

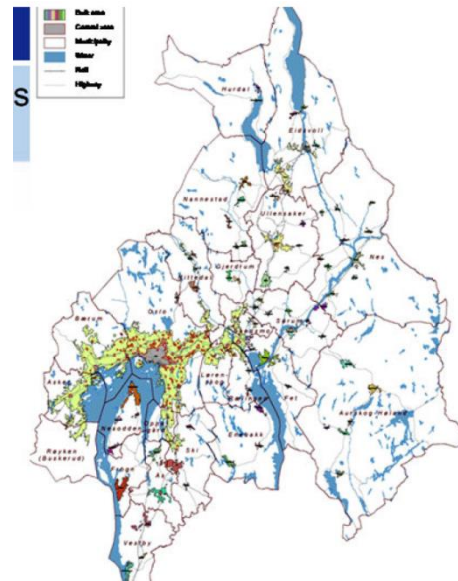
Meeting between ENC and Schleswig-Holstein 7th May 2015

Energy and climate in relation to transport challenges

Tom Granquist, Senior Adviser, Akershus County



The capital region is growing fast



- **Oslo & Akershus is one functional region – urban and rural**
- **Among Europe's fastest growing Capital regions**
1-2 % annual population growth
~ 1.2 mill. inhabitants → 1.5 mill. 2030-35(?)



Norway

Population 5,1 mill

Gross domestic product
per capita EU 190 %

Unemployment rate 3 %

Oslo + Akershus

Population 1,2 mill

2 counties

22 + 1 municipalities

8 pricezones

Funding 2015;

Ruter revenues 7,0
bn.

Ticket revenues 3,4
bn.

Public funding 2,4
bn.

Toll funding (O3) 0,7
bn.

All modes playing together



Bus

Metro

Tram

NSB

Train

Flytoget

Airport Express

Boat

140 mill
43 %

88 mill
27 %

51 mill
16 %

37 mill
11 %

7 mill
2 %

4,2 mill
1 %



56 % on rail, electric renewable energy

326 million travels in Oslo og Akershus in 2014

Ruter total	319 mill. +
3,4 %	
Oslo	220 mill. + 2,2 %

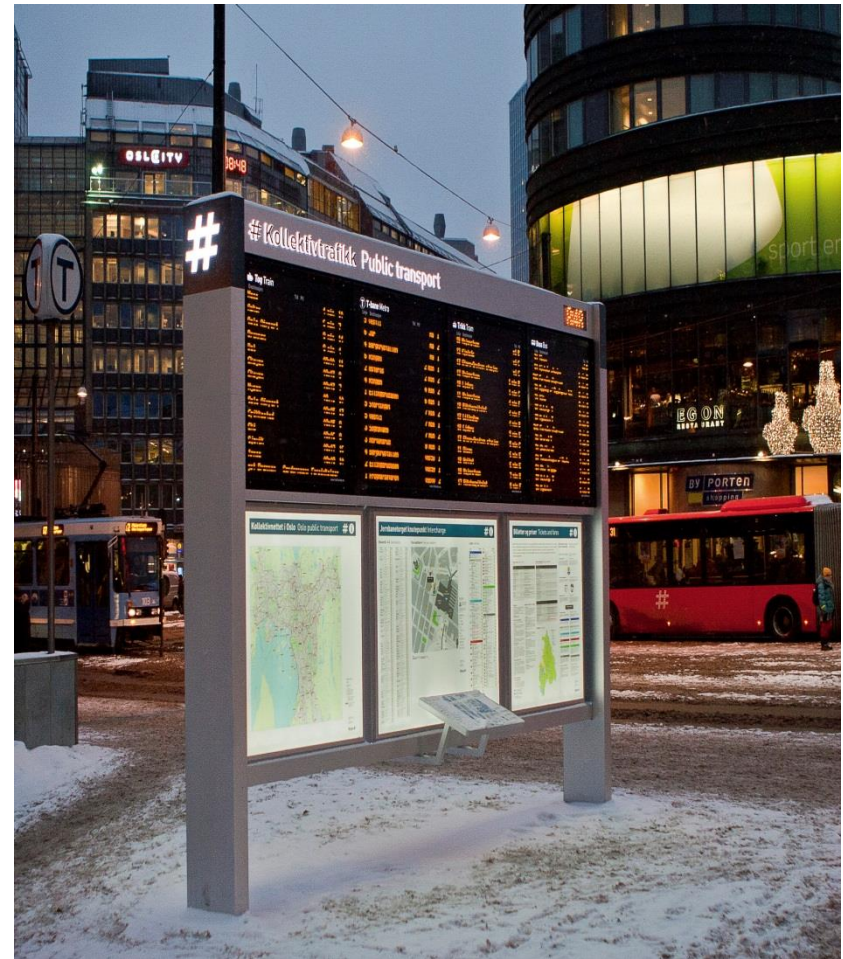


Our policy for fossil free transport

- **Overall goal: Down to ½ 1990 GHG emissions by 2030**
- **At least 20 % reduction from transport**, despite population growth
- Main focus on BE and FC transport, partly on biogas (public transport)
- **Partnership with the City of Oslo, on:**
 - GHG emissions
 - Land use planning
 - Transport policy in general
 - Fossil free transport and electro mobility
 - Fossil free public transport by 2020 (biodiesel, biogas, FC and BE)
 - Energy efficiency and transition

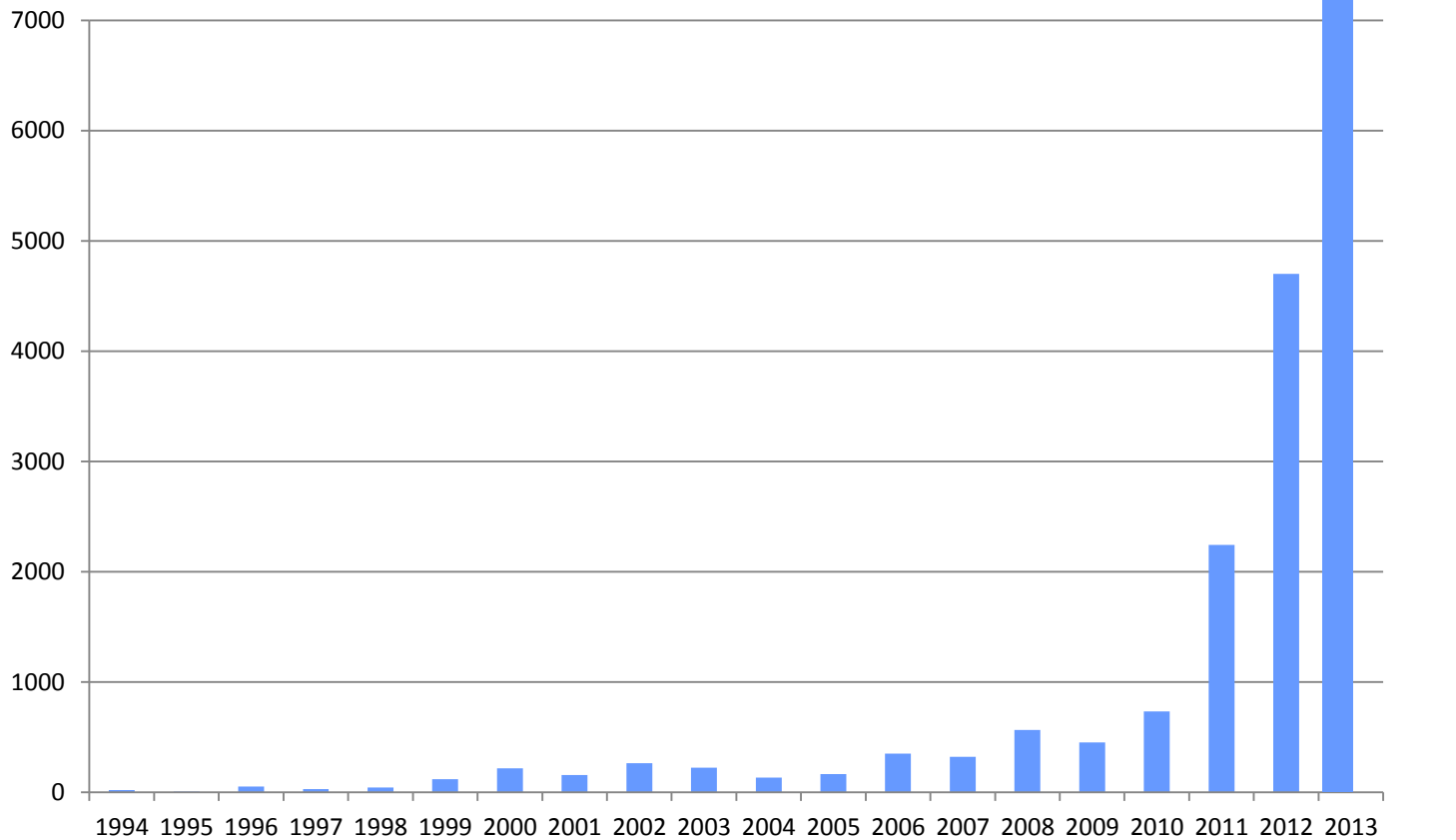
Development 2007–2014

- + 12 % population growth
- + 28 % public transport in Oslo
- + 48 % public transport in Akershus
- 0,25 % car traffic in Oslo
- + 6 % car traffic in Akershus
- + 25 % market share in Oslo
- + 50 % market share in Akershus

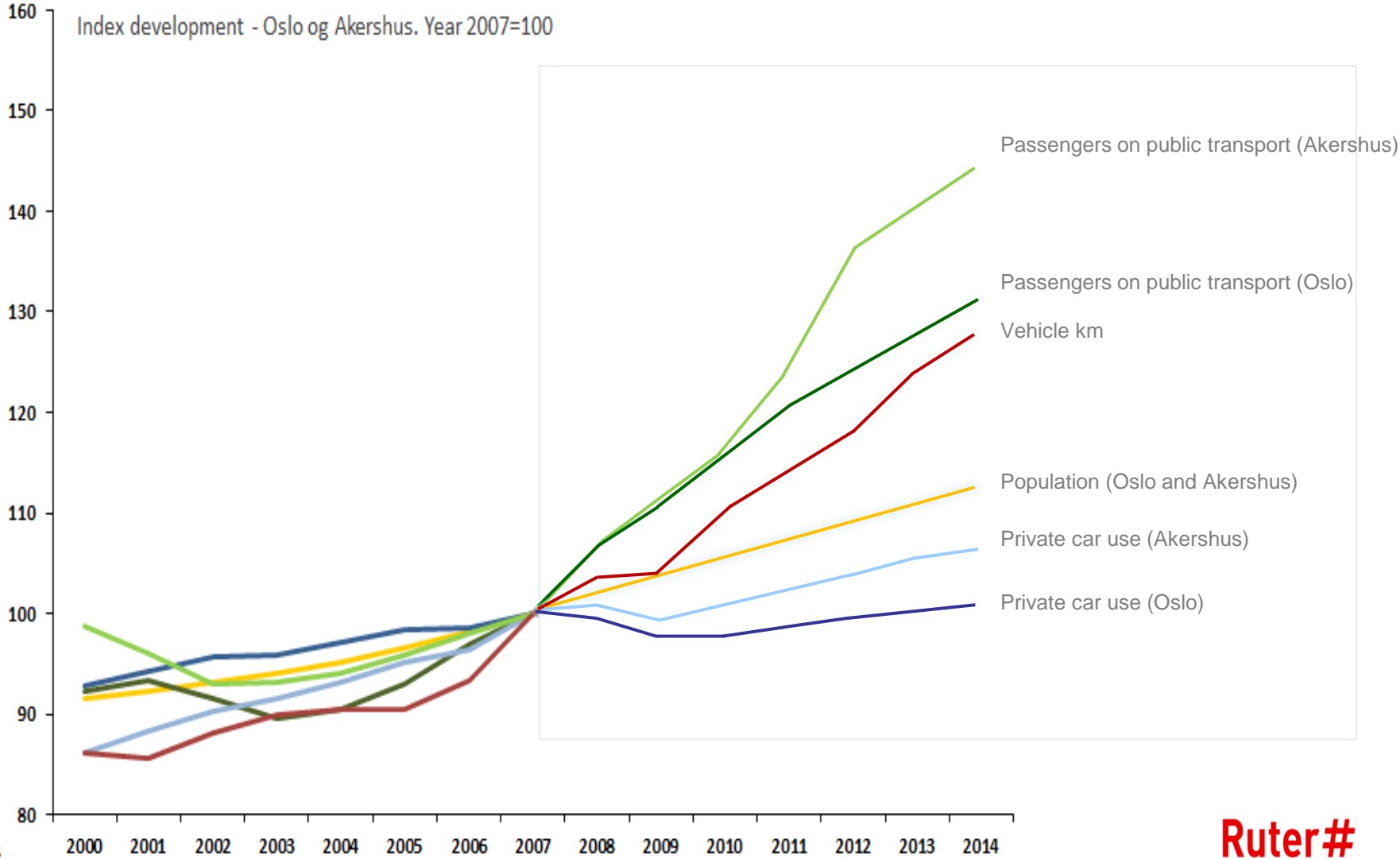


The World highest density of BEVs

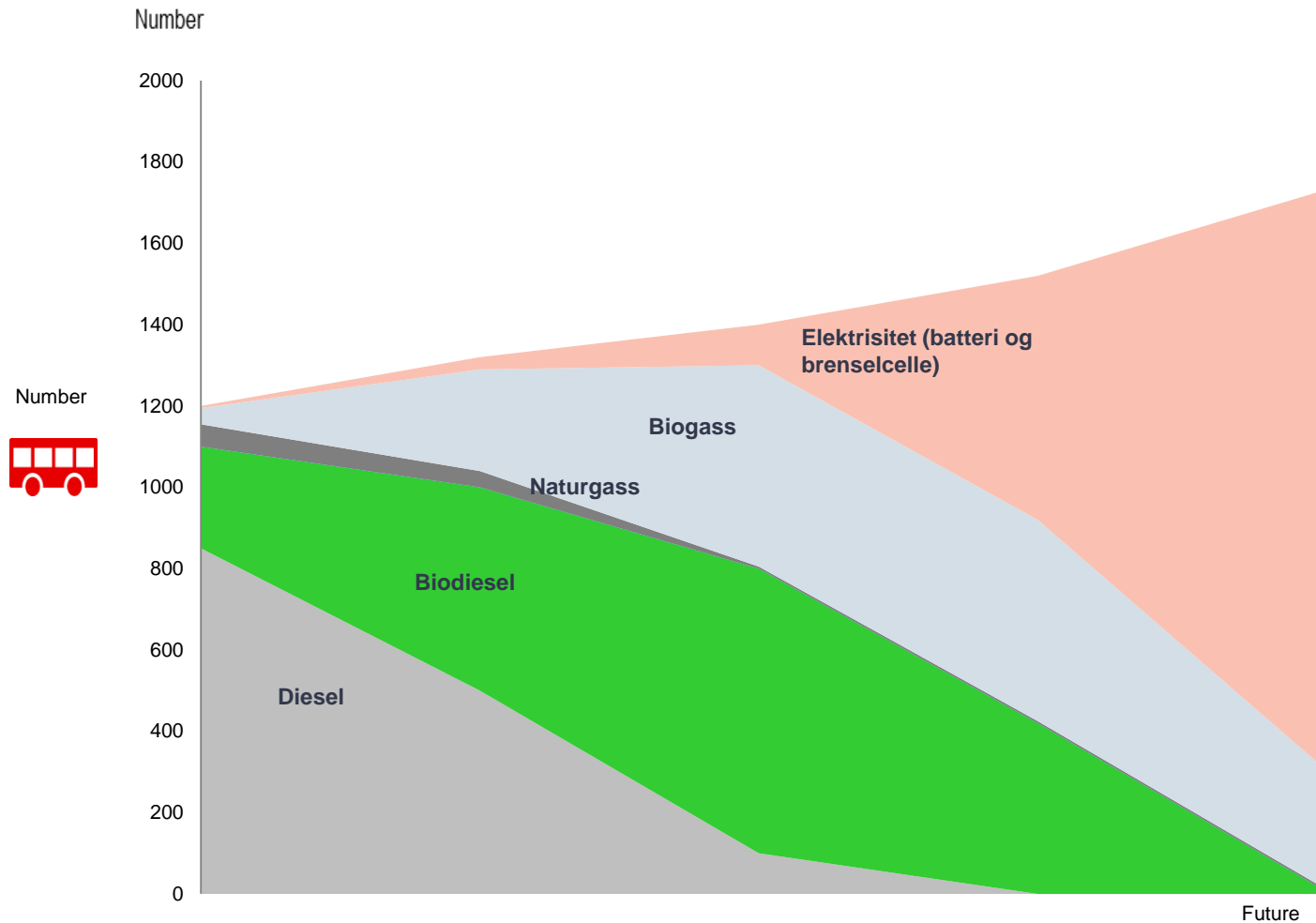
Annual registered EVs Norway



Public transport has increased its market share of motorised journeys compared to private car use



Environmental strategy – looking into the future



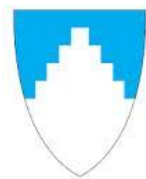
The region is well prepared for hydrogen

- **Good experience with FCEV-testing**
 - 3 years testing in the region has proved it is a robust technology
- **Infrastructure in place from 2015**
 - 5 years successful test period
 - 2 new, robust HRS at central locations in the region within 2015
- **Outstanding incentives for zero emission vehicles**
 - Major tax cuts make the cars cheap to purchase and run
 - Good accessibility: Free use of public transport lane, free parking places
- **Electro mobility introduction a great success**
 - Remarkable BEV-development the last 5 years
 - World highest density of BEVs in the Oslo Region today

Hydrogen Strategy 2014-2025

- prepared together with the City Government of Oslo

- 3 areas of priority
 - Maintain/strengthen the HRS network, good access to sufficient fuel**
 - Stimulating demands
 - Market communication; regulatory matters; int. cooperation
- 2 phases: 2014-18, 2019-25
- **HRS investments in S Norway: approx. € 125 mill. until 2025**
 - A self driven market before 2025
- **Separate strategy for Research & Economic Development**



AKERSHUS
County Council

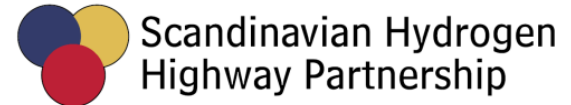


City of Oslo

Cooperation will be essential



Hydrogen Sweden



Status May 2014

SHHP Vision and status:

»SECURE SCANDINAVIA AS ONE AMONG THE FIRST REGIONS IN THE WORLD WHERE HYDROGEN CARS ARE MARKET INTRODUCED«



Now: 40 FCEVs, 5 buses



In operation (10)



Decided/Under construction (7)



Under consideration (15+)



Clean Energy Partnership Germany

X km

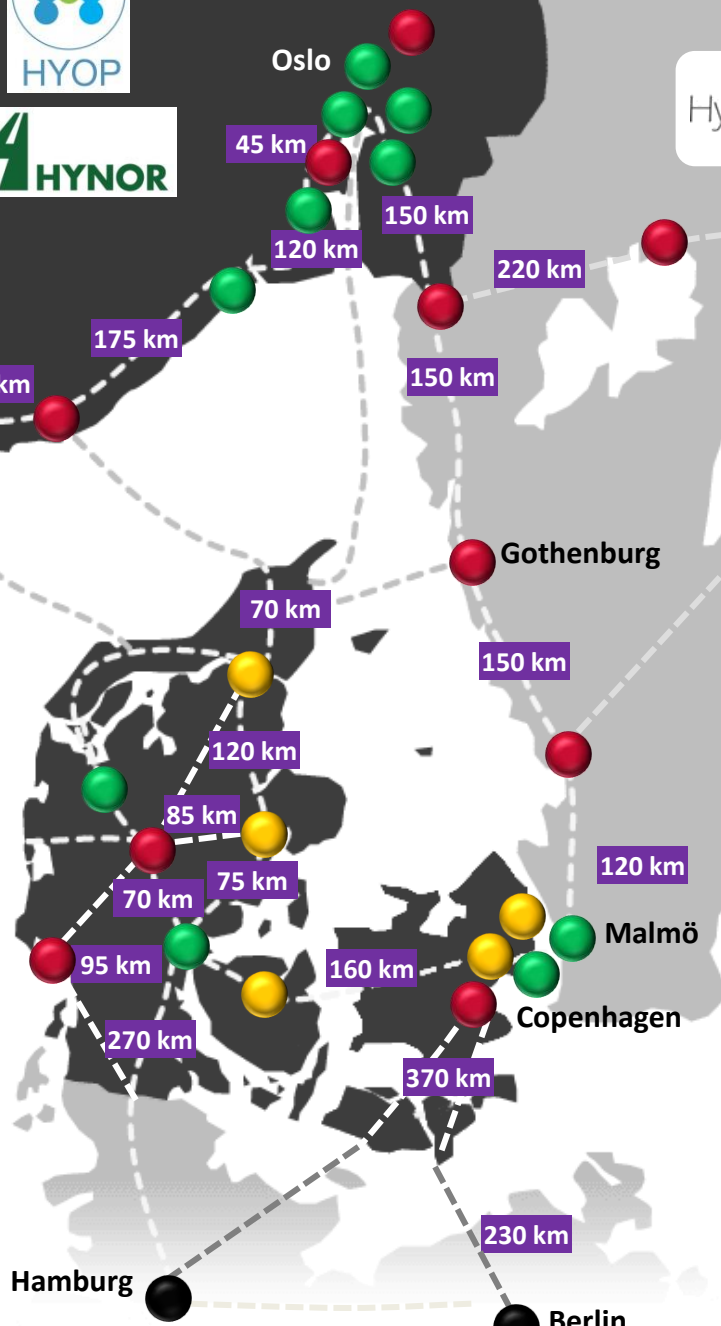
Road distance between stations



HYDROGEN LINK
www.hydrogenlink.net

Hamburg

Berlin



Road tolling in Oslo

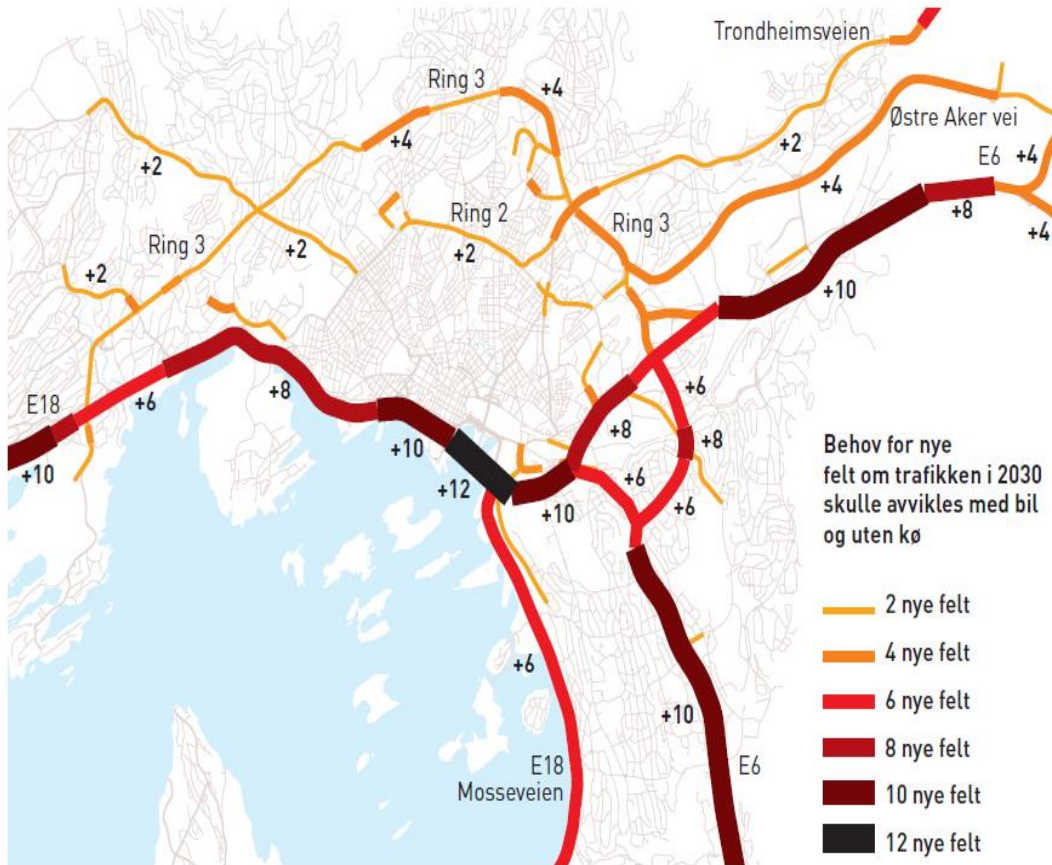
- **1990: Oslo Package 1**, 20% revenue allocated to PT infrastructure
- **2001: Oslo Package 2**: NOK 2,0 on tolls earmarked for PT infrastructure and NOK 0,75 on PT tickets earmarked for PT rolling stock
- **2008: Oslo Package 3**: An additional cordon line on the western border, a new toll charge structure and 60% of revenues earmarked to PT infrastructure, rolling stock and operations (2008-2030)



..... City border

===== Toll ring cordon line

The alternative is less smart!



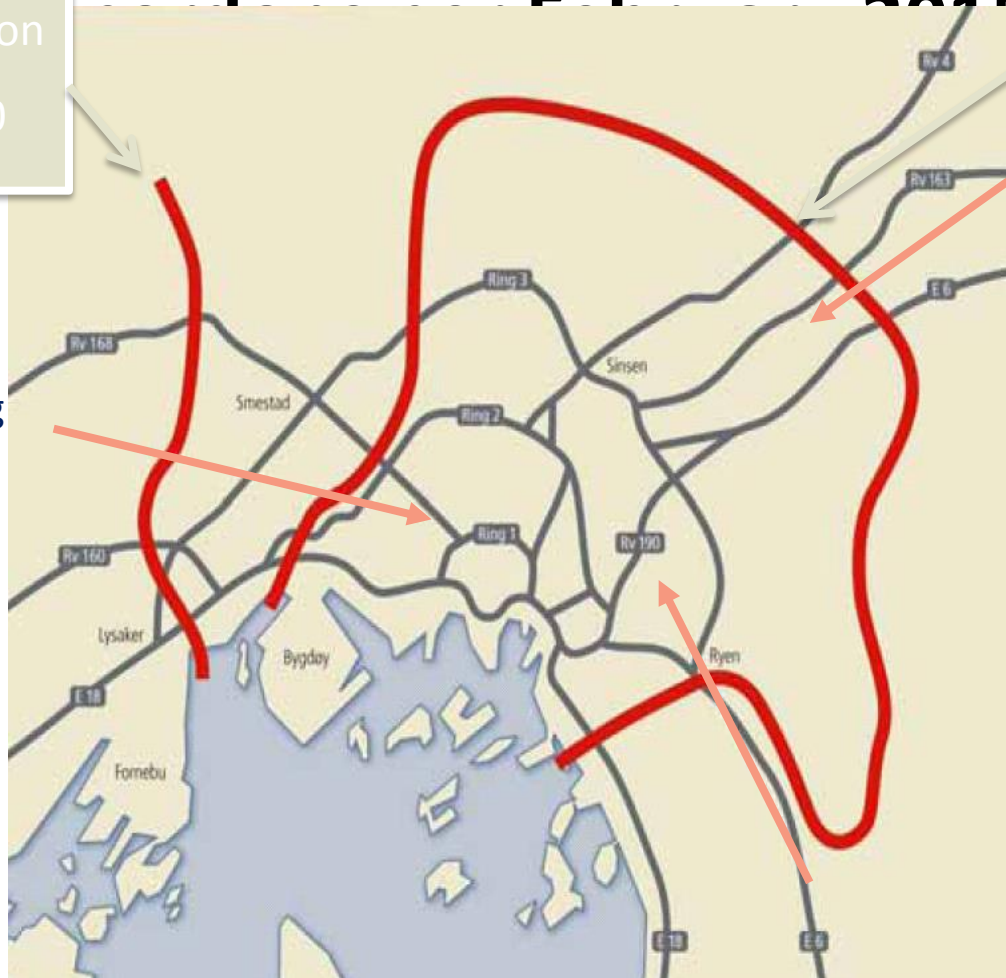
- Better use of available capacity in the transport network
- Return of investment in PT in Oslo and Akershus is 1,8
Source: Urbanet Analyse



Oslo package 3

Bærum toll cordon
Price NOK 15,50
or appr. 1,9 €

Motorists are charged only one direction - driving towards the inner city

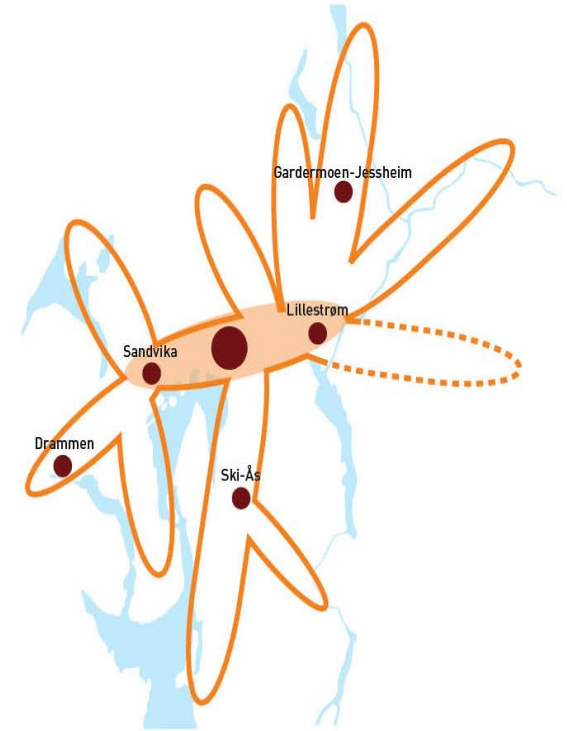
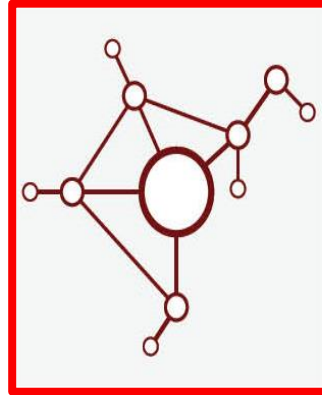
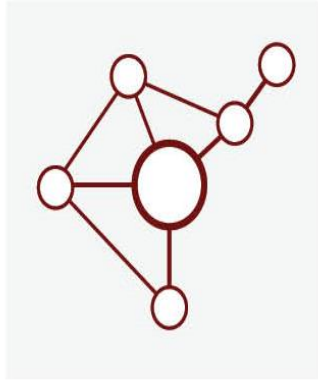
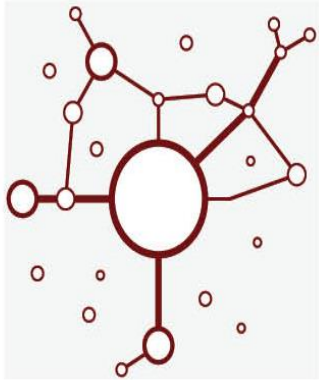


Oslo toll cordon
Price NOK 31 or
appr. 3,75 €

Same price 24/7
Heavy vehicle 3 times normal price
Free charging if:

- Electric vehicle
- Crossing same toll cordon within 1 hour
- Crossing more than 60 times/month

PT oriented land use is a must



Short term effect by 30 % population increase in the Oslo region

	Car use	PT
Densification	- 8 %	+ 12 %
Urban Sprawl	+ 3 %	- 19 %

Densification in a PT oriented pattern gives less car traffic, more public transport, better environment and lower costs.

Regional Land Use Secretariat is located in Ruter's (PTA) office

**New Skøyen Interchange
Train. Metro. Tram.
Regional Bus. City Bus**



Oslo Central Station and bus terminal



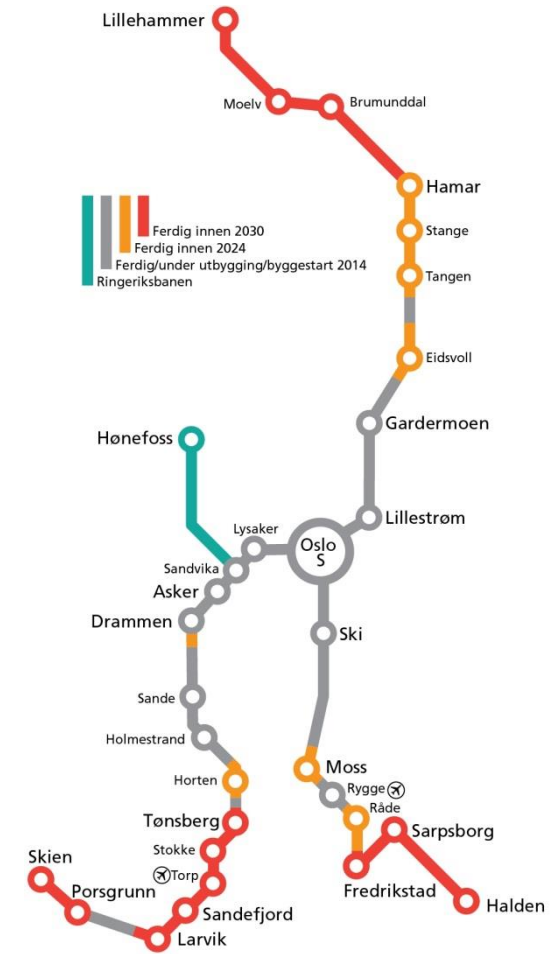
Eastern Norway – Oslo Region

- Eastern Norway consists of the eight counties of Akershus, Buskerud, Hedmark, Oppland, Oslo, Telemark, Vestfold and Östfold. These counties together make up 30 per cent of the land area of Norway and, with a total of about 2.5 million inhabitants, have just half of Norway's population. Eastern Norway is the national centre of gravity in terms of both population and commerce as well as being the commercial and educational centre in Norway
- The region is also the hub for all transportation activities - on road, rail, by air and by sea. The city of Oslo is the capital of Norway.
- From an international point of view, Eastern Norway is a small region, located in the outskirts of Europe. International competition is hard, and the competitive drawbacks confronting Eastern Norway are significant. Good infrastructure is important for the competitiveness of a region. The infrastructure of Eastern Norway is not satisfactory, neither nationally nor in an European perspective. In a Norwegian context however, Eastern Norway is a robust and attractive region.
- Most of the urban settlements in Eastern Norway are located in a triangle with corners in the towns of Lillehammer, Skien and Halden. Due to the railway system of Eastern Norway, this area is sometimes called "The Inter-City Triangle". The Greater Oslo, defined as Oslo and the urbanised part of the surrounding county Akershus, is the dominating centre of the region. The Greater Oslo area houses close to 1,3million inhabitants.



InterCity-Infrastructure project

- The Norwegian Parliament has approved the construction of one big infrastructure project linking the towns of Lillehammer, Hønefoss, Skien og Halden. Total costs is over 160 billion Nok/20 billion Euros
- The InterCity infrastructure is planned to be finished in 2027/2030.
- The Follotunnel between Oslo and Ski (20 km) is planned to be completed in 2021





Oslo-Gothenburg-Copenhagen transport corridor - Our way to Europe

- This transport corridor is the western leg of the “Nordic Triangle” The business relations between Oslo and Stockholm is very important, but the main gateway for Norway to Europe will always be the Oslo-Gothenburg-Copenhagen corridor.
- Gothenburg Harbour is Scandinavia`s biggest and most important harbour. This is an important harbour for Norway.
- The motorway E 6 and a railway (mostly single tracks) links up the harbours in Oslo,Gothenburg and Malmö/Copenhagen. A continuous double track railway with high capacity for both the freight rail traffic will improve the situation significantly for more freight transported by rail and sea in the corridor.
- Railway system in the corridor links up Oslo airport, Gothenburg airport and Copenhagen airport,,but the present system is too slow and is nor competitive compared to travelling by air or by road. A modern and efficient InterCity/HighSpeed system would alter this significantly by halving the journey times.



The Osloregion - an integrated area of a common Nordic region

- The Oslo and Akershus region is small in European context-1,3 million inhabitants. It is important for business development to have a close cooperation with the adjacent regions and countries.
- The transport corridor between Oslo-Stockholm-Copenhagen makes up the «Nordic Triangel» and the main aim here is to develop the regions and areas bordering this these corridors into an intergrated business and workingmarket region. It can be mentioned that to day there are over 500 Norwegian firms located in both the Stockholm and Gothenburg regions.
- The Western leg of the Nordic Triangel is also known as the COINCO corridor (The Corridor of Innovation and Cooperation) and has at present:
 - 29 universities and colleges - over 260000 students
 - 14000 research workers
 - 22 science parks/incubators



Why is the Oslo-Gothenburg-Copenhagen transport corridor so important ?

3 countries, 4 big town regions, 2 capitals.

Norway is a small country with regard to a population of 5 million. Hence, it is important for business development and industry to have a close cooperation with the adjacent regions and countries.. Scandinavia has a total population is 19.5 millions and 8 millions live in the Oslo-Gothenburg-Copenhagen corridor. In this corridor 1,3 million people live in the Oslo and Akershus region.

This transport corridor between Oslo-Gothenburg-Copenhagen is the western leg of the "Nordic Triangle" which connects the metropolitan areas between Oslo-Copenhagen and Stockholm. The business relations between Oslo and Stockholm is very important ,but the main gateway for Norway to Europe will always be the Oslo-Gothenburg-Copenhagen corridor. The Scandinavian Governments have recently declared to EU that this is the most important cross border infrastructure project that has to be improved in Scandinavia.

Gothenburg Harbour is Scandinavia`s biggest and most important harbour. This is also the most important harbour for Norway.The motorway E 6 and a railway (mostly single tracks) links up the harbours in Oslo,Gothenburg and Malmø/Copenhagen. A continuous double track railway with high capacity for both the freight and the passenger rail raffic will improve the situation significantly for more freight transported by rail and sea in the corridor.

Railway system in the corridor links up Oslo airport, Gothenbutg airport and Copenhagen airport,,but the present system is too slow and is nor competitive compared to travelling by air or by road. A modern and efficient InterCity/HighSpeed system would alter this significantly by halving the journey times.

Hvorfor er COINCO North korridoren viktig?

-3 land, 4 storbyregioner, 2 hovedsteder - dette er den skandinaviske 8 millionersbyen.

-Skandinavias tettest befolkede område. Av 19,3 millioner innbyggere bor 8 millioner i korridoren. Oslo-Gøteborg-København.

-Høyeste antall av studenter, forskere og kunnskapsintensive næringer.

-29 universiteter og høyskoler

-260 000 universitetsstudenter

-14 000 forskere

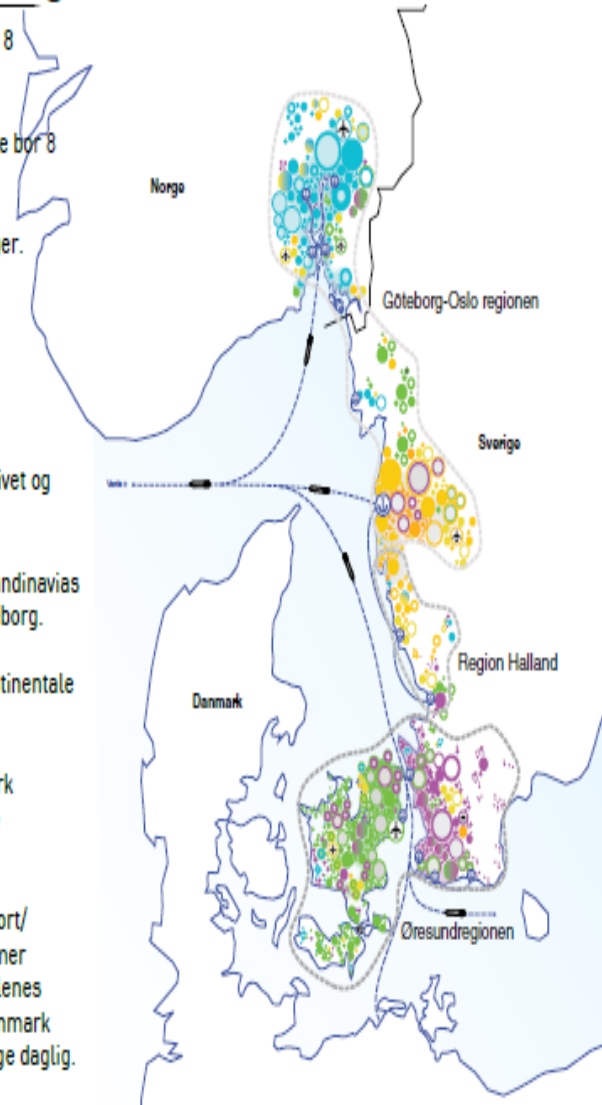
-22 vitenskapsparker/inkubatorer

-Lange transportavstander og stort etterslep spesielt når det gjelder investeringer på jernbane fører til konkurranseulempen for næringslivet og begrenser samhandlingsmulighetene.

-Gøteborg er Skandinavias største og viktigste havn. Over 50% av Skandinavias industrielle kapasitet er å finne innenfor en radius på 300km fra Gøteborg.

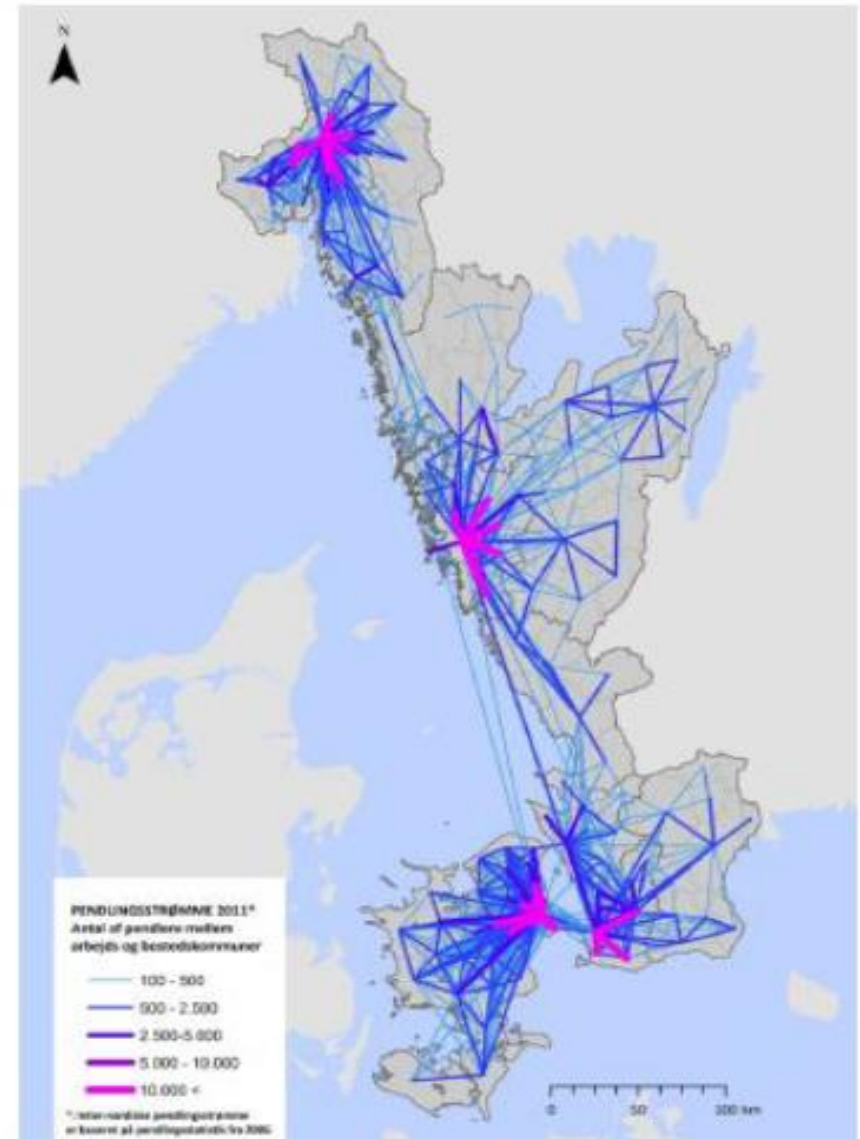
-Kastrup er Skandinavias største lufthavn med høyest antall interkontinentale forbindelser. Flyplassen er avgjørende for Skandinavias globale konkurransekraft og sentral også for svensk og norsk næringsliv. Flypassledelsen er positiv til et Skandinavisk høyhastighetstognettverk linket opp mot flyplassen og sier dette vil styrke deres internasjonale konkurransekraft.

-Oslo-Gøteborg-København er Norges viktigste godskorridor for import/eksport, men utgjør en stor miljøutfordring ettersom store godsvolumer fraktes på vei. Åpningen av Femern Bælt vil ytterligere styrke lastebilenes konkurransedyktighet og skape vekst i transittrafikken både for Danmark og Sverige. 2400 lastebiler passerer grensen mellom Norge og Sverige daglig. Jernbanens markedsandel for godstransport er bare 17%.



Commuting today

- **Urban concentration**
- **Cross border commuting limited**

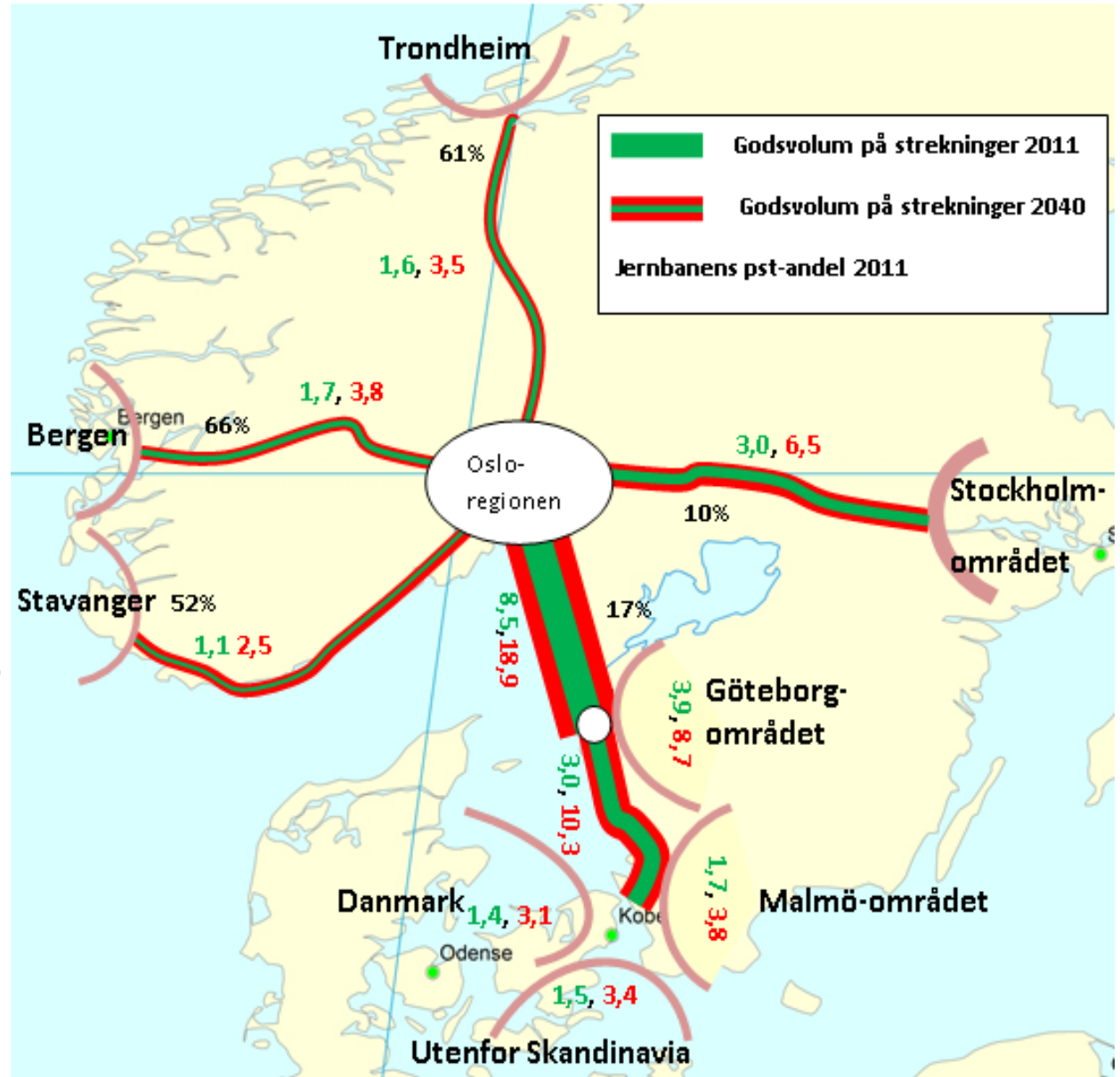


Commuting pattern in the corridor 2011

Future goods volumes by rail between Oslo–Göteborg–Copenhagen – The Continent

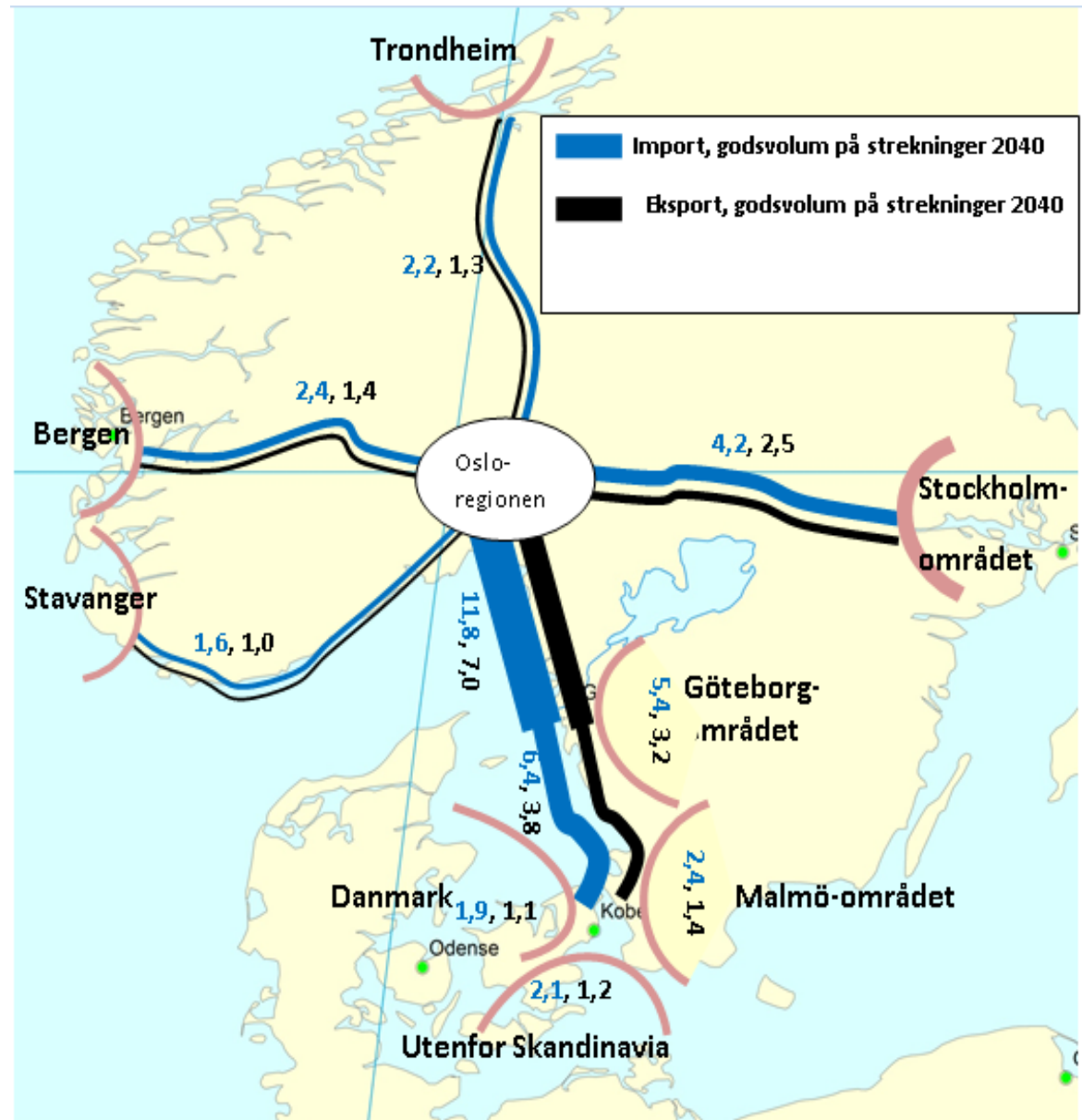
Freight volumes to/from Oslo (exclusive. ship). Cargo volumes in Mill.-tonn, 2011 og 2040.

Source: Analyse og Strategi og TØI



Future goods volumes By rail between Oslo– Gothenburg– Copenhagen The Continent

Import and export of freight
volumes to/from Oslo. Excl skip.
Freightvolumes in Mill.-tonn, 2040.

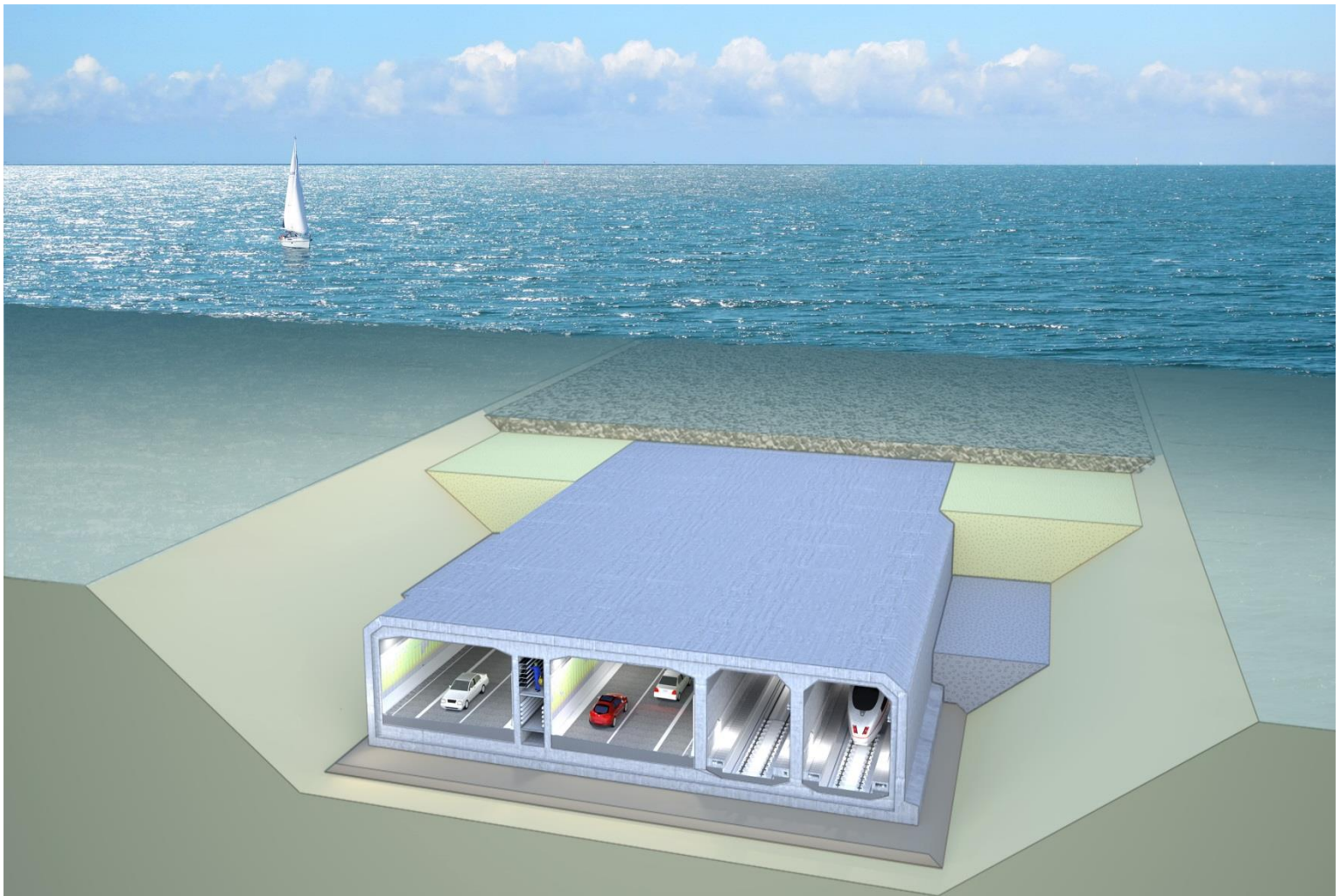


One truck per minute crosses the Norwegian / Swedish border in each direction



2021, opening of the Fehmarnbelt Fixed Link

2,5h travel time Copenhagen-Hamburg by high speed rail



The railwaystandard of today

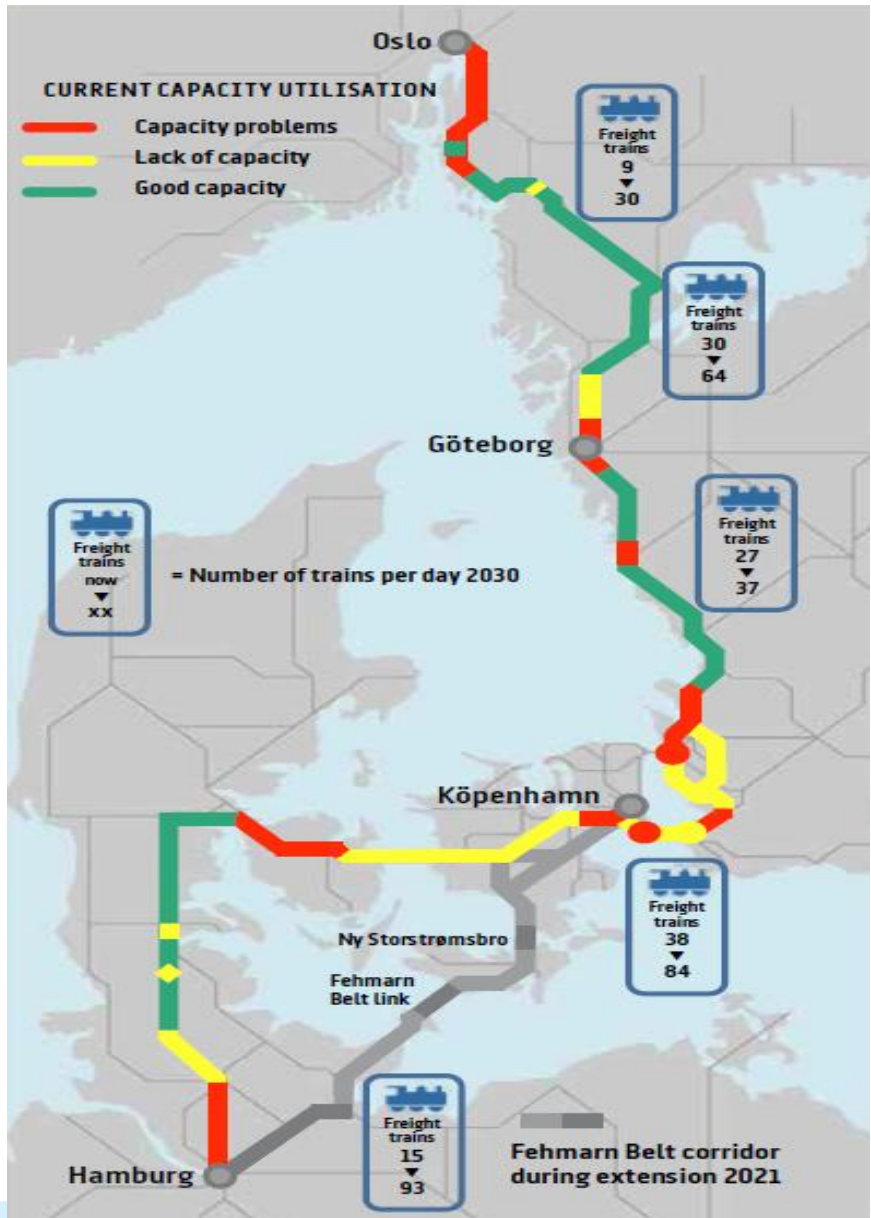
- a few missing links, many of them are planned to be built before 2030!
- Öxnered – Halden a cross border link with potential



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Akershus Fylkeskommune | Region Halland | Business Region Göteborg | Malmö stad | Göteborg stad | Region Skåne | Helsingborg stad | City of Oslo
Region Hovedstaden | Københavns Kommune | Østfold Fylkeskommune | Västra Götalandsregionen | Trafikverket

Current capacity utilization for the freight traffic by railways in the Oslo-Gothenburg-Copenhagen-Hamburg Corridor

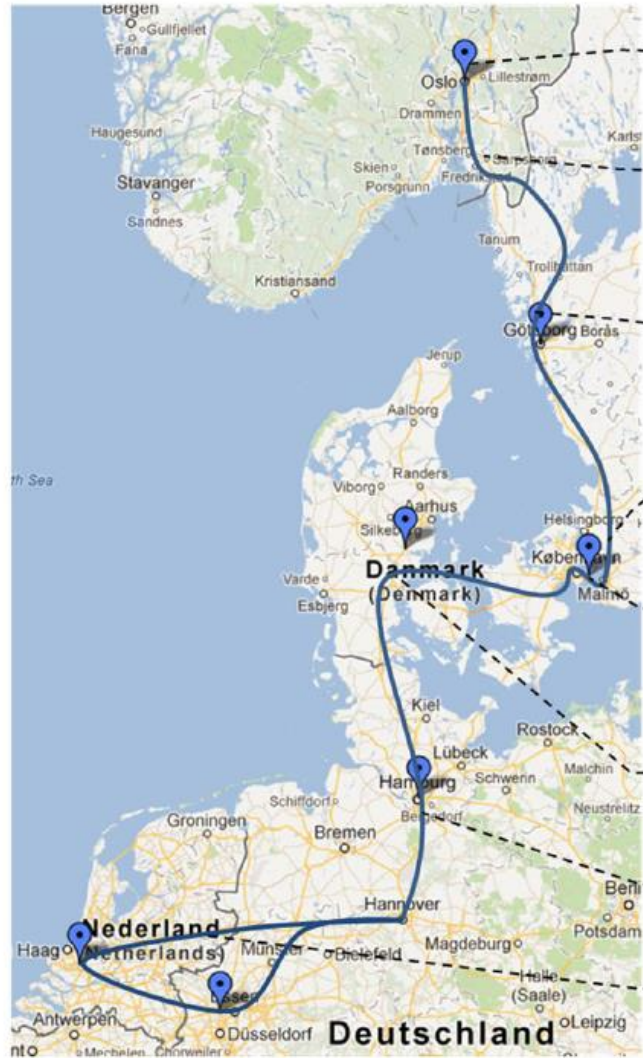


Power supply:
Norway, Sweden and Germany use similar systems. Denmark and the Netherlands use another system (except for Betuweroute, that has the same system as SE, NO and DE.)

Signaling system:
More than 20 different signaling systems are used in Europe. SE and NO uses similar systems.

Maximum length of trains:
Varies from 580 meter in NO to 835 between Kolding and Padborg in DK.

Bottlenecks in the Railway network Between Oslo and Rotterdam



Oslo-Ski: high capacity utilization

Sandbukta - Halden – Öxnered: high capacity utilization/Single track

Gothenburg: intersecting traffic/ high capacity utilization

Skania: Single tracks/ limited possibilities for overtakings/ expected increase in traffic

The Öresund bridge: high capacity utilization
Kastrup: capacity deficit

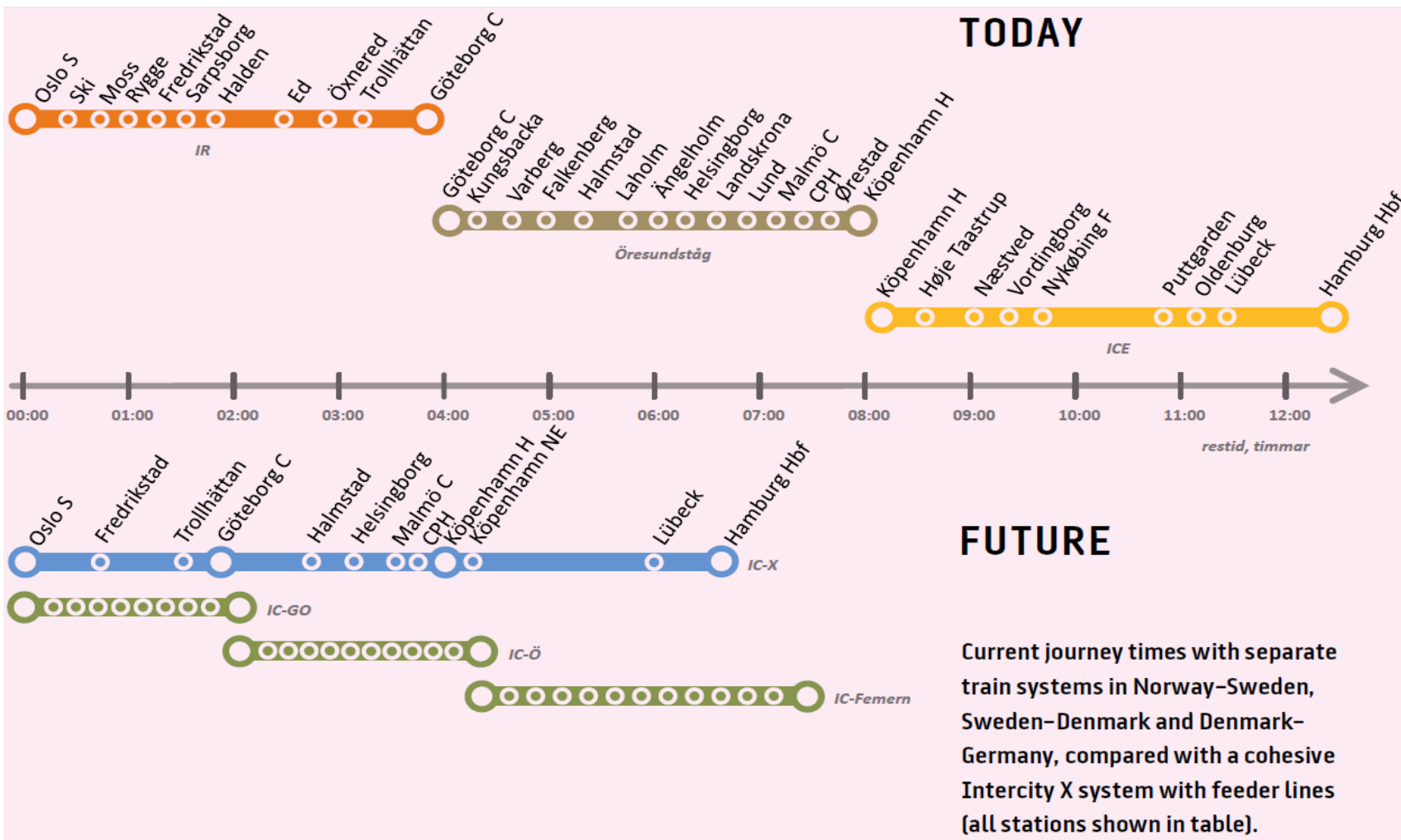
Copenhagen – Padborg: low speed railway due to single track stretches and varying power supply systems

Hamburg: Insufficient capacity

Betuweroute: Low capacity utilization due to lack of sufficient infrastructure in Germany

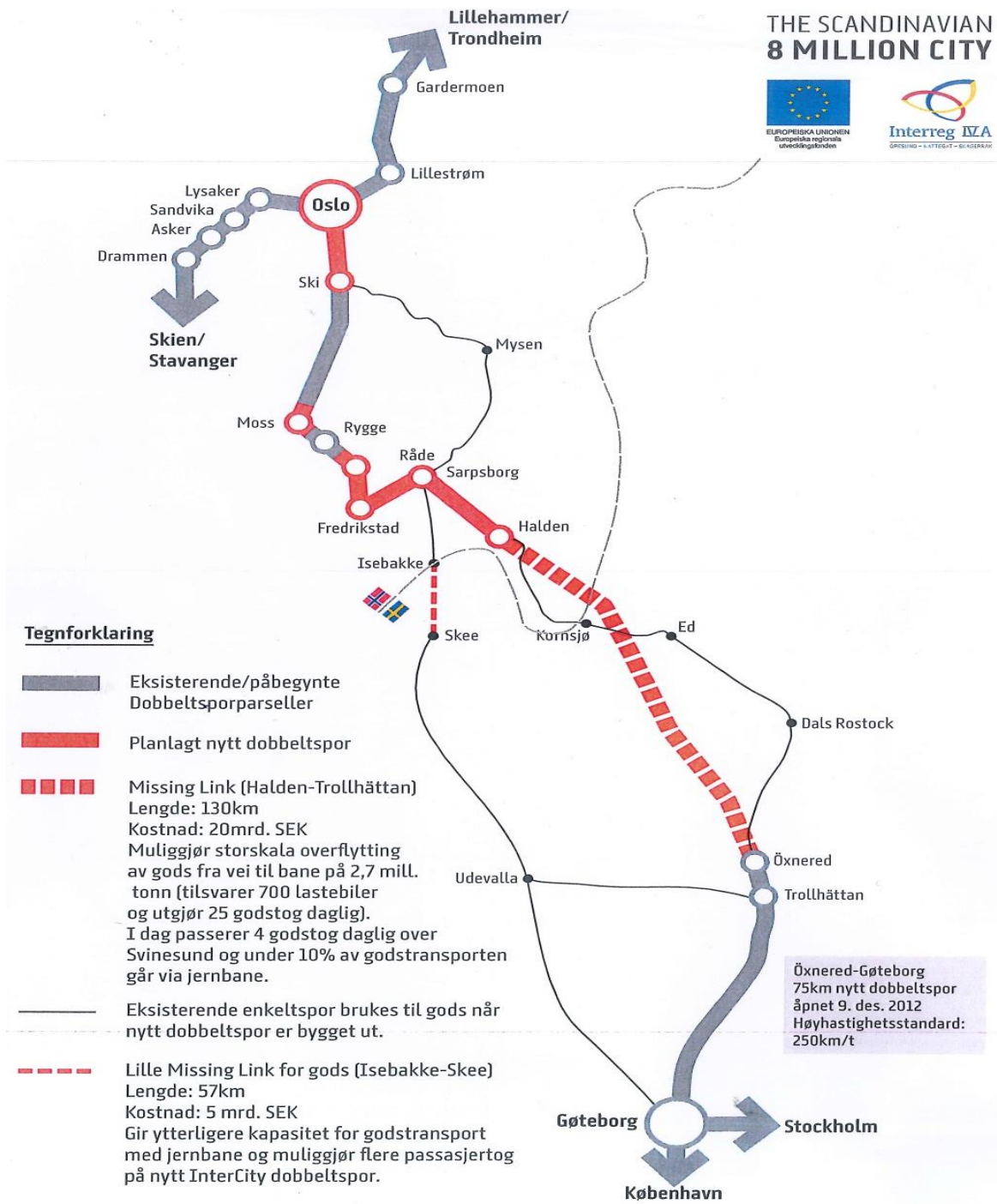
A possible new train system between Oslo-Gothenburg-Copenhagen-Hamburg for passenger journeys– A significant reduction in journey times

- With double-tracking of the Oslo-Copenhagen line with 250 km/h, the present journey time InterCity X system by train can be halved by the introduction of the InterCityX system.
- It is important that infrastructure expansion is coordinated between the countries, with regard to both timescale and technical standard.



Missing Link-A new railway track between Halden in Norway and Öxnered/Trollättan in Sweden

THE SCANDINAVIAN 8 MILLION CITY



Keys to symbols

Existing Railway tracks..Doble track sections

Planned new double track

Missing Link Halden-Trollhättan)

Length:130 km.Cost:20 billion SEK. Makes it possible to shift freight from road to rail of 2,7 mill. tonn.(ie. reduction of 700 lorries to 25 daily freight trains). 4 freight trains passing the border which is less than 10% of the freight tonnage in this corridor.

Existing railway tracks that can be used for freight transport

Little Missing Linkfor freight(Isebakke-Skee). Lenght=57 km, Cost= 5 Billion SEK. Makes it possible for additional freight trains and higher frequency of passenger trains on the new InterCity track

Tegnforklaring

- Eksisterende/påbegynte Dobbeltsporparceller
- Planlagt nytt dobbeltspor
- Missing Link (Halden-Trollhättan)
Lengde: 130km
Kostnad: 20mrd. SEK
Muliggjør storskala overflytting av gods fra vei til bane på 2,7 mill. tonn (tilsvarer 700 lastebiler og utgjør 25 godstog daglig). I dag passerer 4 godstog daglig over Svinesund og under 10% av godstransporten går via jernbane.
- Eksisterende enkeltspor brukes til gods når nytt dobbeltspor er bygget ut.
- Lille Missing Link for gods (Isebakke-Skee)
Lengde: 57km
Kostnad: 5 mrd. SEK
Gir ytterligere kapasitet for godstransport med jernbane og muliggjør flere passasjertog på nytt InterCity dobbeltspor.

Öxnered-Göteborg
75km nytt dobbeltspor åpnet 9. des. 2012
Høyhastighetsstandard: 250km/t

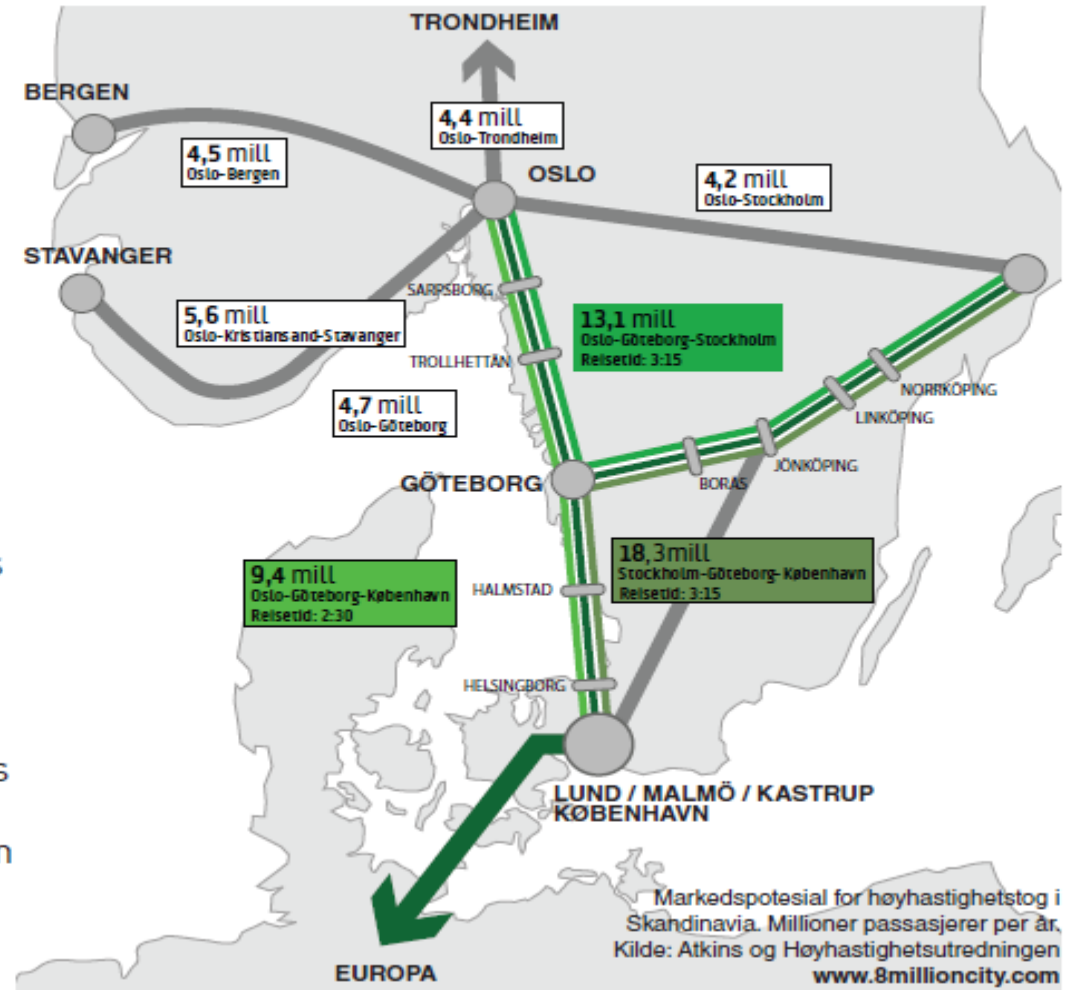
Oslo kommunes innspill til NTP:

-InterCity-benet til Halden må bygges ut i sin helhet da det er første strekning av en grønn transportkorridor til Europa både for passasjerer og gods.

-Oslo`s største miljøutfordring er vegtransporten. 2300 lastebiler passerer Svinesund daglig. For å flytte gods fra vei til bane må "the Missing Link", dobbeltspor mellom Halden og Trollhättan bygges ut. Norge må ta initiativ til å få på plass et norsk-svensk plansamarbeid etter modell fra Svinesundsforbindelsen. Dersom flere kontainere ankommer Norge på tog, fraktes de også videre til Bergen og Trondheim på tog. Det gir miljøgevinster for hele landet.

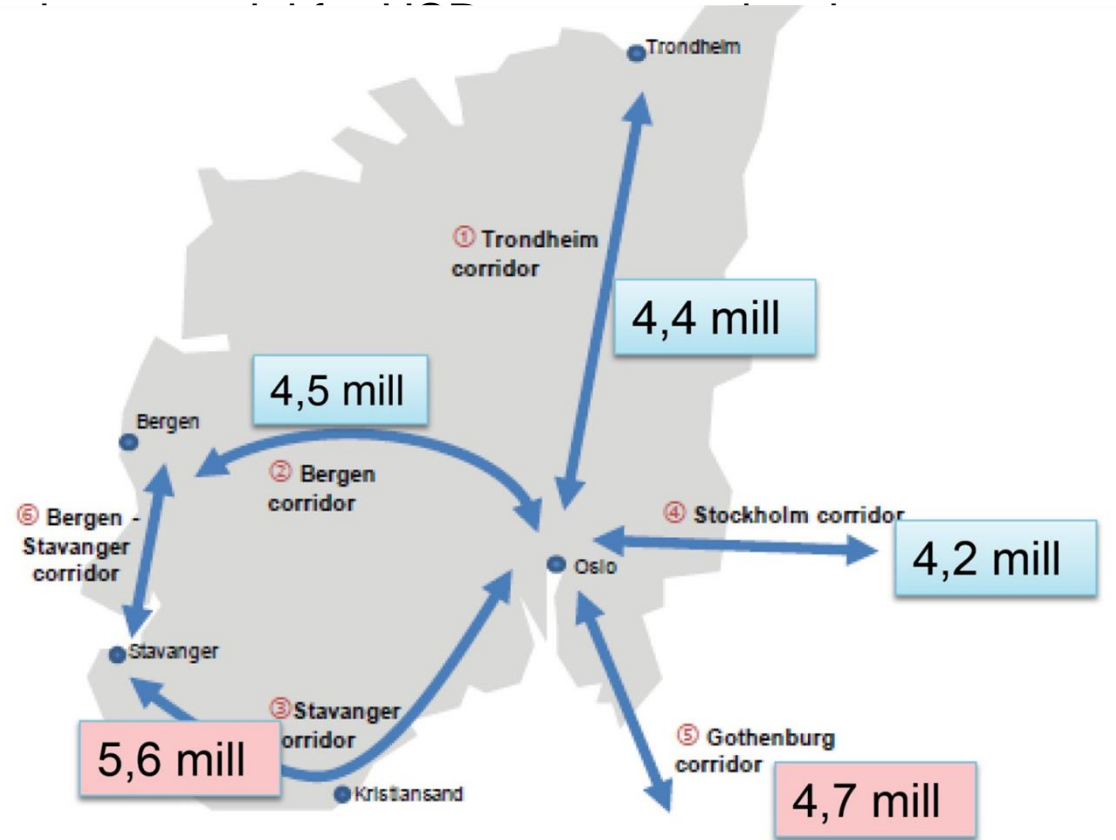
-Bygges InterCity-triangelet for 250km/t og stasjonene med forbikjøringsspor reduseres reisetiden også til Bergen og Trondheim, og vi er i gang med å bygge høyhastighetsbanen til Europa.

www.8millioncity.com



National high-speed rail study in Sweden and Norway

The cross border m



Policy resolution from Akershus County 8th Desember 2014.

«The border crossing railway track between Halden and Trollhättan is very important for both the freight and passenger traffic. The InterCity building of a continuous double railway track between Oslo to Halden is to be completed in 2030 according to the construction programme . It must hence be a goal that a new crossborder double railway track from Halden to Trollhättan also should be completed in 2030. It is first at this point in time that the railway connection between Oslo and Gothenburg will appear as a modern and efficient railtransport network of high quality and will contribute to considerable benefits to both the population and industry in Norway and Sweden».

Vedtaket på norsk:

«For Norge er den grensekryssende strekningen mellom Halden og Trollhättan svært viktig både for gods- og passasjertrafikken. Det er lagt opp til at Intercity utbyggingen med dobbeltspor fra Oslo til Halden skal slutføres i 2030. Det bør derfor være et mål at videreføringen med utbygging av et sammenhengende dobbeltspor fram til Trollhättan på svensk side, også ferdigstilles i 2030. Hele jernbanestrekningen Oslo -Gøteborg vil da framstå som et moderne og framtidsrettet jernbanenett av høy kvalitet og vil innebære betydelige fordeler både for befolkning og næringsliv i Norge og Sverige».