed link – Government-owned Corporation**

In 2008, a Danish-German treaty on the fixed link across the Fehmarn Belt was signed. This provides for a fixed link with a four lane motorway and an electrified double track to be constructed between Puttgarden in Germany and Roedbyhavn in Denmark. According to the latest time schedule, the fixed link is expected to open in 2020.

The Danish Government decided to adopt the successful model used previously for fixed links across the Great Belt and the Sound, i.e. a government-owned corporation established under the corporations’ law, a government-secured loan and financing via user fees.

A state-owned company is in charge of the preparatory work, planning, approval, construction, financing, ownership, operation and maintenance of the fixed link. The toll station will be on the Danish side; toll rates are to be oriented in accordance with the price of ferries crossing the Fehmarn Belt. Denmark will receive the revenues from the bridge company and cover possible losses. Denmark has also reserved the right to use the toll revenues to finance the upgrading of the Danish hinterland connections. Infrastructure in the Danish hinterland is the exclusive responsibility of Denmark. Germany is responsible for upgrading the German hinterland connections, including the financing. As noted earlier, the EU is expected to make a financial contribution towards the cost.
Organisational arrangements for public transport in the region are set up rather differently. A number of public transport problems were identified. Some problems related to national and municipal organisations not co-ordinating properly on the respective public transport services for which they are responsible. Other problems related to funding.

In relation to funding, under the recent division of national and municipal authorities, the main train services are funded by the Government (some local trains are funded by the regions). Buses are hired by the municipalities and regions, with e.g. for Zealand in 2009 on average 53.3% of their costs funded by revenues, the rest by municipalities and regions.\textsuperscript{13}

In relation to co-ordination, responsibility is shared between three levels of government. There is no single public transport body with the responsibility for ensuring the necessary degree of co-ordination across public transport networks and between the public transport network operations that needed by users.

The Ministry commissioned a report to look into the problems.

The Report advised, in respect of the Bus Funding Model that the problem areas identified were the large number of stakeholders; the lack of transparency; the lack of customer orientation; and the lack of realistic commuting data. Any final recommendation on the bus funding model depends on the “higher level” decision about an umbrella organisation.

In relation to organizational arrangements, the report advised two options identified for an alternative organisational set-up of public transport in the Greater Copenhagen Area. In the light version Transport of Greater Copenhagen is an umbrella for the three organisations Movia, Metro and the Danish Transport Authority on the co-ordination level; in the full version Transport of Greater Copenhagen would be the only organisation on the co-ordination level. It has not been decided yet whether such an umbrella organisation will be established and if so, which of the alternative solutions would be the most appropriate.

Looking to the future, the report suggested that, before moving on with setting up an alternative structure for the public transport in the Greater Copenhagen Area, political decisions on the quantified objectives of the “green policy” and the desired levels of local responsibility, common welfare and cost proportionality need to be taken. Establishing an umbrella organisation would require an in-depth analysis covering the elements strategy, organisation, financing, decision making and legal design.

Source: Analysis of the Organisation Set-up of Public Transportation in the Greater Copenhagen Area, BSL Management Consultants of the Lloyd’s Register Group.

7.9 New policy environments – Green growth

What is Green Growth?

Growing concerns about the environmental unsustainability of past economic growth patterns and increased awareness of a potential future climate crisis have made it clear that the environment and the economy can no longer be considered in isolation. At the same time, the financial and economic crisis has

\textsuperscript{13} i.e. corresponding to the area of responsibility of Movia. It has to be pointed out that \textit{inter alia} due to adjustments in legislation the share of self-financing has been declining, considering that the figure for 2007 was 58%.
provided the opportunity for policy interventions aimed at encouraging recovery and renewed growth on more environmentally and socially sustainable grounds.

Within this context, green growth is gaining support as a way to pursue economic growth and development, while preventing environmental degradation, biodiversity loss and unsustainable natural resource use. It builds on existing sustainable development initiatives in many countries and aims at identifying cleaner sources of growth, including seizing the opportunities to develop new green industries, jobs and technologies, while also managing the structural changes associated with the transition to a greener economy.

At the OECD Ministerial Meeting in 2009, Ministers of 34 countries decided to develop a Green Growth Strategy. The mandate was clear: growth can – and should – go hand-in-hand with green. In this context, central questions for the project’s case study work are: How are “climate change”, “low carbon” and “green growth”-related policy objectives and measures likely to affect key gateways hubs? How can infrastructure investment best contribute to “green growth” in particular?

**Contributions to Green growth**

1. **Planning and Development Stages**

The first way in which Port infrastructure investment can contribute to Green Growth is during the planning and development stages. The proponents need to ensure that the investments are well chosen in the context of new policy settings that seek cleaner sources of growth. They also need to ensure that the developments are undertaken in ways that minimise adverse environmental impacts, make use of less polluting transport modes and promote new green industries, jobs and technologies.

2. **Contributions during operations and use**

The second way in which infrastructure can be expected to contribute to green growth relates to the contributions it will make during the infrastructure’s operations and use. Given the long expected life of most infrastructures, there may be scope for users – and their use of the infrastructure – to make very significant contributions over long time periods ahead to the greener outcomes required.

**Action being taken**

Denmark’s Green Transport Policy Agreement to 2020 represents an important step in ensuring Denmark’s Transport sector contributes to lowering of CO₂ emissions.

The transport sector must make its contribution to meeting the requirement for a reduction at least 20 per cent in CO₂ emissions from non-trading sector in 2020 compared to 2005 levels. The parties note that the Government has estimated that an overall sign of proposals in the Green Transport Vision DK will provide a reduction in CO₂ emissions of between 0.7 and 1.5 million tons annually in 2020 compared to the baseline projection – Depending on the details and transposing the future development and penetration of new technologies

*Source: Agreement on a Green Transport Policy, Jan 2009, Denmark Ministry of Transport (Electronic translation).*

**Opportunities**

The Green Transport Policy Agreement has reinforced that the sector must make its contribution to meeting the requirement for a reduction at least 20 per cent in CO₂ emissions from the non-trading sector in 2020, compared to 2005 levels.
The Green Transport Policy Agreement also sets out a number of principles and objectives that will help improve contributions to green growth: Noteworthy is the objective that: “Public transport shall absorb most of the future growth in traffic. The railways shall be reliable, safe and ultramodern” As well, the intention that a “green re-orientation of the existing car taxation system is to be carried out”.

In this respect, there is currently a high registration tax on car purchases. The Principles for a green Congestion highlight that in future it should be cheaper to buy a new, safe and environmentally sound car, while more expensive to use the car – especially if it pollutes a lot, or if driving takes place in areas and periods that are very crowded.

Transport within Copenhagen is already relatively “green” with cycling, vehicles and public transport having fairly equal mode shares for journeys to work. However, these developments create real opportunities for very significant increases in transport infrastructure contributions to Green Growth.

Challenges

One of the most important challenges will be to strike the right balance between infrastructure investment and other measures taken to achieve the desired levels of mobility on road and rail transport modes. Given the difficulties of reducing road traffic congestion as cities grow and people and businesses seek out the benefits of proximity and agglomeration, there could be a need to consider promoting “accessibility and sustainable mobility”, instead of mobility alone.

There will also be challenges related to measures being undertaken to achieve “green” transport:

- Research on green vehicles will encompass a wide range of possible fuels
- New “cleaner” technology to make any given volume of traffic more “green”
- Restructuring the taxation of cars – prompting car drivers to environmentally correct and energy saving decisions when buying and when using a car
- More efficient use of the transport system by location and time period.

In overall terms, the OECD Territorial Review of Copenhagen also noted:

| Fine-tuning environmental policies could help the City of Copenhagen realise its ambition to become the greenest capital in Europe. However, more could be done to bolster the City of Copenhagen’s sustainability, including reduction of air pollution. Finally, an ecosystem-based planning approach and continued crossborder environmental co-operation is called for, given the prevalence of pollution in the Øresund Region.

CHAPTER 8
FINAL REMARKS

Greater Copenhagen Area

The Greater Copenhagen Area is relatively small by comparison with many of the major European metropolitan areas – e.g. Paris, Berlin, and Hamburg. It is more similar in size to other competitive cities in the Region – e.g. Oslo, Stockholm and Helsinki.

Copenhagen is ranked highly in respect of its transport infrastructure. Most obviously, transport in Copenhagen differs from other European metropolitan areas in terms of:

- road and rail infrastructure. Both are relatively high quality unlike systems in many other cities which often have infrastructure deficiencies in one or both modes;

- transport usage. Remarkably, a high proportion of trips in Copenhagen itself are undertaken by bicycle or by walking. Copenhagen has one of the highest – if not the highest – rate of bicycle use. Many Copenhageners bicycle to work. For work travel, the current modal shares by rail, road and cycling are understood to be roughly similar.

Despite some increase in congestion, average speeds on the roads still appear to be higher than in other European cities. Rail systems provide good levels of accessibility and reliability too. However, at the same time, there is evidence of crowding on public transport systems in peak periods – and evidence of increasing congestion on the roads, particularly on radial routes to the city and in certain locations along the close ring corridors around the city. Nevertheless, mobility has remained relatively high.

Copenhagen also differs markedly from other metropolitan areas in terms of its transport plans and aspirations. Copenhagen aspires to significantly improve public transport usage, reduce traffic congestion on the roads and maintain high levels of mobility by road and rail systems as well, in a balanced fashion and at the same time.

The Copenhagen Metropolitan Area doesn’t yet have an integrated traffic plan for all forms of transport related to future development plans and the wider objectives for Copenhagen itself. However, it does have an agreed and fully funded infrastructure programme over the period to 2020, with Decided Projects encompassing infrastructure and other investments in all transport modes.
Strategic Issues

There are fairly consistent views on the strategic issues. For example, The Capital Region of Denmark’s Regional Development Plan identified the strategic issues as:

- The growing congestion and the transitional traffic through the central districts
- Making the use of collective transportation an attractive alternative to the car
- The Connection between the Capital Region and the neighbouring regions, the Region of Zealand, the Region of Scania and Northern Europe

Source: Capital Regional Development Plan, 2008.

Green Transport Agreement

The Agreement on “A Green Transport Policy” reached in January 2009 by the Government and other parties (all in all seven out of eight parties in the parliament) has provided remarkable opportunities for moving forward in the desired directions. The Agreement sets out the key principles to be taken into account. The Green Transport Policy principles recognise the importance of a green transport vision that will ensure high mobility and reduce pollution and other negative effects; more and better public transport and improving conditions for bicycles and principles for a green congestion. The Agreement recognises the need for road improvements where this is the best approach: e.g. on circular routes and approach roads in the highest density areas (i.e. Copenhagen). It appears to give more weight to collective transport improvements that previously – within a balanced modal approach. Note worthy is the objective that: “Public transport shall absorb most of the future growth in traffic. The railways shall be reliable, safe and ultramodern”. As well, the intention that a “green re-orientation of the existing car taxation system is to be carried out”.

Considerable progress has already been made with a fully funded transport infrastructure programme filled with Decided Projects to 2020. The strategic analysis to be undertaken for the period beyond 2020 also provides very good opportunities to identify and explore projects which can make valuable contributions to desired transport outcomes in the period to 2030 and beyond.

At the same time, it will be important to clarify what the desired outcomes for Copenhagen as a whole are, as distinct from the desired outcomes for transport.

Funding

The Infrastructure Fund and its many different sources of funding – together with the special standalone funds for the large Fehmarn Belt and Metro projects – are providing security and ensuring sufficient funding for all the “Decided Projects” over the period to 2020.

In the case of the general Infrastructure Fund, while budget funding from general tax revenues is important, a significant share of the funding is in fact “Earmarked” funding from other identified sources. The Infrastructure Fund has robust and diverse sources of funding, which are indicators of good practice.

In overall terms, the arrangements on which the very large infrastructure investment programme are based are widely supported and working well. The challenges ahead include assuring the future security of funding that will be required post 2020. The strategic problem is that the demand for transport and mobility is rising at the same time as other demands are increasing (e.g. health, environment and ageing populations).
Denmark has been giving consideration to the best approaches to take. As a first step, a km-based road charging scheme will be introduced for all trucks. Denmark will thus opt out of today's Euro-vignette – a time based scheme covering all trucks above 12 t driving the main international road connections in Sweden, the Netherlands, Luxembourg, Belgium and Denmark.

A forward looking option could be to explore the opportunities (e.g. in the context of the proposed green congestion and other policy changes) for Denmark to move towards a financially self-sustaining transport network funding model, which could remove some of the current limitations.

**Strategic Infrastructure post 2020**

Project plans are well elaborated up to 2020. Looking ahead at the period from 2020 to 2030 and beyond, it will be important to begin discussing and then developing a consistent, integrated multimodal plan for the further development of the transport system in the long run. Of course, the planning and development of major transport infrastructure takes long time periods and the processes absorb considerable resources.

Setting the priorities and securing the necessary financial resources beyond 2020 will be highly important – as is gathering the relevant stakeholders and their support. It will be important to continue to secure agreements between the relevant stakeholders to support the integrated transport plan and ambitious projects that seem possible.

Considering the Greater Copenhagen Area’s currently favourable position compared to other metropolitan areas, acting well ahead time could certainly help avoid some of the larger traffic problems confronting comparable cities.

The *Case Study* has given some consideration to a number of opportunities that might be of significant benefit to Copenhagen in the medium to longer term – i.e. after the completion of the Fehmarn Belt link. The highlights appeared to be:

- in conjunction with the Fehmarn Belt fixed link, the creation of a future Fehmarn region, including Denmark, Northern Germany and Southern Sweden
- an inner harbour tunnel that would improve road connections and facilitate urban re-development in Copenhagen
- further improvement of the public transport system in Copenhagen e.g. automatic suburban rail trains and new suburban rail services
- options for improving the connections between western and eastern Denmark, among others by improving domestic rail transport connections from Copenhagen to other Danish cities in accordance with the “One-Hour” rail policy
- improvements in air and land connections to Copenhagen Airport and rail connections to the relocated port
- a fixed link between Aarhus and Zealand (Kalundborg) that could greatly improve connections between Copenhagen and Aarhus – as well as between Jutland and Zealand generally, but is the most expensive project currently under consideration
• a possible Elsinore – Helsingborg fixed link across the Sound, which is being discussed by a Danish-Swedish group of government officials

• the possible need for a western Ring 5 bypass of Copenhagen – separately from or in combination with any Elsinore – Helsingborg link.

Clearly, across the projects identified, there are many strategic opportunities over the period from 2020 to 2030 and beyond. Of course, there are many more, too numerous to mention here. In assessing the priorities for strategic infrastructure investment, careful consideration should be given to the opportunities for better connecting the largest population and employment centres. The important opportunities for doing so that stand out are:

• better integrating the very large population and employment centres on the Danish and Swedish sides of the Øresund Sound

• better connecting the population and employment centres in Copenhagen and Funen/Jutland.

Strategic transport projects that can improve accessibility in these two important settings in particular would appear likely to offer both the transport improvements needed as well as the productivity and wider benefits that are being sought for the Greater Copenhagen Area.

If public transport improvements can be undertaken first, the benefits of doing so include having time to assess any roads improvement needs in the corridor in the light of performance on the roads – after public transport has been improved and has had an opportunity to absorb a good share of the growth in traffic.

Of course, each of the possible infrastructure projects will need to be fully evaluated. In timing terms at least, there could be a need to choose, for example, between some of the important projects: such as a western bypass of the Copenhagen area (e.g. a Ring 5 route) versus an inner harbour tunnel. Careful evaluations will be needed, given the importance of the differences between projects.

Network considerations

The strategic infrastructure projects under consideration in Copenhagen and Jutland could produce significant returns in terms of overall objectives for transport and contribute to the development of Copenhagen and Denmark more broadly. Priorities will become clearer once the planned “strategic analysis” assessments have been undertaken by the Ministry. Of course, the projects would be costly- e.g. a western bypass of the Copenhagen area or a harbour tunnel would cost several billion EUR each; and a Kalundborg link possibly around 16 B EUR.

In the wider context, with a substantial portion of Danish industry situated in Jutland, there are considerable export and import activities and also transit traffic in that part of Denmark. Aarhus has the largest container port in Denmark. Better connections and bringing Jutland and regions east close together are important objectives. The options identified include shorter term improvements along existing corridors versus more strategic ones along new corridors (such as an Aarhus – Zealand (Kalundborg) link).

Unlike the two options under consideration for better connecting Funen and Jutland, an Aarhus – Kalundborg link would not contribute to improving the connections between Aarhus and Odense on Funen, Denmark’s third largest city – or to the “One-Hour”-model improvements. However, if technically and economically feasible, it would make a very large contribution to improving the overall transport network
and its connections, improving Copenhagen’s connectivity and centrality in Danish and Øresund networks and bringing the west and east of Denmark closer together.

Some very good assessments will need to be undertaken. The parties involved in infrastructure planning and those responsible for decisions on infrastructure priorities, funding and development will need to be well advised by the strategic analyses too, including in terms of the ways in which each of the major projects would contribute to overall objectives – as well as each of the transport objectives.

No doubt, difficult strategic choices will have to be made. Desirably, they will have wide support from the parties involved. With priorities set, strategies will need to be settled to ensure the future infrastructure needed for the period beyond 2020 can be funded and delivered on time. Throughout these processes, it will be important to focus on overall goals and major objectives, recognising that strategic transport infrastructure delivers services important to national and regional competitiveness, productivity, employment, quality of life and a sustainable environment.

In the meantime, the decisions that the Danish government has taken on infrastructure investment to 2020 – supported by fully approved funding from secure funding sources – will make important contributions towards achieving the objectives of the Agreement on Green Transport Policy. The overall arrangements are widely supported and should help ensure that major current issues and problems are addressed with the best approaches and latest technology while planning is under way on how best to ensure Denmark and the Greater Copenhagen Area continue to benefit from high quality infrastructure beyond 2020.
ANNEX A
COPENHAGEN WORKSHOP – 28 MAY 2010

LIST OF PARTICIPANTS

OECD-team
International Futures Programme Barrie Stevens
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Denmark's technical university, transport institute Camilla Brems

Other ministries
Ministry of Taxation Henrik Wedebye
ANNEX B

TRANSCONTINENTAL INFRASTRUCTURE TO 2030/2050

GREATER COPENHAGEN AREA CASE STUDY

COPENHAGEN WORKSHOP
9:00 AM, 28 MAY 2010

DRAFT ANNOTATED AGENDA

8.30  ARRIVAL, BREAKFAST…

9.00  1.  WELCOME AND INTRODUCTIONS
      Thomas Jørgensen

9.10  2.  CASE STUDY PROGRAMME – IFP STATUS REPORT & WORKSHOP OBJECTIVES
      Barrie Stevens, OECD/IFP

9.20  3.  SHORT PRESENTATION BY THE HOSTS
      The hosts – Ute Stemmann – will make a short presentation on the Greater Copenhagen area, organisational roles and responsibilities, current population levels and employment locations and expected future changes.

4.  OPPORTUNITIES AND CHALLENGES FOR GREATER COPENHAGEN AREA

Presentations and Discussions:

9.30  4.1 Global and regional projections and scenarios
      IFP – John White – will make a presentation on the global and regional economic projections and the trade and transport outlook for the short to medium and longer term. Discussion will focus on the key aspects of importance to the Greater Copenhagen Area.

10.10 Coffee break

10.25 4.2 Possible new trade routes, expected infrastructure developments and their effects
      IFP – John White – will make a presentation on possible new trade routes that could bear on the area. Discussion will focus on expected developments – including completion of TEN-T projects and in the quality and reliability of infrastructure – and their likely effects on the Greater Copenhagen Area.

11.00 4.3 Competitiveness, supply chain performance and possible improvements
      IFP – Barrie Stevens – will make a presentation on Denmark’s competitiveness and supply chain performance and possible improvements. Discussion will focus on possible future actions and their likely effects on the Greater Copenhagen Area.
11.35  **4.4 Strategic infrastructure investment needs to 2015 and 2030 (Presentation)**

The hosts – Thomas Jørgensen – will make a presentation on the Government’s ongoing initiatives up to 2020 and the framework for the ministry's strategic analyses of the long-term infrastructure plans for Greater Copenhagen – focusing on the main strategic choices to be made and possible solutions.

11.50  **Lunch**

12.30  **4.4 (cont.) Strategic infrastructure investment needs to 2015 and 2030 (Discussion)**

13.00  **4.5 Financial arrangements and sources and models of sustainable financing**

IFP – Barrie Stevens – will introduce this item with an update on recent developments in infrastructure funding and financing – and the expected short-medium term outlook. Discussions will focus on future plans already discussed / analysed by the Danish Government / Ministry of Transport. Consideration will also be given to any additional sources of sustainable funding and financing needed in the short-medium term for the infrastructure investments planned for the Greater Copenhagen area.

13.50  **Coffee break**

14.05  **4.6 Infrastructure contributions to “Green Growth”**

IFP – John White – will make a brief presentation of the project’s long-term scenarios

The hosts – Ute Stemmann – will make a short presentation on three pillars for green transport policy:

– investments in public transport (congestion, environmental impact...)
– research on the introduction of more green vehicles (incl. specific infrastructure needs)
– optimising interactions and combinations across the different transportation modes.

The discussions will explore the expected contributions to “CO₂ reduction” and “green growth” strategies. These will include the contributions that seem likely during infrastructure development stages as well the contributions likely to be made in the longer term, as a result of improved infrastructure operation and use.

15.00  **5. FINAL REMARKS**

15.30  **6. WORKSHOP CLOSE**