

"The Oslo Case Study" Final Report

An analysis of the potential of new multimodal freight services for transport of goods by rail and sea between Greater Oslo and the rest of the Scandria Corridor (Gothenburg - Copenhagen/Southern Sweden - Northern Germany/Poland) 2017

Interreg Baltic Sea Region Project #R032

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- How the output shall be used by the target group?

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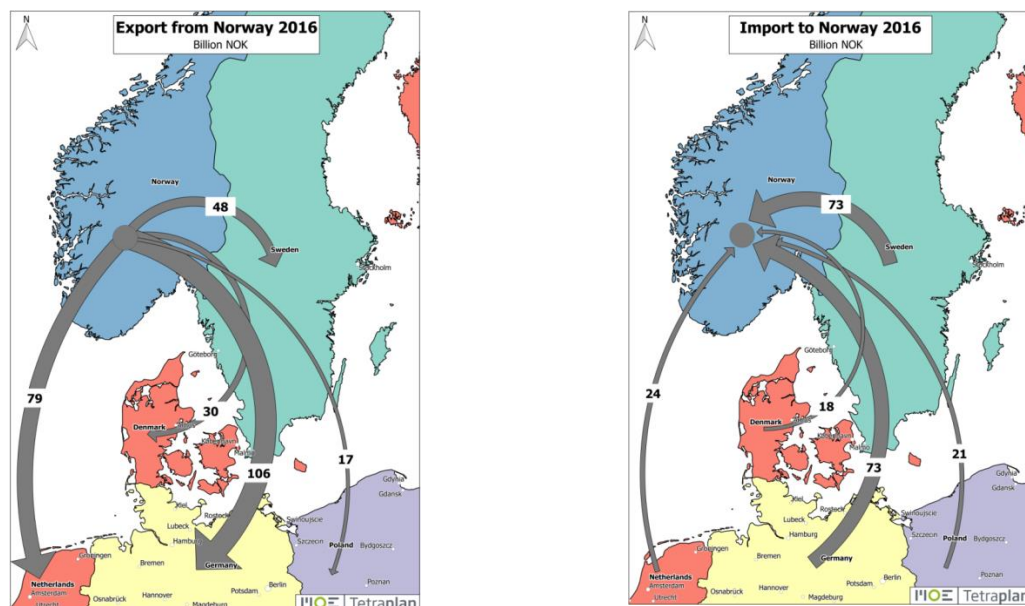
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1 Summary

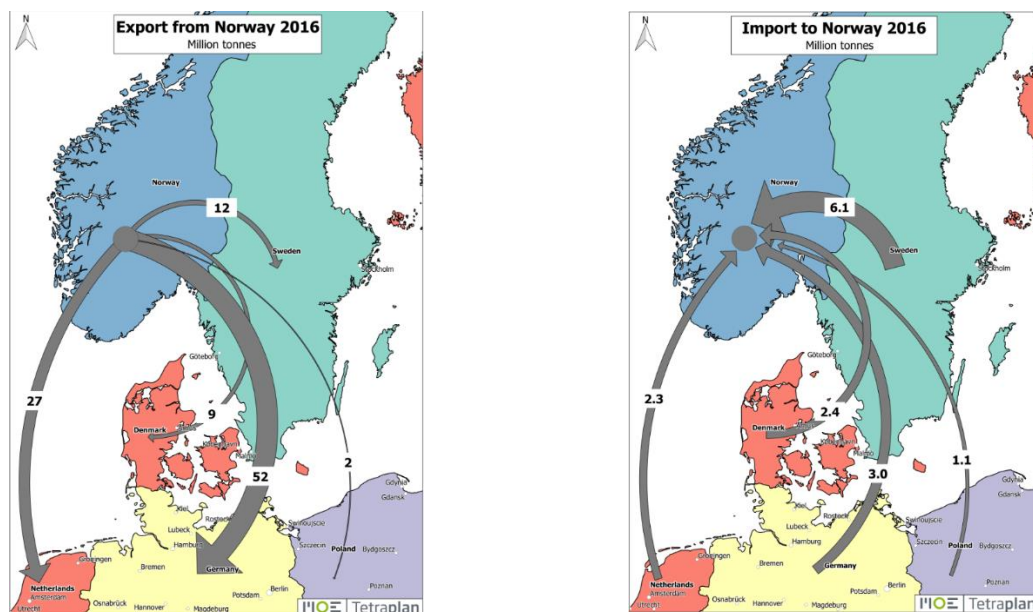
The total import and export has the following split on the most important countries in this study:

Figure 1 Norwegian gross export and import in 2016 related to the main countries included in the report, measured in billion NOK. (incl. oil and gas)



Source: SSB table 00809

Figure 2 Norwegian gross export and import in 2016 related to the main countries included in the report, measured in million tonnes. (incl. oil and gas)

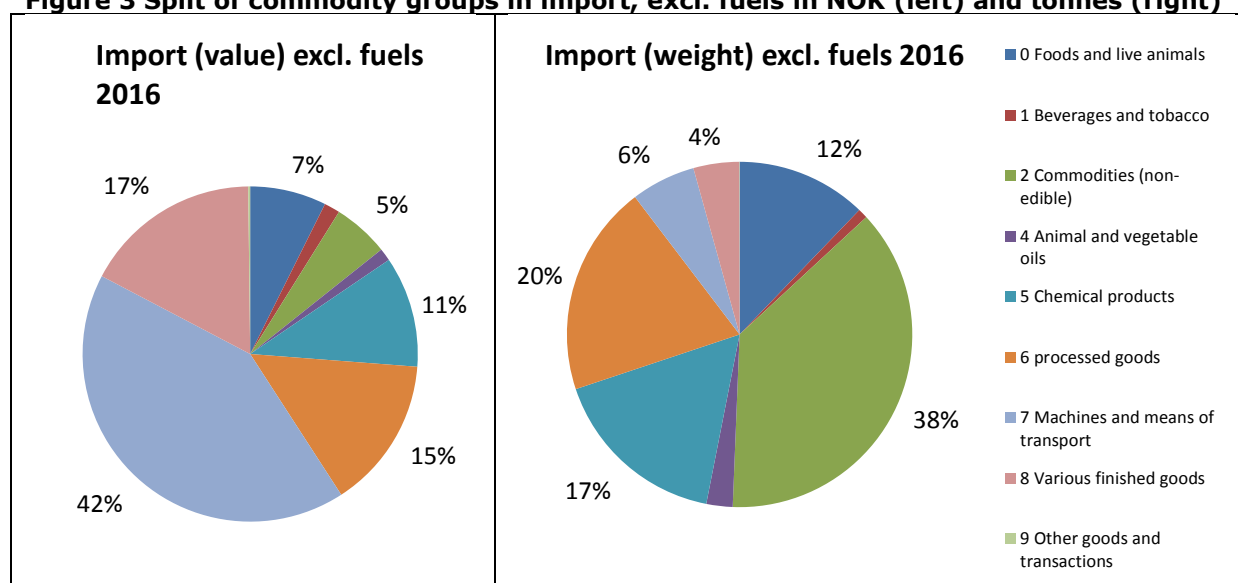


Source: SSB table 00809

As the export of oil and gas is so large and cannot be shifted from road to rail or sea, the commodity group 3 fuels¹ (oil and gas) has been excluded in the analysis. The whole analysis is based on data for 2016 and further details regarding the most important commodity groups etc. can be found in the following chapters of the report.

The commodity groups in the Norwegian import have the following split for value and weight:

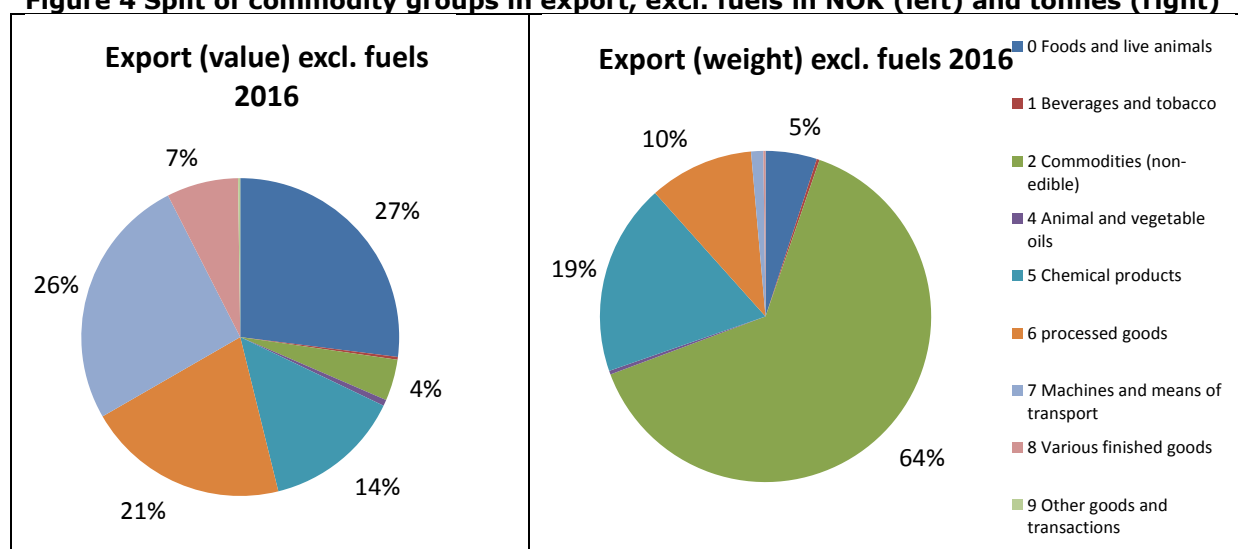
Figure 3 Split of commodity groups in import, excl. fuels in NOK (left) and tonnes (right)



Source: SSB, table 08809

The commodity groups in the Norwegian export (excl. fuels) have the following split, as regards value and weight:

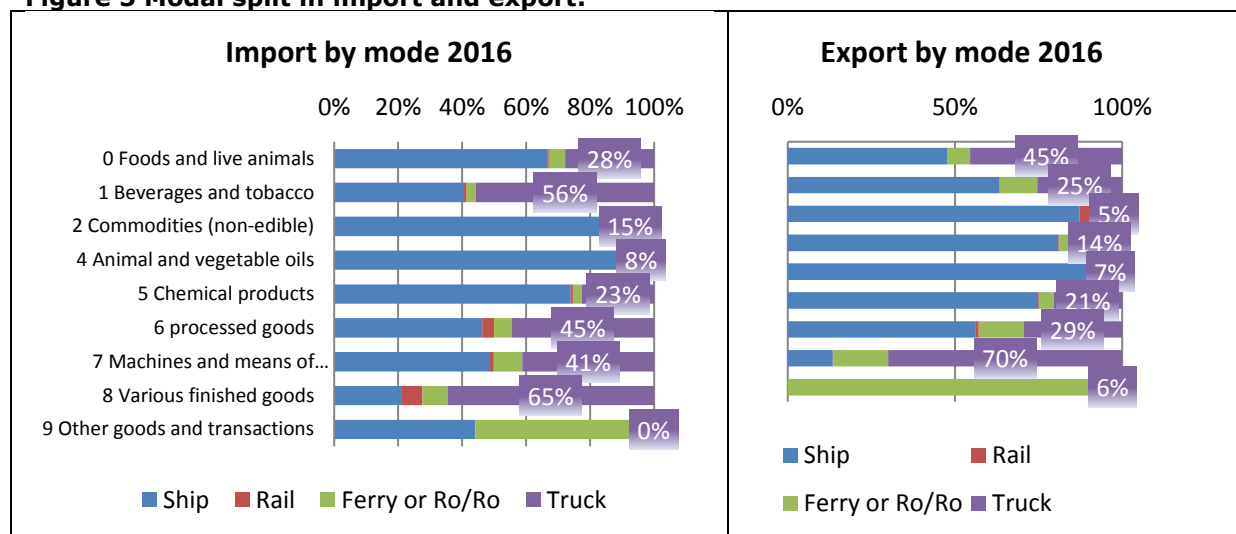
Figure 4 Split of commodity groups in export, excl. fuels in NOK (left) and tonnes (right)



Source: SSB, table 08809

¹ SITC 3 - Mineral fuels, lubricants and related materials, short: fuels, includes the following subgroups; 32 - Coal, coke and briquettes; 33 - Petroleum, petroleum products and related materials; 34 - Gas, natural and manufactured; and 35 - Electric current

Figure 5 Modal split in import and export:

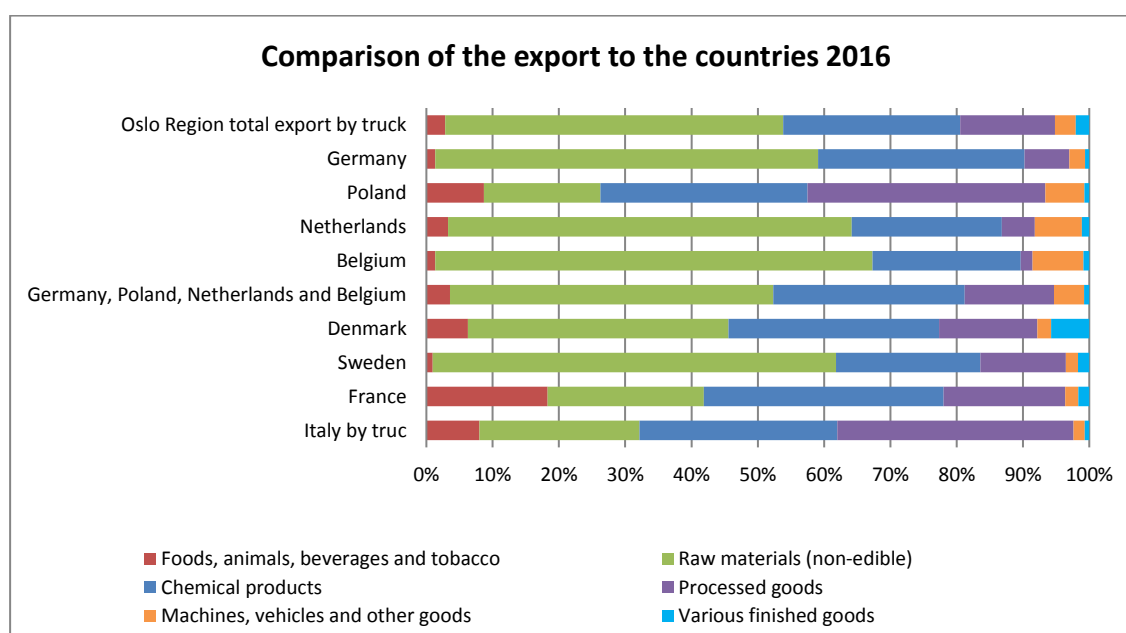


Source: SSB, table 08812

1.1 Oslo Region export

When comparing the regions export by truck to the relevant countries there are differences. "Raw materials" are generally has the largest share of the volume and "Chemical products" as the second largest. For Poland, France and Italy "Foods, animals, beverages and tobacco" play a relative bigger role compared to the other countries. "Processed goods" are relatively large in the export to Poland and Italy. In the export to Netherlands and Belgium "Machines, vehicles and other goods" play a relatively larger role.

Figure 6 Comparison of the export to the countries



Source: SSB data on regional export and own estimations

The data on the exports from the Oslo Region provides a picture of the export and points to commodity groups which can have potential for being transferred to greener transport. On the other hand the data for both the export and especially the import are limited. We calculated the volumes in weights based on national statistic, our insight into the transport modes used and destinations are limited and it's not possible to get the data on SITC 2 level to look further into the commodity groups and see where the real potentials are.

1.2 Countries as hub (non-direct transports)

When looking into the data regarding country of departure being different from country of origin, a first look at the use of different hubs can be assumed.

According to the Trafikverket Survey in Western ports and ports in Blekinge², the share of transport that are between terminals, or at least has a terminal as departure or arrival point is between 20 and 30%. Therefore it can be assumed that some 25% are transports via hubs.

According to the statistics some 310,000 tonnes from other countries are using Germany, Poland, Italy, France, Belgium and Netherlands as hubs in the import by road to Norway. For Sweden and Denmark some 700,000 tonnes from other countries are using Denmark and Sweden as hub in the Norwegian import by road.

1.3 "Direct transport"

There are almost 800,000 tonnes in direct transport in the Norwegian import from Germany and Poland, and further potential when also including the other mentioned countries on the European Continent. Therefore there should be sufficient potential for new offers of greener transport services.

Table 1 Import by truck 2016, same country of origin and country of departure

Import by truck 2016, same country of origin and country of departure									
Tonnes	Belgium	Denmark	France	Italy	Netherlands	Poland	Sweden	Germany	Sum 8 countries
Sum	76.708	549.014	116.229	206.379	152.437	344.217	3.626.294	454.370	5.525.648
Share	1%	10%	2%	4%	3%	6%	66%	8%	100%

Source: SSB, table 06320

The direct transports in import from Denmark and Sweden most probably use other routes than the route that the potential new service that the feasibility study will look into.

1.4 Germany and Poland

The table below shows the total volume by road in import and export on Poland and Germany, as well as the volumes where the countries are hubs for other countries and the volume of "direct

² The analysis covers the following ports: Strömstad, Gothenburg, Varberg, Halmstad, Karlshamn and Karlskrona, and is also a part of Scandria2Act. The analysis, dated 2017-04-04 is based on interviews and observations.

transport". Further we have put in our estimations as regards the export volume by road from the Oslo Region, based on own assumptions and calculations.

Table 2 Road volume on Germany and Poland

Tonnes	Germany			Poland		
	Import to Norway	Share of total	Export from Norway	Import to Norway	Share of total	Export from Norway
Total Norway by road	565.714		342.742	422.649		377.697
hub for other countries	102.502	18%		10.533	2%	
"direct transport"	454.370	80%		344.217	81%	
Calculated for Oslo Region			124.379			66.079
Share of total export			36%			17%

Source: SSB Table 08812, 08809, 10482 and own estimations

1.5 Conclusions

When looking at the volumes of road transport between the Continent and Norway and especially the Oslo Region there is more than sufficient volume at hand for a new ferry/ RoRo or a rail service. A new service to the Oslo Region could also be used for other areas in Norway by intermodal connections by rail etc. But, there are many other factors that are part of the decisions regarding modal choice. Price is the most important, but also service level, delivery conditions, regularity, transport time etc. The Norwegian shippers and receivers are not always in charge of choosing how their transports are done, as it could be decided by the sender or by a forwarding agent. And sometimes they actually are not even aware of that there are interesting, greener choices available, as the truck is so easy to order and handle.

The ports that would be most interesting for a new ferry or RoRo service are the ports that already today have large ferry traffic between Scandinavia and the Continent, as this would only add to the existing activities and many of the hauliers and forwarders already use these ports. On German side, this would mean the port of Lübeck or Rostock with excellent hinterland connections. In Poland Swinoujscie would be a very good port. Maybe also Gdynia, although that would mean longer transport times for a ferry Gdynia-Oslo, compared to Swinoujscie-Oslo.

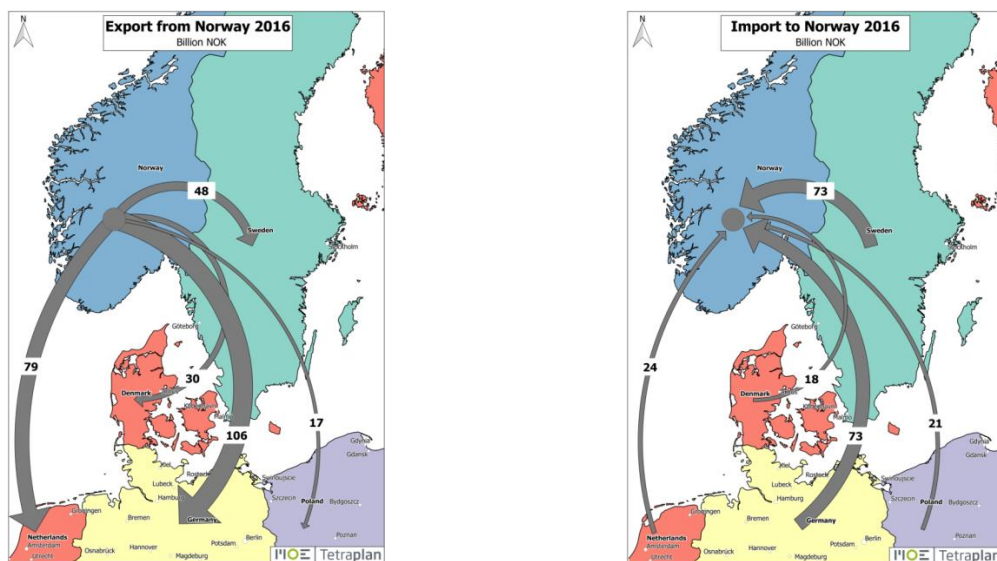
In order to shift road transports between the Continent and Norway to more environmentally-adapted modes, there is a need to find out more in detail what services and service levels that would be needed from the shippers and what could influence their choice to change to Ferry/RoRo or rail for these transports. Further, there is a need to go into which service levels, such as transport time etc. that could be achieved with a short sea/ferry solution, as well as looking into the possibility of daily connections.

The terminals that would be the most interesting for intermodal connections with Alnabru for example, would be Hamburg and Malmö, with the possibility for connection to other terminals either en route or in the different intermodal networks that are available through different service providers. There is certainly also a need for a better service level and a thorough look at the price level. Hamburg terminal has intermodal connections to all parts of Germany but also to the whole of Europe. Malmö terminal is the largest intermodal terminal in Southern Sweden and also have a very good intermodal network. The operator is also very keen on developing the terminal, and new cranes will increase the terminal capacity with 75% in the beginning of 2018. But there is also a need to look into other possible terminals, so ensure the suitable service level for the many shippers, forwarders and hauliers.

2 Norsk sammendrag (Norwegian Summary)

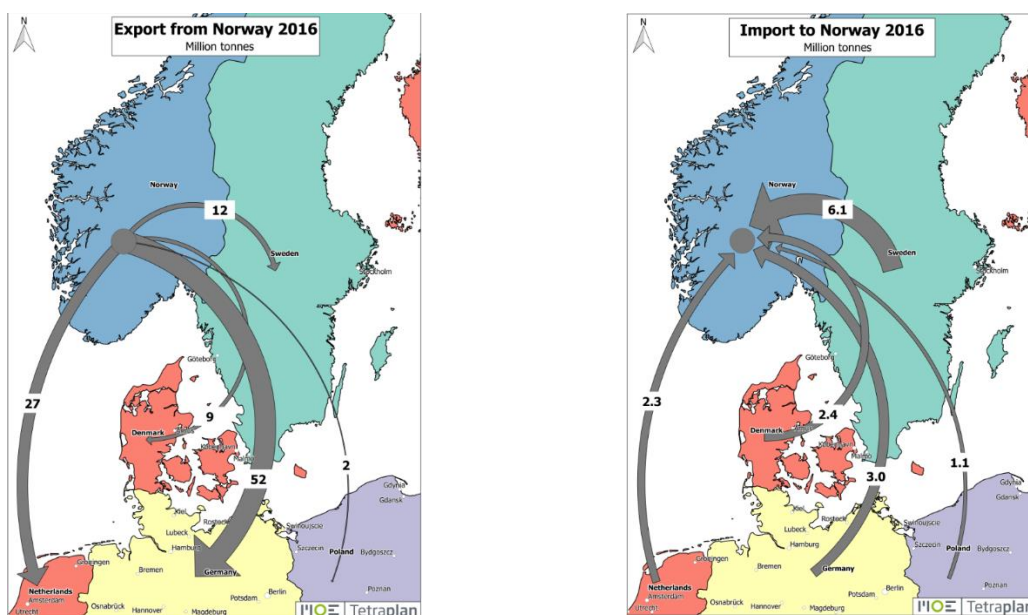
Total import og eksport på Norge fordelt i forhold til de viktigste handelslandene i studien:

Figur 7 Norsk eksport og import i 2016 relatert til de viktigste handelsnasjonene i den inkluderte rapporten, målt i milliarder norske kroner.



Source: SSB table 00809

Figur 8 Norsk eksport og import i 2016 relatert til de viktigste handelsnasjonene i den inkluderte rapporten, målt i millioner tonn.

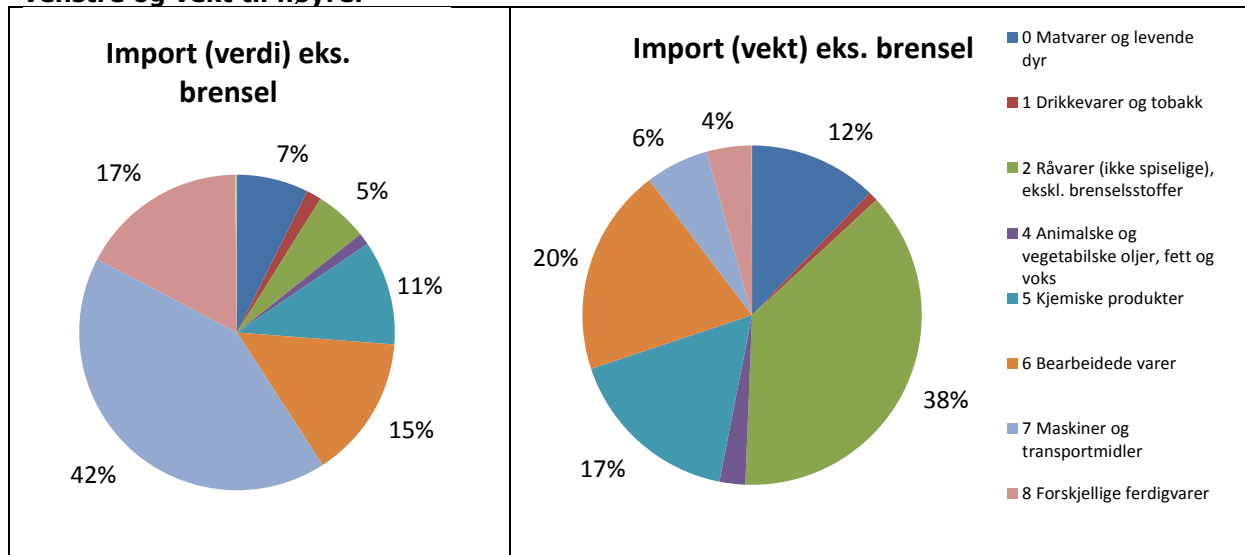


Kilde: SSB, tabell 08809

Når eksport av olje og gass er såpass stort i omfang, og det ikke er rom for å skifte fra vei til sjø eller bane, er varegruppe 3 brensel³ (olje og gass) utelatt i analysen. Hele analysen er basert på datagrunnlag fra 2016 og et mer detaljert bilde av dette grunnlag for de viktigste varegruppene etc. finnes i de påfølgende kapitler av rapporten.

Varegrupper i norsk import har følgende fordeling, her delt på verdi og vekt:

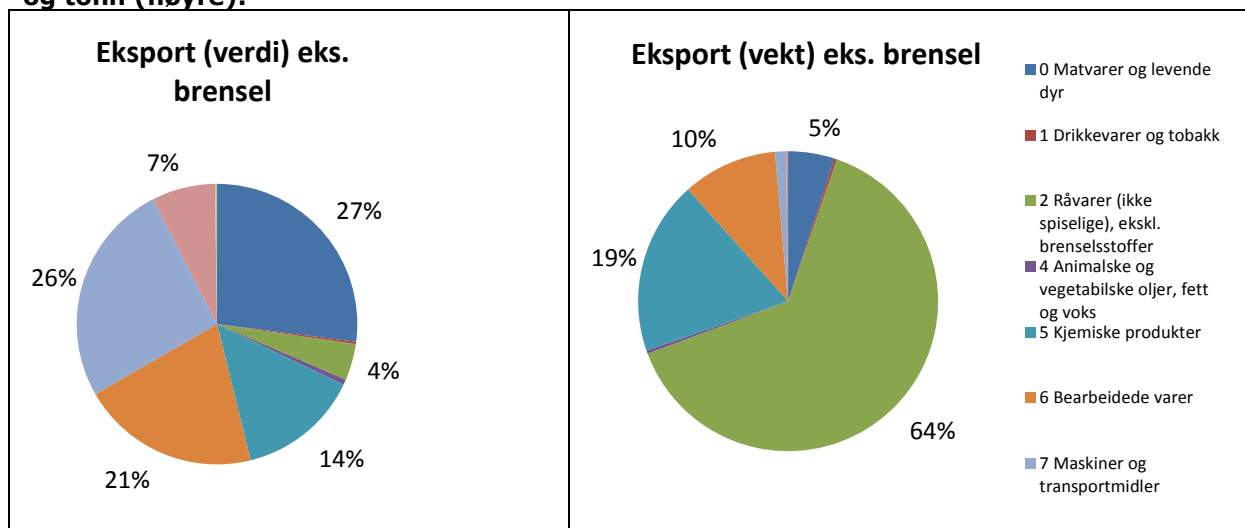
Figur 9 Fordeling av varegrupper for import, ekskludert brensel. Oppdelt i kroneverdi til venstre og vekt til høyre:



Kilde: SSB, tabell 08809

Varegrupper i norsk eksport (eks. brensel) har følgende fordeling, fordelt på verdi og vekt:

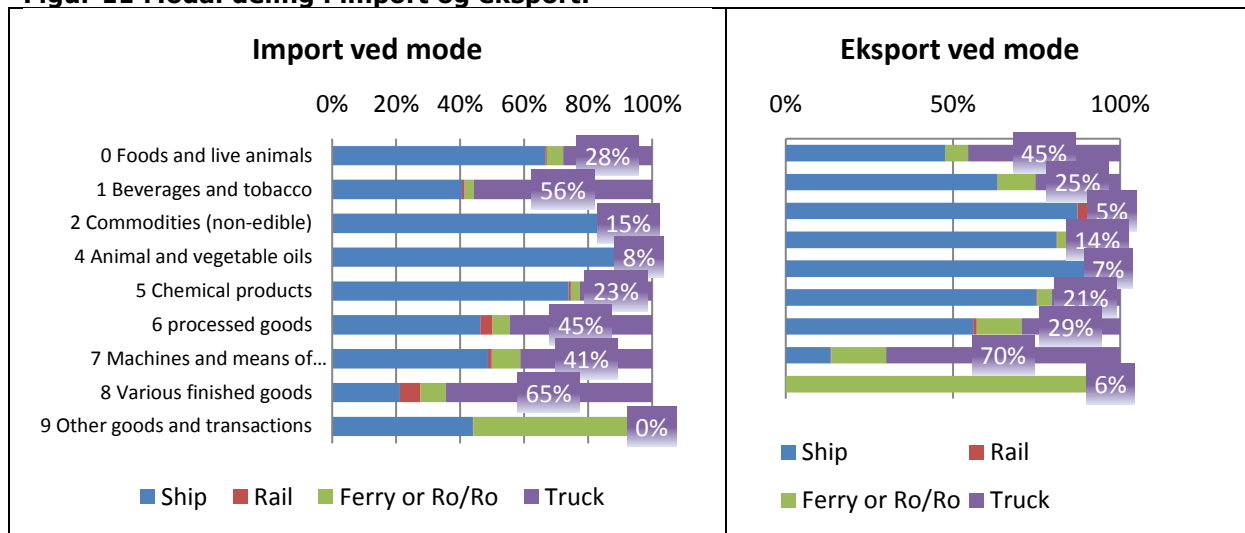
Figur 10 Fordeling av varegrupper innen eksport (ekskludert brensel), i verdi (venstre) og tonn (høyre):



Kilde: SSB, tabell 08809

³ SITC 3 - Brenselstoffer, smøreoljer, elektrisk strøm, forkortet: brensel, inkluderer følgende undergrupper; 32 - Kull, koks og briketter, 33 - Mineralolje og mineraloljeprodukter, 34 - Gass, naturlig og tilvirket; og 35 - Elektrisk strøm.

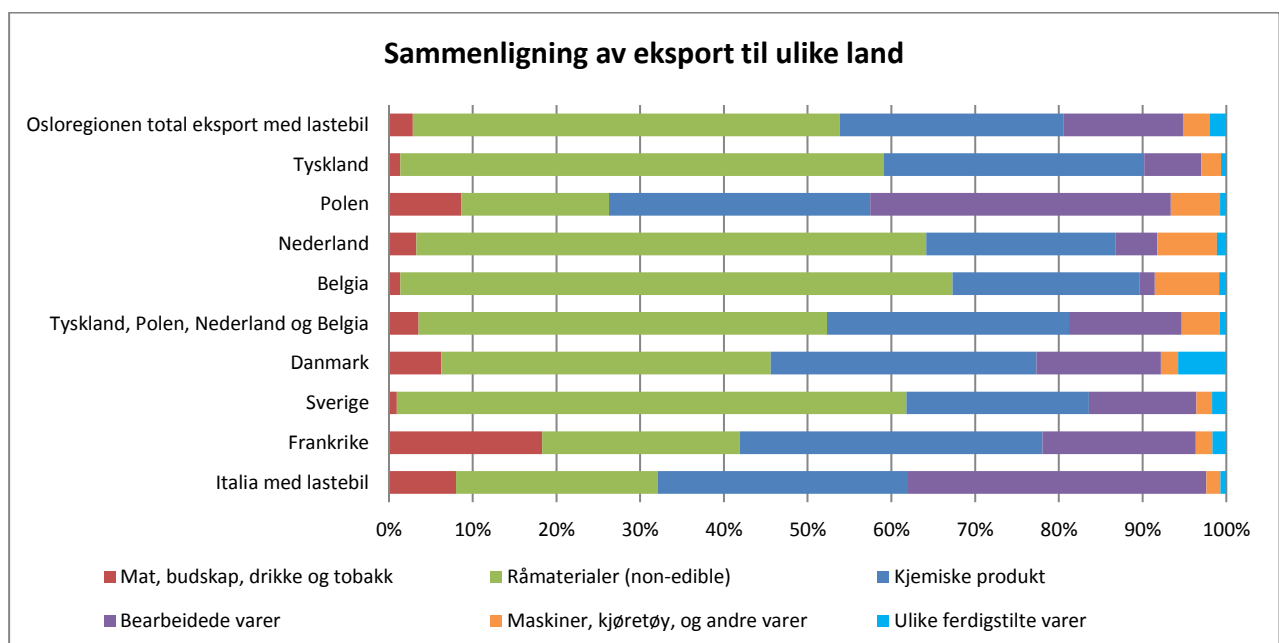
Figur 11 Modal deling i import og eksport:



2.1 Eksport fra Osloregionen

Når man sammenligner regionenes eksport med lastebil til relevante land er der forskjeller. *Råmaterialer* er generelt størst i forhold til volum, med kjemiske produkter som den nest største. For Polen, Frankrike og Italia spiller mat, dyr, drikkevarer og *tobakk* en relativt større rolle sammenlignet med andre land. Eksport av bearbejdede varer er relativt stor til Polen og Italia. Eksport til Nederland og Belgia er det i stor grad eksport av maskiner, kjøretøy og andre varer som gjør seg fremtredende.

Figur 12: Sammenligning av eksport til ulike land:



Datagrunnlaget fra Osloregionen gir oss et bilde på eksporten fra regionen og peker samtidig ut varegrupper som kan ha potensiale for et skifte til grønnere transport. På den andre siden er det et begrenset datagrunnlaget for eksport, men spesielt import. Vi har beregnet volumet i vekt basert på nasjonal statistikk, men vår oversikt over hvilke former for transport og destinasjoner som benyttes er begrenset. Spesielt med tanke på at det ikke er mulig å få data på SITC 2-nivå. En tilgang som ville gjort oss i stand til å se nærmere på spesifikke varegrupper og se det virkelige potensiale.

2.2 Land som knutepunkt/ hub (ikke-direkte transport)

Med innblikk i datagrunnlaget relatert til avgangsland som er annerledes enn opprinnelsesland, gir det, ved første øyekast, en mulighet for at forskjellige knutepunkt kan benyttes.

I følge *Trafikverket* sin undersøkelse av de vestlige havner, samt Blekinge Havn⁴, er andelen transport mellom knutepunkt, eller som i alle fall har en hub som avgangs- eller ankomstpunkt, mellom 20 og 30%. Det kan derfor antas at ca. 25% av transport er mellom slike knutepunkt.

Statistikken tilsier at 310,000 tonn fra andre land bruker Tyskland, Polen, Italia, Frankrike, Belgia, og Nederland som hub ved import langs vei til Norge. For Sverige og Danmark ankommer rundt 700,000 tonn fra andre land som bruker Danmark og Sverige som knutepunkt ved import til Norge langs vei.

2.3 Direkte transport

Det er nesten 800,000 tonn i direkte transport for norsk import fra Tyskland og Polen. Det er også et større potensial når man også inkluderer de andre nevnte land på det europeiske kontinent. Det skulle derfor være tilstrekkelig potensiale for nye tilbud av grønnere transport.

Tabell 3:

Import med lastebil 2016, samme opprinnelsesland og avgangsland									
Tonn	Belgia	Danmark	Frankrike	Italia	Nederland	Polen	Sverige	Tyskland	Sum 8 land
Sum	76.708	549.014	116.229	206.379	152.437	344.217	3.626.294	454.370	5.525.648
Fordeling	1%	10%	2%	4%	3%	6%	66%	8%	100%

Kilde: SSB, tabell 06320

Direktetransport av import fra Danmark og Sverige bruker mest sannsynlig andre ruter enn ruten som den potensielle nye service mulighetsstudien vil se på.

2.4 Tyskland og Polen

Tabellen under viser det totale volum langs vei for import og eksport for Polen og Tyskland. I tillegg viser den også volum hvor landene er knutepunkt for andre land og volumet av direkte trans-

⁴ Analysen dekker følgende havner: Strømstad, Göteborg, Varberg, Halmstad, Karlshamn og Karlskrona, og er også del av Scandria2Act. Analysen, datert 4. april 2017, er basert på intervjuer og observasjoner.

port. Videre har vi inkludert våre estimater som forholder seg til eksportvolum langs vei for Osloregionen, basert på våre egne antakelser og utregninger.

Tabell 4: Volum langs vei for Tyskland og Polen

Tonn	Tyskland			Polen		
	Import til Norge	Andel av total	Eksport fra Norge	Import til Norge	Andel av total	Eksport fra Norge
Total Norge langs vei	565 714		342 742	422 649		377 697
hub for andre land	102 502	18 %		10 533	2 %	
"direkte transport"	454 370	80 %		344 217	81 %	
Kalkulert for Osloregionen			124 379			66 079
Andel av total eksport			36 %			17 %

Kilde: SSB Tabell 08812, 08809, 10482 og egne estimater

2.5 Konklusjon

Når man ser på volumet av godstrafikk mellom kontinentet og Norge, og spesielt Osloregionen, er det tilstrekkelig volum for en ny ferge/ RoRo eller jernbaneløsning. En ny service til Osloregionen kan også brukes av andre områder av Norge ved hjelp av intermodal tilknytning ved for eksempel jernbane. Men, det er mange andre faktorer som spiller inn på beslutninger vedrørende modalvalg. Pris er den viktigste, men også servicenivå, leveransevilkår, regularitet, transporttid, mm. Norske avsendere og mottakere har ikke alltid mulighet for å velge, da ansvaret ofte ligger hos sender eller videresendingsfirma. Det er også en faktor at mange ikke er klar over at det er andre interessante og grønnere valg tilgjengelig, fordi lastebil i dag er meget enkelt å bestille og håndtere.

Havner som ville være mest interessant for en ny ferge eller RoRo-service er havner som allerede i dag har stor fergetrafikk mellom Skandinavia og kontinentet, da dette bare ville supplere eksisterende aktivitet, samt at mange selskaper allerede benytter seg av disse havnene. På tysk side ville dette bety havnene i Lübeck og Rostock, som har utmerkede tilknytningsmuligheter. I Polen ville Swinoujscie være en veldig god havn. Gdynia er også et godt alternativ, men ville innebære lengre transporttider for ferger mellom Gdynia-Oslo, sammenlignet med Swinoujscie-Oslo.

For å skifte fra veibasert transport til mer miljøtilpassede transportalternativer mellom kontinentet og Norge, er det nødvendig å finne ut mer i detalj hva slags tilbud og servicenivå som ville være påkrevet for å påvirke et skifte til ferge/ RoRo eller tog blant transportselskapene. Videre er det behov for å gå nærmere inn på servicenivået for transporttid og lignende som kan oppnås ved en kort sjø eller fergeløsning. Herunder burde man se på mulighetene for daglige avganger.

Terminalene som kunne være mest interessant for intermodale koblinger med Alnabru, for eksempel, ville være Hamburg og Malmø med ytterligere mulighet for tilknytning til andre terminaler enten underveis eller i de ulike intermodalnettverk, som er tilgjengelige gjennom forskjellige service-tilbydere. Men, det er sannsynligvis også behov for å utvikle et bedre servicenivå og en grundig gjennomgang av kostnadsnivået.

Hamburg terminal har intermodale koblinger til alle deler av Tyskland og er i tillegg koblet til hele Europa. Malmø terminal er den største intermodale terminalen i den sørlige delen av Sverige og har også gode intermodale nettverk. Operatøren er også villig til å utvikle terminalen og nye kraner vil øke terminalens kapasitet med 75% i begynnelsen av 2018. Det er også grunnlag for å

se på andre mulige terminaler for å sikre et tilstrekkelig tilbud til de aktuelle fraktører, speditører og transportører.

3 Introduction to Scandria®2Act

Scandria®2Act refers to BSR programme aim to "increase the efficiency of transporting goods and persons in north-south connections by increasing the capacity of transport actors in the field of interoperability not duplicating efforts by TEN-T policies".

As stated in the EUSBSR-Action Plan, "a well-functioning transport system, combined with greater attention to the spatial development and location patterns, is of vital importance for prosperity and economic growth" in the Baltic Sea Region (BSR). According to the Roadmap to a Single European Transport Area, the current patchwork of national transport systems is segmented and based upon oil (25% of total GHG emission on the bill of transport).

There is a need to address a more efficient and decarbonized transport system. European Commission (COM), Parliament and Member States (MS) agreed on a new European Transport Policy to be realized by 2030/2050 respectively. Major instrument will be core network corridors (CNC) coordinated by a European Coordinator. There are four of these CNC in the BSR, two surrounding the Baltic Sea: Scandinavian-Mediterranean (ScanMed) and North Sea – Baltic (NSB). The CNC will focus on the deployment of cross-border transport infrastructure.

A major challenge in organising transport along the corridor is the negative environmental impact caused by emissions mainly of road transport and the limited capacity of transport infrastructure in highly utilized corridor sections. The Core Network Corridor Study for the ScanMed Corridor identified a number of bottlenecks already existing in the transport network and confirms rising transport volumes between the corridor regions. This puts high pressure to develop cross-sectoral and cross-level solutions that minimise environmental impact of transport and optimise capacity utilisation.

Thus two very relevant approaches are to strengthen MULTIMODAL TRANSPORT and to deploy CLEAN FUELS. Both approaches have the potential to reduce GHG-emissions significantly. Although there is a variety of regional solutions in place, they are not sufficiently applied to the transnational extent of the core network corridor, since there is:

- a lack of continuity of clean fuel policies, strategies and applications along the Corridor,
- a lack of knowledge concerning multimodal corridor capacities especially in relevant cross-border regions,

When it comes to the full use of public transport potential, a lack of information about multimodal services and prices for international travellers is to be stated.

Currently, there is no integrated approach of corridor regions towards the EU Core Network Corridors. The multi-level GOVERNANCE (MLG) approach as initially addressed by the Scandria project and developed by BSR TransGovernance project needs to be consolidated and implemented.

Scandria®2Act is addressing these shortcomings by applying a cooperative approach to better utilize regional capacities for transnational corridor development.

3.1 Introduction to Scandria2Act Activity 3.3

Currently, the by far largest transport volumes along the ScanMed corridor are transported by trucks. A further infrastructural and operational development of the corridor will facilitate a greater share of train and sea transports and reduce trucking on partly heavily congested roads. In order

to foster modal shift from road to rail and sea transport, Scandria2Act partners support the development of new transnational market-ready intermodal transport solutions. The Activity 3.3 activity involves the following major nodes in the development of transnational supply chains:

- Örebro (incl. Hallsberg marshalling yard, the biggest in Northern Europe, and the Hallsberg terminal, a TEN-T core rail-road terminal) is the most important hub for flows between Northern Scandinavia and Central Europe
- Oslo (incl. Alnabru terminal, one of Europe's largest rail-road terminals) is the most important hub for flows between Norway and Central Europe
- Rostock (biggest harbour in Eastern Germany in terms of net figures, offering services to Trelleborg, Gedser and Finland) is the most important harbour for flows between Scandinavia, Eastern Germany and South East Europe
- Hamburg (intermodal logistics gateway of greatest importance for flows to and from Northern Europe) is the most important hub for flows from Scandinavia to Western and Central Europe

Currently logistics stakeholders do often choose not to carry out in-depth analyses of the potential for modal shift since they require some resources and there is no guarantee that the results will be sufficient to achieve modal shift. This is the entry point for the partners collaborating in this activity.

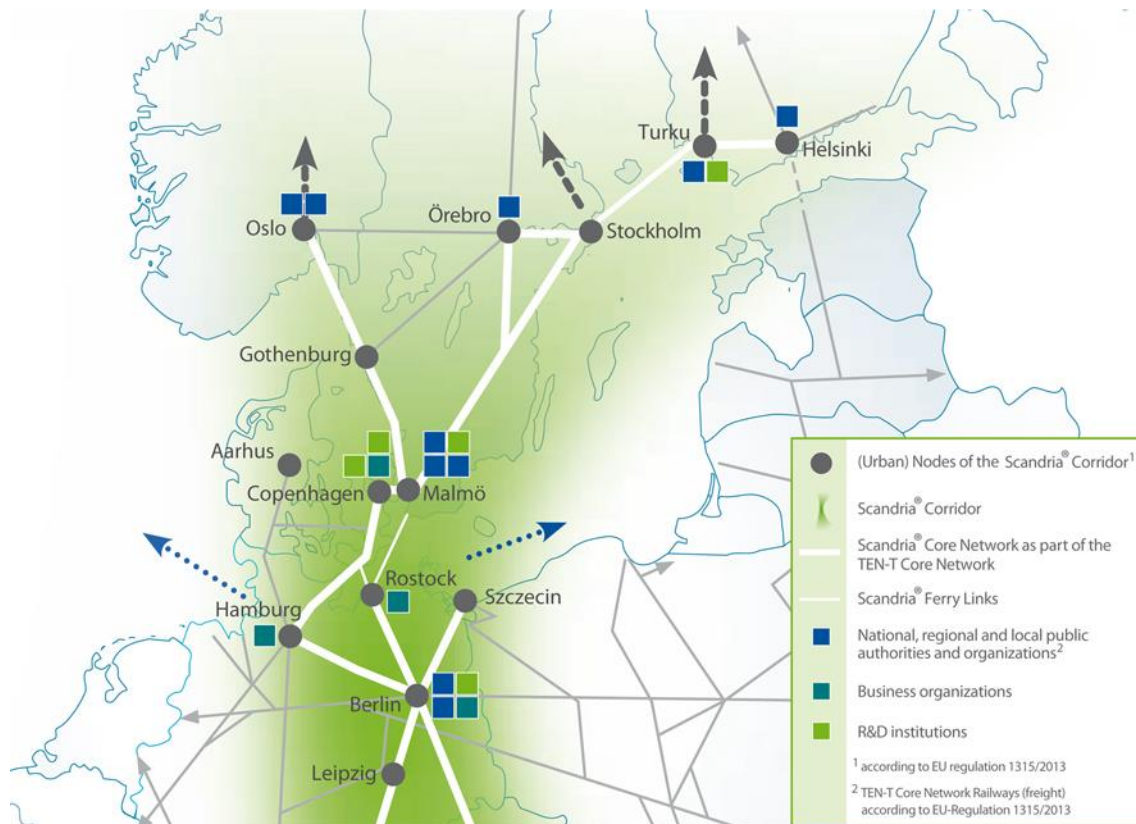
The Scandria2Act Activity 3.3 partners are planning to conduct in close collaboration feasibility studies on the potential for modal shift along the Scandria corridor. This includes dialogue with shippers, transport service providers, national transport administrations, etc. about opportunities, challenges and preconditions for modal shift along this corridor. Each partner will mainly focus on the flows to/from the area where the partner is located or active. The gathered information will then be shared so that the partners benefit from and can make use of the knowledge of the other partners in activity 3.3 (Fostering modal shift). This part is essential in order to achieve in-depth analyses.

3.2 Geographical scope of the Scandria®2Act corridor

The geographical scope of the Scandria®2Act corridor follows the Scandinavian-Mediterranean core network corridor from Helsinki /Stockholm/Oslo southwards towards Berlin. This means that the corridor starts in Helsinki and goes via Stockholm southwards toward Germany. At the same time, there is a branch of the corridor that starts in Oslo and connects with Stockholm as well as goes southwards towards Scania, Denmark and Germany.

Below the geography of the Scandria®2Act corridor and hence this project can be seen:

Figure 13 Map of Scandria2Act partnership



Source: © S. Hofschlaeger / pixelio.de | www.pixelio.de

3.3 Introduction

The Oslo region case is a feasibility study within Scandria2Act, Work Package 3.3 Fostering Modal Shift, and this report concerns the first part of the feasibility study, a study of the potential of new multimodal freight services for transport of goods by rail and sea between the Greater Oslo region and the rest of the Scandria Corridor (Gothenburg – Copenhagen/Southern Sweden – Northern Germany/Poland).

3.4 The analysis

The report presents the analysis of the potential for modal shift for long distance truck transports to/from the European Continent, on transit through Southern and Western Sweden, crossing the Norwegian/Swedish border with origin/destination in the Greater Oslo region. The largest part are so called EU-trucks and that means a tractor unit and a semi-trailer. Many of the semi-trailers could also use railway, although more than 90% of European semi-trailers are not liftable. This could however also be solved by different solutions, for example the Nikrasa⁵ System that is in use by TX Logistik.

The main target of the report is to describe the present situation, future development, forecasts and potential for modal shift in the corridor.

⁵ <http://www.txlogistik-nikrasa.eu/en/>

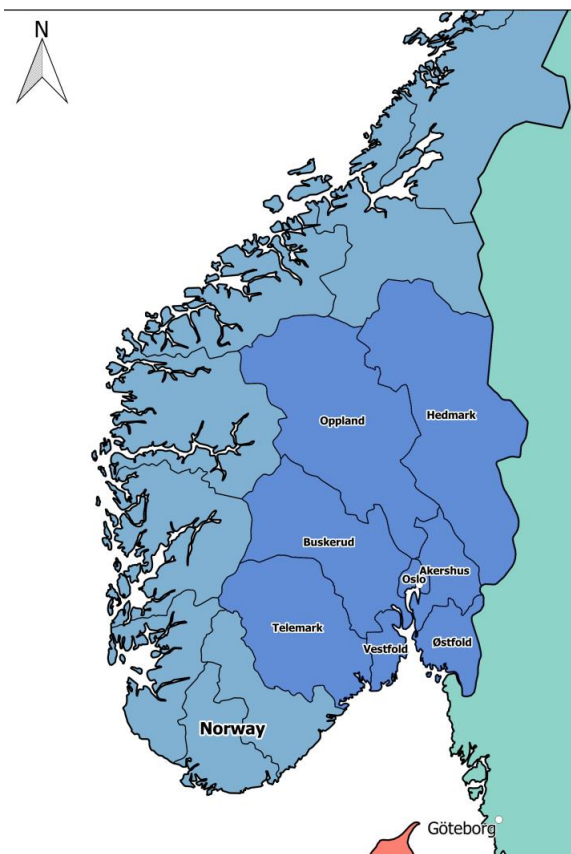
The report concerns finding the potential within international transport flows by truck (incl. via Ro-Ro and ferries), that could be shifted towards the more environmentally-adapted transport modes ferry and/or railway, to/from the Oslo Region.

The Oslo Region contains the following Norwegian counties:

- Oslo
- Akershus
- Buskerud
- Hedmark
- Oppland
- Østfold
- Telemark
- Vestfold

A map of the region is shown in **Figure 14**.

Figure 14 Map of the Oslo Region – the counties in this report are shown in dark blue



3.5 Methodology

This report is based on a row of previous studies and report, where the 2 main are the Svinesund Analysis and the Quality control of data basis for transfer from road in Norway traffic. Some of the

previously collected data has been updated as regards the present situation, which means that the latest available data will be used in most cases, namely for the year 2016.

The new data has then been compared to previous data from different studies in order to form a sound basis for the evaluation of the potential flows for shift from road to the more environmentally-adapted transport modes, sea and rail. During the work we have also made some assumptions and these are also described. Due to lack of consistent data on regional level, we have been forced to make a number of assumptions in order to get closer to the potential. It might not be the full truth, but it is an attempt at finding the potential even when detailed data is lacking.

Some parts of the other chapters come from the report Analysis of potential development for strategic freight hubs, which is also a Scandria2Act-report performed by MOE | Tetraplan. That report focusses on Scania, wherefore the information especially as regards the north-western part of the Scandria2Act-corridor between Oslo and Scania has been added.

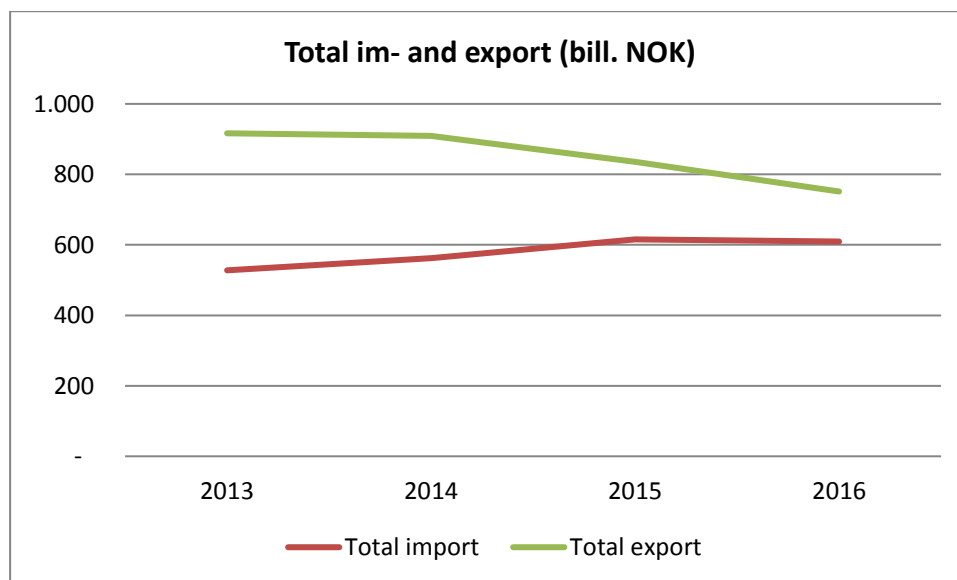
4 Description of the present situation

In the following the present situation of the international freight transport by road with Norway and the Oslo Region is described. We have started at the overall level of total import and export and worked including all commodity types, and soon realised that fuels had to be taken out of the equation, as it is such a large volume seen in tonnes and only an extremely small share of this use road transport. We have made splits into the different countries in focus as well as into the most important commodity types.

4.1 Development of Norwegian trade 2013-2016

The Norwegian value of export has been declining since 2013 from around 900 billion NOK to 750 billion NOK. This is probably related to falling oil prices globally. In the same period there has been a slow growth in the value of the import. See **Figure 15**.

Figure 15 Total Norwegian import and export in billion NOK



Source: SSB, table 08809

Below in **Figure 16** the total import and export, measured in tonnes is shown. As can be seen there is a very large difference between import and export, and this is mainly due to the very large volume of oil and gas in export.

Figure 16 Total Norwegian import and export in million tonnes



Source: SSB, table 08809

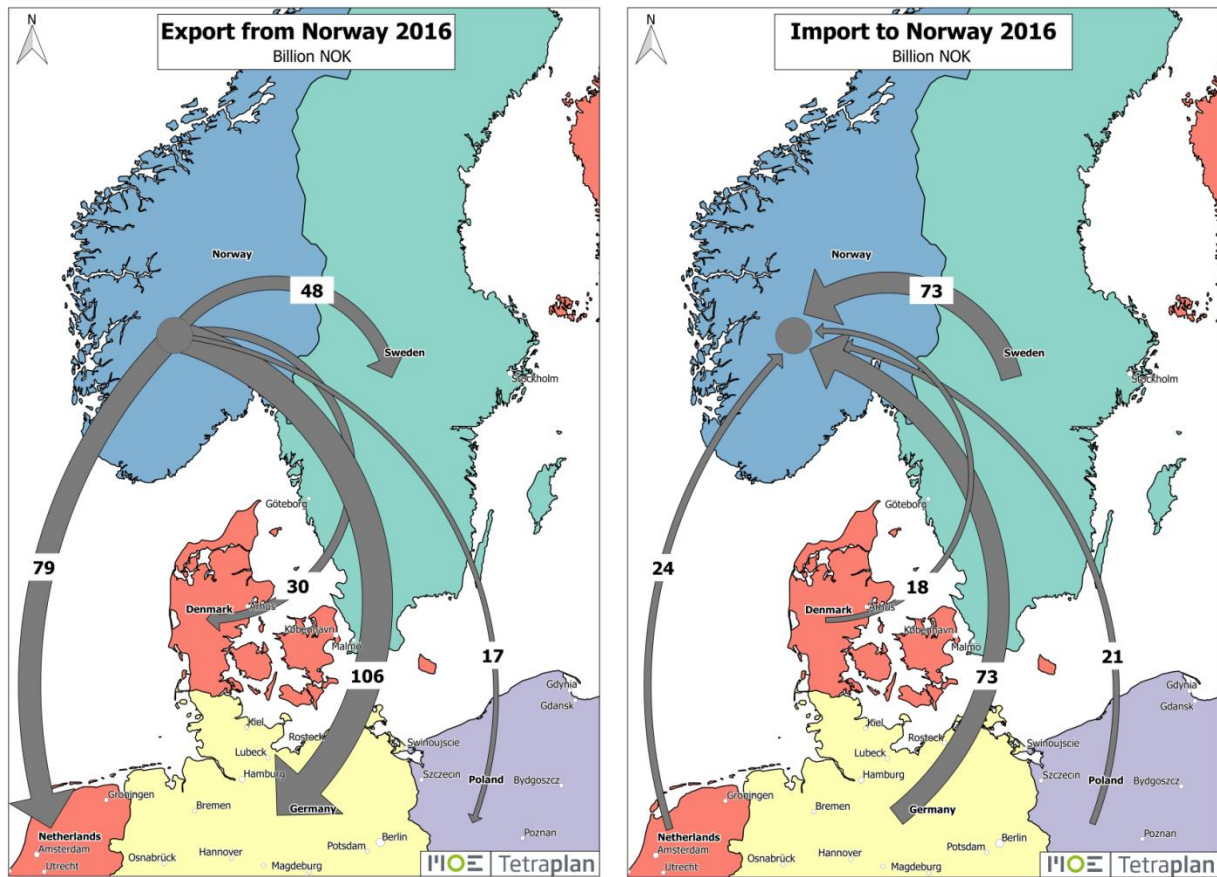
4.2 Norwegian trade in 2016

In order to find the potential for modal shift the latest data as regards import to and export from Norway has been scrutinized. The latest available data is from 2016.

Below the total export and import to/from Norway in value can be found, i.e. Including the very large commodity group fuels.

Figure 17 shows the export from Norway and the import to Norway in 2016 related to the main countries included in the report, measured in billion NOK.

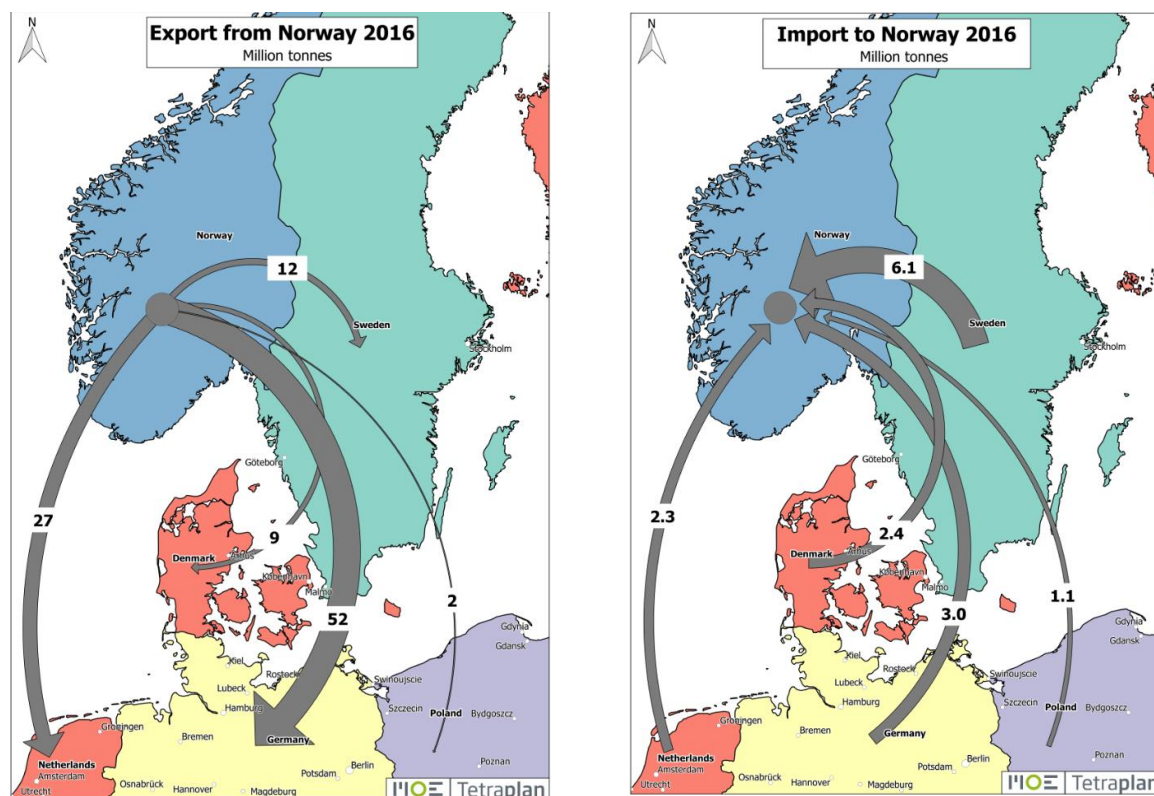
Figure 17 Norwegian export and import in 2016 related to the main countries included in the report, measured in billion NOK.



Source: SSB table 00809

Figure 18 shows the export from Norway and the import to Norway related to the main countries included in the report, measured in billion tonnes.

Figure 18 Norwegian export and import in 2016 related to the main countries included in the report, measured in million tonnes.



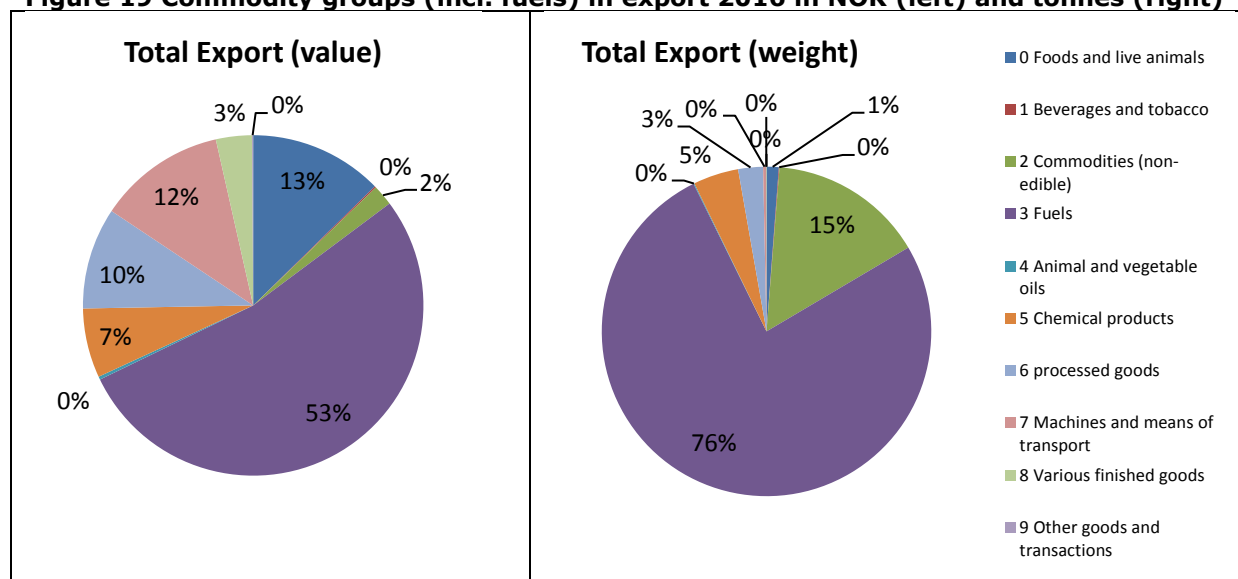
Source: SSB table 00809

4.2.1 Commodity groups in import and export

When looking a bit closer into the trade statistics a split in SITC-commodity groups has been made and the following commodities are the largest within the different areas. In the export volumes, we can see that the commodity group "3. Fuel" has a very large share.

The two following figures show the different commodity groups (SITC 1 level) shares of export in both NOK and tonnes.

Figure 19 Commodity groups (incl. fuels) in export 2016 in NOK (left) and tonnes (right)



Source: SSB, table 08809

The share for commodity group “3 Fuels” is 53% for value and 76% in weight. A very small part of this is transported on road and potential for modal shift for these volumes is very small. We have therefore decided to exclude the commodity group because it has a very low potential for modal shift and its large share blurs the picture, for the rest of the potentially transferable commodity groups.

Table 5 List of commodity groups we work with onwards

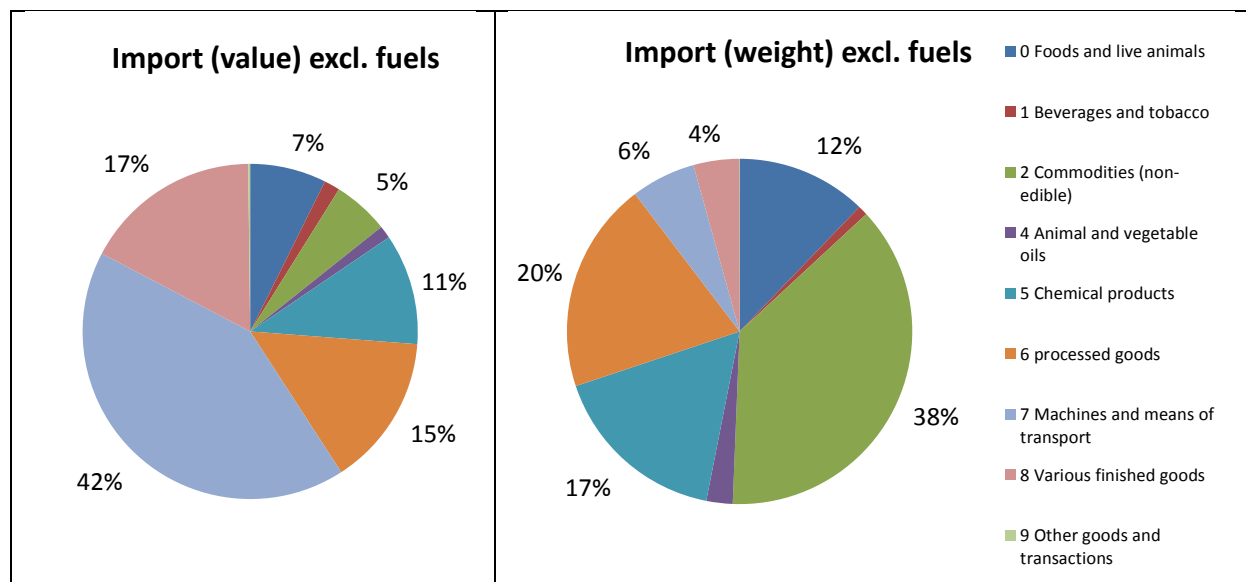
0 Foods and live animals
1 Beverages and tobacco
2 Raw materials (non-edible), excl. Fuels
4 Animal and vegetable oils, grease and wax
5 Chemical products
6 Processed goods grouped mainly by material
7 Machines and means of transport
8 Various finished goods
9 Other goods and transactions

In the tables and figures the names of the commodity groups will be shown in a shorter version in order to make them easier to read.

In the following we take a deeper look into the commodity groups’ share of the import and export and we look at both weight and value. In each case we identify the 3 largest commodity groups and to get a clearer view of the commodity groups’ composition we show the 3 largest subgroups share of the total. See the tables under each figure.

First we look at split of commodity groups in value in import and export.

Figure 20 Split of commodity groups in import, excl. fuels in NOK (left) and tonnes (right)



Source: SSB, table 08809

As can be seen above to the left, the largest commodity groups, excl. fuels, in import to Norway, based on value are: "7. Machines and means of transport", "8. Various finished goods" and "6. Processed goods". These commodity groups account for 74% of the import when fuel is excluded. The largest subgroups within the 3 commodity groups are:

Table 6 Largest commodity groups in import, excl. fuels (in NOK) and their primary sub-groups

Commodity group	Share of total	Subgroup	Share of total
7 Machines and means of transport	42%	78 Road vehicles	12%
		79 Other means of transport	6%
		74 Other industrial machinery and equipment	5%
8 Various finished goods	17%	89 Various finished goods, i.e.	5%
		84 Clothing and accessories for clothes	3%
		87 Scientific and technical instruments	3%
6 processed goods	15%	69 Goods of metals, i.e.	5%
		66 Articles of non-metallic minerals	2%
		67 Iron and steel	2%

Source: SSB, table 08809

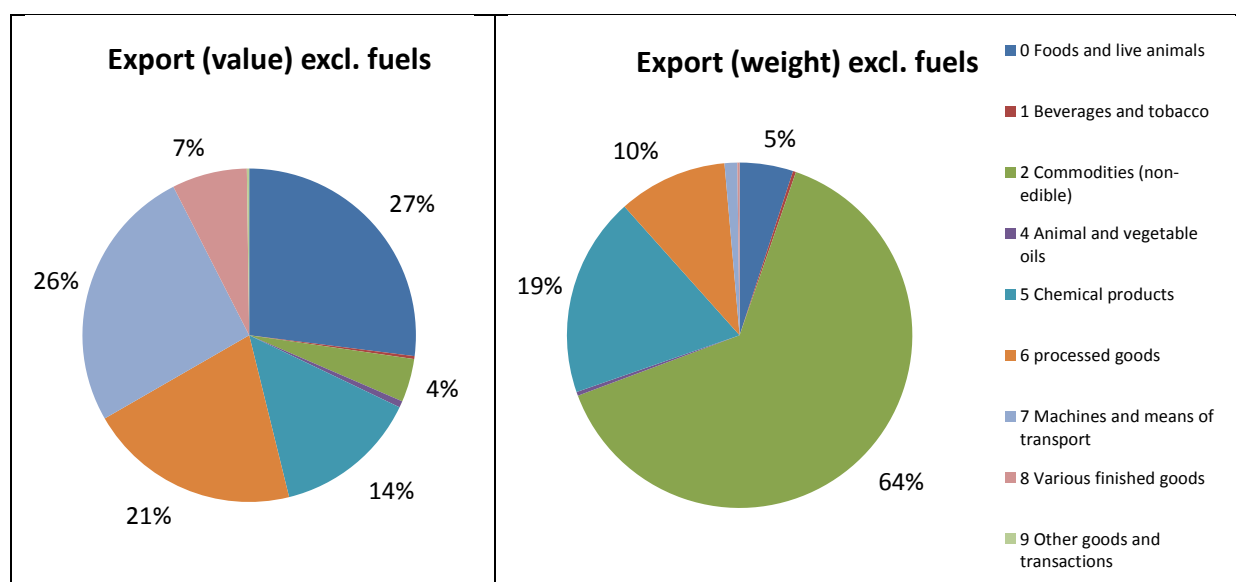
As can be seen above to the right, the largest commodity groups, excl. fuels, in import to Norway, based on weight are: "2. Commodities (non-edible)", "6. Processed goods" and "5. Chemical products". These commodity groups account for 75% of the import volume when fuel is excluded. The largest subgroups within the 3 commodity groups are:

Table 7 Largest commodity groups in import, excl. fuels (tonnes) and their primary sub-groups

Commodity group	Share of total	Subgroup	Share of total
2 Commodities (non-edible)	38%	28 Ores and metal waste	17%
		27 Raw fertilizers and raw minerals	13%
		24 Timber, timber and cork	5%
6 Processed goods	20%	66 Articles of non-metallic minerals	7%
		67 Iron and steel	4%
		69 Goods of metals, i.e.	3%
5 Chemical products	17%	51 Organic Chemical Products	3%
		52 Inorganic Chemical Products	4%
		56 Fertilizer	4%

Source: SSB, table 08809

Figure 21 Split of commodity groups in export, excl. fuels in NOK (left) and tonnes (right)



Source: SSB, table 08809

As can be seen above to the left, the largest commodity groups, excl. fuels, in export to Norway, based on value are: "0. Food and live animals", "7. Machines and means of transport" and "6. Processed goods". These commodity groups account for 74% of the export when fuel is excluded. The largest subgroups within the 3 commodity groups are:

Table 8 Largest commodity groups in export, excl. fuels (in NOK) and their primary sub-groups

Commodity group	Share of total	Subgroup	Share of total
0 Foods and live animals	27%	03 Fish, crustaceans, molluscs	25%
		08 Animal trout (excluding untouched grains)	1%
		09 Various foods	0%
7 Machines and means of transport	26%	79 Other means of transport	6%
		74 Other industrial machinery and equipment	6%
		77 Electrical machinery and equipment	4%
6 Processed goods	21%	68 Metals, excluding iron and steel	11%
		67 Iron and steel	3%
		69 Goods of metals, i.e.	3%

Source: SSB, table 08809

When looking at weight the commodities are split somewhat differently. As can be seen above to the right, the largest commodity groups, excl. fuels, in export to Norway, based on weight are: "2. Commodities (non-edible)", "5. Chemical products" and "6. Processed goods". These commodity groups account for 93% of the export volume when fuel is excluded. The largest subgroups within the 3 commodity groups are:

Table 9 Largest commodity groups in export, excl. fuels (tonnes) and their primary sub-groups

Commodity group	Share of total	Subgroup	Share of total
2 Commodities (non-edible)	64%	27 Raw fertilizers and raw minerals	48%
		24 Timber, timber and cork	8%
		28 Ores and metal waste	6%
5 Chemical products	19%	59 Chemical products not mentioned otherwise	13%
		51 Organic Chemical Products	3%
		52 Inorganic Chemical Products	2%
6 processed goods	10%	68 Metals, excluding iron and steel	3%
		67 Iron and steel	3%
		64 Paper, cardboard and goods	2%

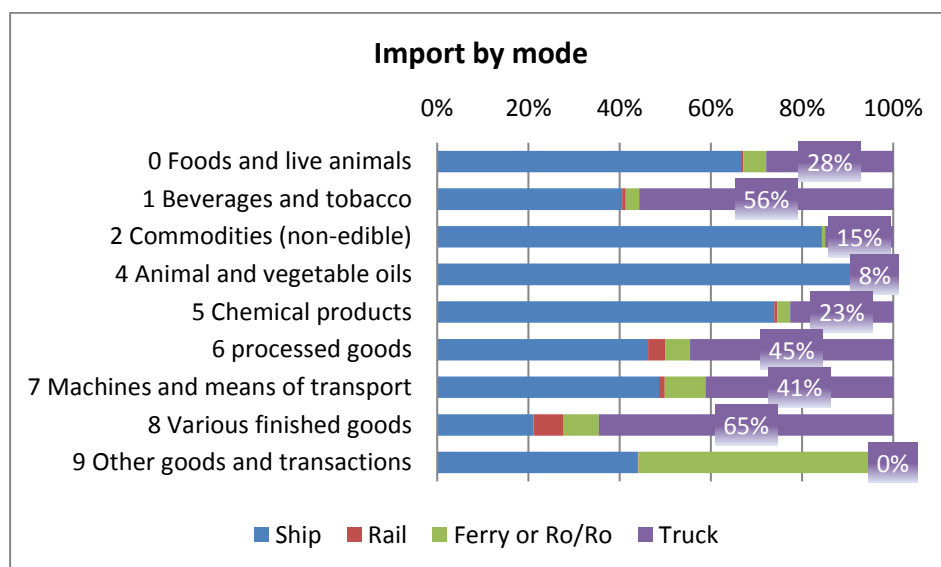
Source: SSB, table 08809

The subgroup "27 Raw fertilizers and raw minerals" almost accounts for half of the export in weight, with its 48% share of total export (still excluding fuels). We conclude that this must be some raw mineral product and taking the volume into account we expect that it will be transported by ship were possible, and therefore there is no potential for further greening with modal shift.

5 Transport modes in Norwegian import and export

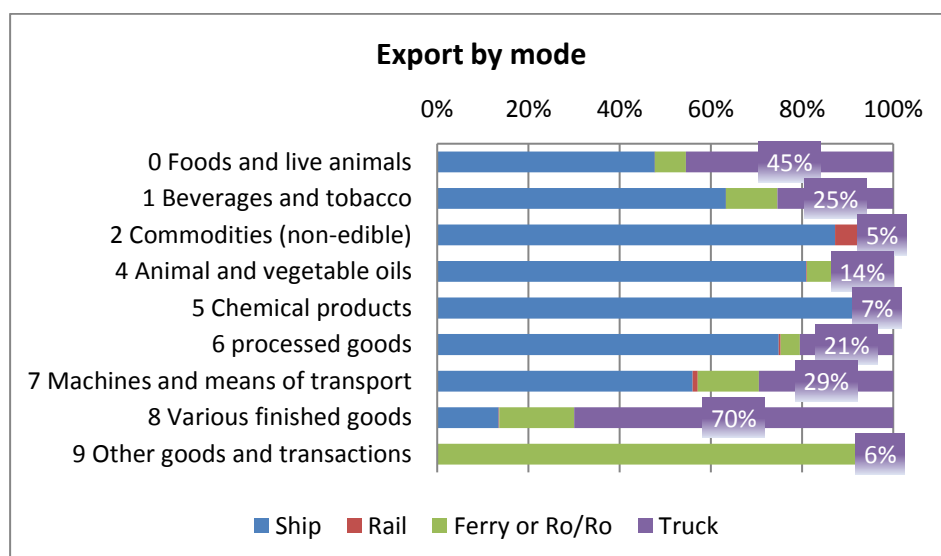
The following two figures show the split between the different transport modes for import and export. There are a number of different transport modes in the Norwegian statistics, but we have grouped them into Ship (Norwegian and foreign), Rail (incl. truck/trailer on railway), Ferry or Ro/Ro (incl. rail wagon, truck or trailer on ferry) and Truck. The other modes are insignificant for these transports (pipeline, air etc.).

Figure 22 Modal split in Norwegian import 2016



Source: SSB, table 08812

Figure 23 Modal split in Norwegian export 2016



Source: SSB, table 08812

6 Important trade partners to Norway

We have looked into how the import and export to the most important countries looks in order to get closer to the potential volumes for new ferry/rail services.

Table 10 The 20 largest trade partners to Norway split on Import, Export and value/weight 2016

No.	IMPORT 2016	Value (1.000 NOK)	IMPORT 2016	Weight (tonnes)	EXPORT 2016	Value (1.000 NOK)	EXPORT 2016	Weight (tonnes)
1	Germany	72.947.830	Sweden	6.132.420	UK	154.563.005	UK	63.735.984
2	Sweden	72.627.301	Germany	2.950.372	Germany	106.470.221	Germany	52.056.466
3	China	67.078.254	Brasil	2.760.297	Netherlands	78.965.758	Netherlands	27.392.804
4	USA	39.247.384	Russia	2.471.074	France	49.870.151	France	19.657.958
5	Denmark	34.027.139	Denmark	2.387.450	Sweden	48.241.326	Belgium	15.829.795
6	UK	30.781.264	Netherlands	2.302.081	Belgium	32.597.915	Sweden	11.855.004
7	Netherlands	24.313.148	Spain	1.404.548	USA	31.249.478	Denmark	9.270.781
8	Poland	21.397.007	UK	1.373.310	Denmark	29.747.582	USA	4.448.666
9	France	20.025.631	USA	1.294.031	China	19.755.066	Ireland	2.928.050
10	Italy	18.269.406	Poland	1.084.098	Poland	17.431.626	Spain	2.401.742
11	Finland	14.672.948	China	1.065.975	Spain	13.701.472	Finland	2.399.039
12	Japan	14.311.541	Finland	1.044.956	Ireland	11.727.676	Poland	2.118.899
13	South Korea	14.170.091	Belgium	811.530	South Korea	10.742.571	Canada	1.905.638
14	Spain	13.820.671	France	635.954	Japan	10.252.294	Lithuania	1.189.199
15	Belgium	11.029.607	Colombia	480.883	Italy	9.834.032	China	1.083.559
16	Canada	10.755.860	South Africa	474.933	Finland	9.492.825	Iceland	1.008.786
17	Russia	9.611.623	Gabon	466.931	Singapore	8.483.932	Italy	961.647
18	Brasil	9.096.188	Italy	398.639	Canada	7.866.253	Turkey	918.221
19	Switzerland	7.314.829	Belarus	397.643	Lithuania	5.148.941	Singapore	909.988
20	Czech Republic	6.862.502	Canada	367.545	Portugal	4.757.952	Estonia	676.906

Source: SSB, table 08809

We have selected the countries where there seem to be largest potential as regards a possible shift from road to rail/sea within or close by the Scandria corridor. The selected 8 countries account for almost half of the trade with Norway:

- 45 % of the import in value (274 billion out of 607 billion NOK)
- 48 % of the import in weight (16.7 million out of 34,8 million tonnes)
- 50% of the export in value (373 billion out of 747 billion NOK)
- 60% of the export in weight (139 million out of 233 million tonnes)

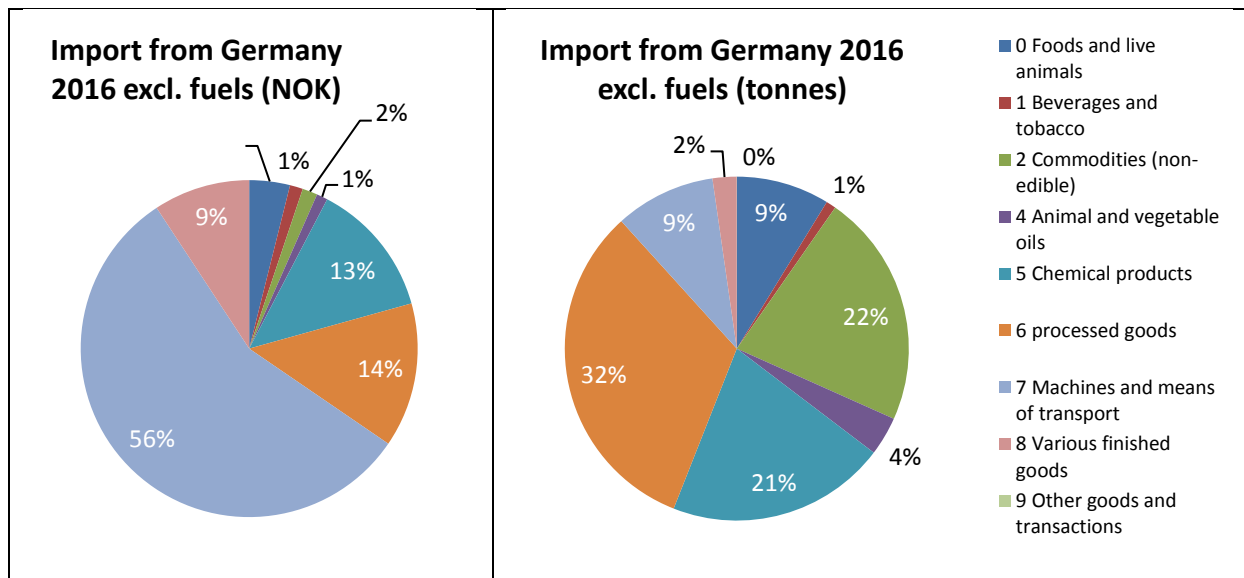
We have mainly looked into Sweden, Denmark, Poland, Germany, Netherlands and Belgium for the potential but have also made some figures that include France and Italy as large countries, where for example a potential shift to rail would be possible. In the following subchapters we go into details about each of the countries.

We have chosen to use the selected commodity group no. 0-9 (except no. 3-fuels) and the same colour in each of the figures. Hereby it is easy to compare the different figures. This means that for example group no. 0-Food is the first group at 12 o'clock in the figure, with the same blue colour in all figures, and so on with the other groups that have the same position and colour throughout the figures. Where the commodity group fuels accounts for a large share of the trade, we have also commented this.

6.1.1 Germany

Germany is the no. 1 import partner for Norway as regards value and no. 2 as regards export. When looking at weight Germany is no. 2 in both import and export. The figure below shows the import from Germany in value and tonnes as regards the concerned commodity groups. They account for 99% of the total import value from Germany. (73 billion NOK in total). The figure below to the right shows the import from Germany in weight, as regards the concerned commodity groups. They account for 97% of the total import weight from Germany. (3 mio. tonnes in total).

Figure 24 Import from Germany excl. fuels in value (left) and tonnes (right)



Source: SSB, table 08809

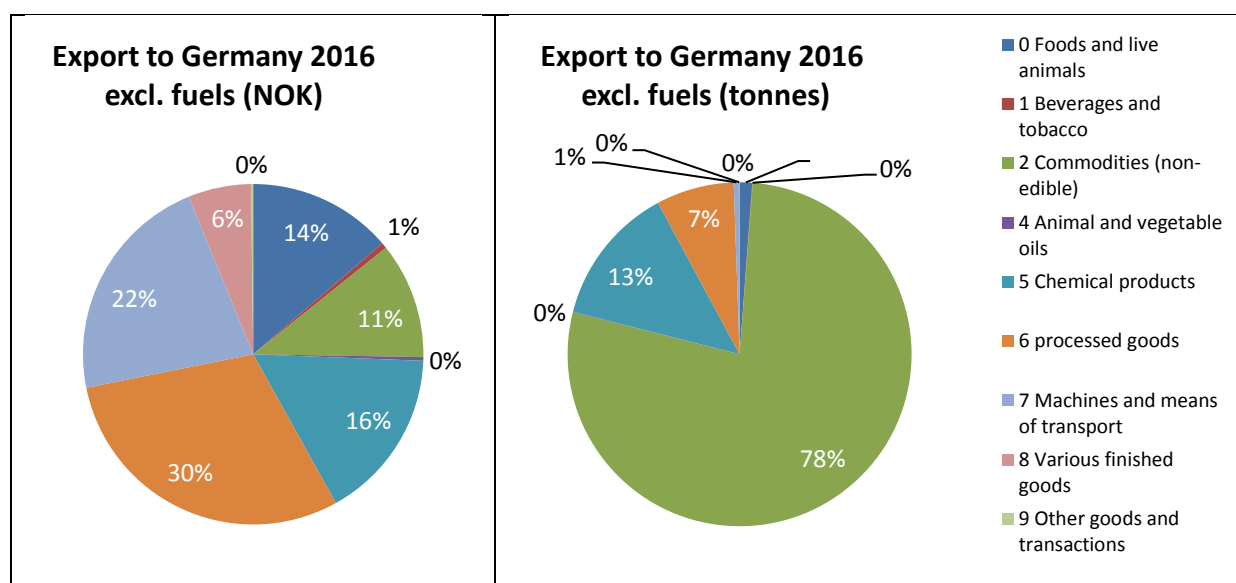
Table 11 Largest commodity groups in import from Germany 2016, excl. fuels (tonnes) and their subgroups

Commodity group	Share of total	Subgroup	Share of total
6 Processed goods	32%	66 Articles of non-metallic minerals	17%
		67 Iron and steel	6%
		69 Goods of metals, i.e.	3%
2 Commodities (non-edible)	22%	29 Animal and vegetable raw materials	19%
		28 Ores and metal waste	2%
		24 Timber, lumber and cork	1%
5 Chemical products	21%	59 Chemical products n.m.a.	10%
		52 Inorganic Chemical products	4%
		57 Plastic raw materials	2%

Source: SSB, table 08809

The figure below to the left shows the export to Germany in value as regards the concerned commodity groups. They account for 27% of the total export value to Germany. (106 billion NOK in total). Fuels account for 73% with 78 billion NOK. The figure below to the right shows the export to Germany in weight as regards the concerned commodity groups. They account for 17% of the total export weight to Germany. (52 million tonnes in total). This means that fuels account for 83% with 43 million tonnes.

Figure 25 Export to Germany excl. fuels in value (left) and tonnes (right)



Source: SSB, table 08809

When looking into the commodity groups, group 2-commodities (non-edible) account for three quarters of the export in tonnes. Below the 3 largest subgroups within the 3 largest commodity groups are listed with their shares.

Table 12 Largest commodity groups in export to Germany 2016, excl. fuels (tonnes) and their subgroups

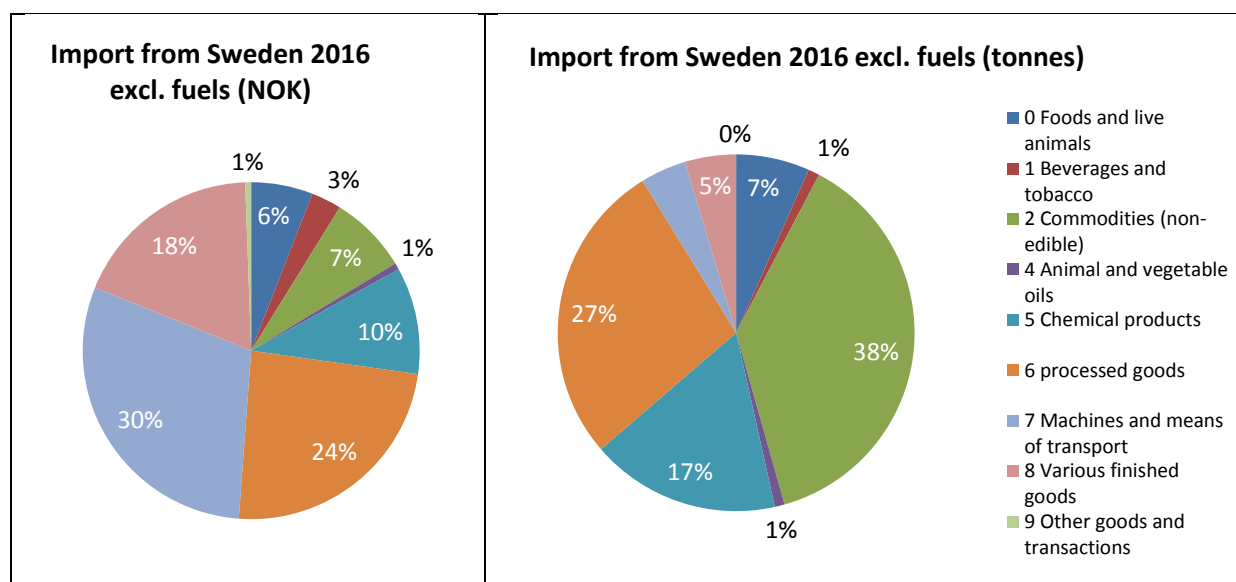
Commodity group	Share of total	Subgroup	Share of total
2 Commodities	78%	27 Crude fertilizers and raw materials	61%
		24 Timber, lumber and cork	9%
		28 Ores and metal waste	6%
5 Chemical products	13%	59 Chemical products n.m.a.	8%
		51 Organic chemical products	2%
		52 Inorganis Chemical products	2%
6 Processed goods	7%	68 Metals, excluding iron and steel	4%
		67 Iron and steel	2%
		64 Paper, cardboard and goods	1%

Source: SSB, table 08809

6.1.2 Sweden

Sweden is the no. 2 import partner for Norway as regards value and no. 5 in export. When looking at weight Sweden is no. 1 in import and no. 6 in export. The figure below to the left shows the import from Sweden in value as regards the concerned commodity groups. They account for 90% of the total import value from Sweden. (73 billion NOK in total). The figure below to the right shows the import from Sweden in weight as regards the concerned commodity groups. They account for 69% of the total import weight from Sweden. (6 million tonnes in total).

Figure 26 Import from Sweden excl. fuels in value (left) and tonnes (right)



Source: SSB, table 08809

Below the 3 largest subgroups within the 3 largest commodity groups are listed with their shares.

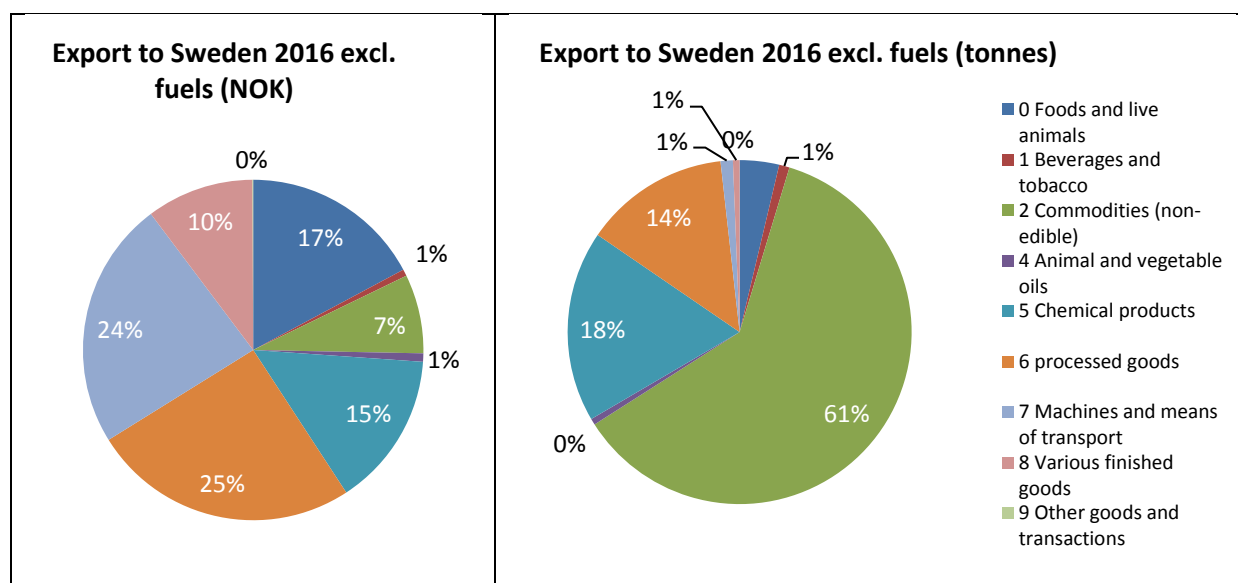
Table 13 Largest commodity groups in import from Sweden 2016, excl. fuels (tonnes) and their subgroups

Commodity group	Share of total	Subgroup	Share of total
2 Commodities (non-edible)	38%	24 Timber, timber and cork	25%
		28 Ores and metal waste	7%
		29 Animal and vegetable raw materials	3%
6 Processed goods	27%	66 Articles of non-metallic minerals	11%
		64 Paper, cardboard and goods	7%
		67 Iron and steel	4%
5 Chemical products	17%	52 Inorganic Chemical Products	6%
		59 Chemical products not mentioned otherwise	4%
		53 Color and tanning fabrics	3%

Source: SSB, table 08809

The figure below to the left shows the export to Sweden in value as regards the concerned commodity groups. They account for 65% of the total export value from Sweden. (48 billion NOK in total). The figure below to the right shows the export to Sweden in weight as regards the concerned commodity groups. They account for 57% of the total export weight to Sweden. (12 million tonnes in total).

Figure 27 Export to Sweden excl. fuels in value (left) and tonnes (right)



Source: SSB, table 08809

Below the 3 largest subgroups within the 3 largest commodity groups are listed with their shares.

Table 14 Largest commodity groups in export to Sweden 2016, excl. fuels (tonnes) and their subgroups

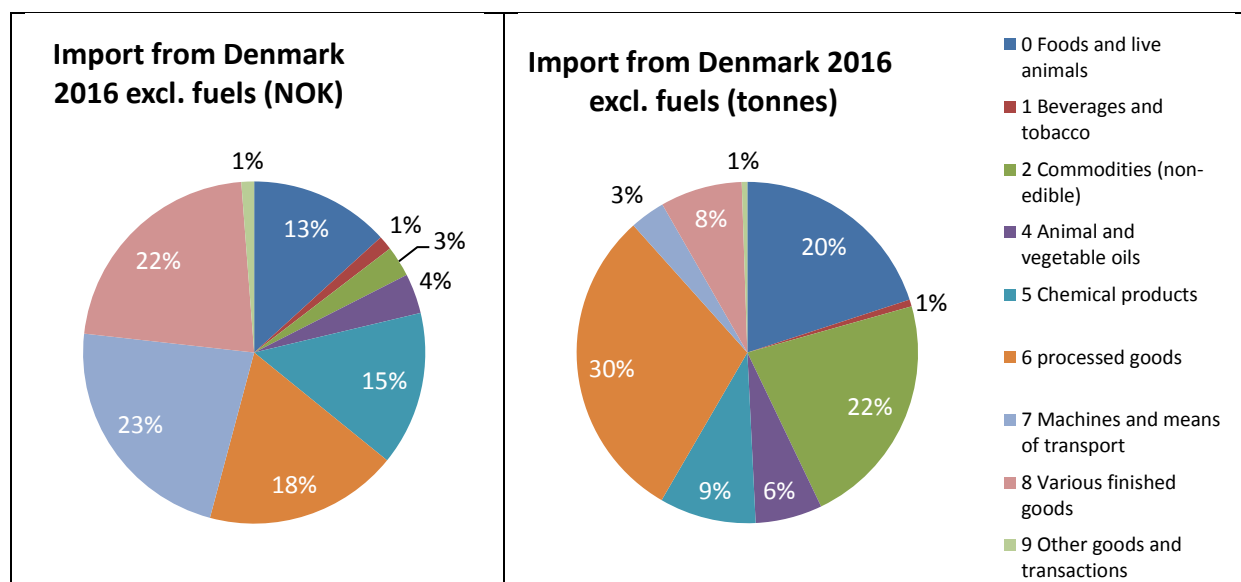
Commodity group	Share of total	Subgroup	Share of total
2 Commodities	61%	24 Timber, timber and cork	47%
		27 Crude fertilizers and raw minerals	11%
		25 Paper and paper waste	2%
5 Chemical products	18%	59 Chemical products not mentioned otherwise	9%
		52 Inorganic Chemical Products	4%
		51 Organic Chemical Products	3%
6 Processed goods	14%	67 Iron and steel	4%
		66 Articles of non-metallic minerals	3%
		63 Articles of wood and cork (except furniture)	2%

Source: SSB, table 08809

6.1.3 Denmark

Denmark is no. 5 import partner for Norway as regards value and no. 8 in export. When looking at weight Denmark is no. 5 in import and no. 7 in export. The figure below to the left shows the import from Denmark in value as regards the concerned commodity groups. They account for 91% of the total import value from Denmark. (31 billion NOK in total). The figure below to the right shows the import from Denmark in weight as regards the concerned commodity groups. They account for 65% of the total import weight from Denmark. (2.4 mio. tonnes in total).

Figure 28 Import from Denmark excl. fuels in value (left) and tonnes (right)



Source: SSB, table 08809

Below the 3 largest subgroups within the 3 largest commodity groups are listed with their shares.

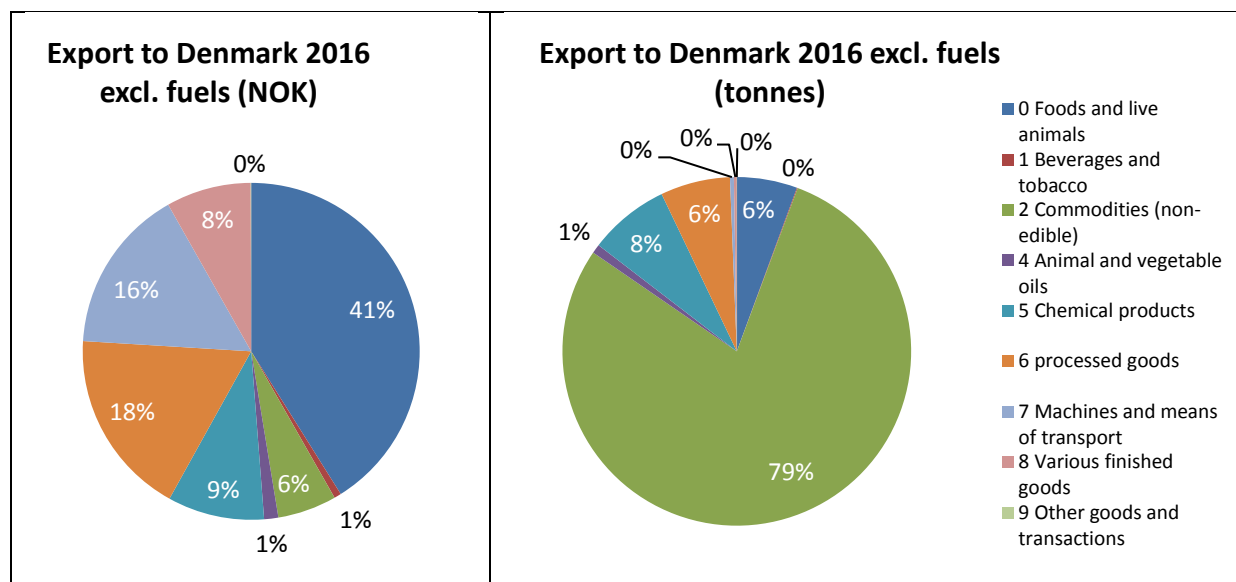
Table 15 Largest commodity groups in import from Denmark 2016, excl. fuels (tonnes) and their subgroups

Commodity group	Share of total	Subgroup	Share of total
6 Manufactured goods	30%	66 Non-metallic mineral manufactures	19%
		69 Manufactures of metal	3%
		67 Iron and steel	3%
2 Crude materials, inedible, except fuels	22%	29 Crude animal and vegetable materials	12%
		28 Ores and metal scrap	5%
		24 Cork and wood	5%
0 Food and live animals	20%	06 Sugar, sugar preparations and honey	6%
		08 Feeding stuff for animals	6%
		04 Cereals and cereal preparations	3%

Source: SSB, table 08809

The figure below to the left shows the export to Denmark in weight as regards the concerned commodity groups. They account for 65% of the total export value to Denmark (19 billion NOK in total). The figure below to the right shows the export to Denmark in weight as regards the concerned commodity groups. They account for 65% of the total import weight from Denmark (9.3 mio. tonnes in total).

Figure 29 Export to Denmark excl. fuels in value (left) and tonnes (right)



Source: SSB, table 08809

Below the 3 largest subgroups within the 3 largest commodity groups are listed with their shares.

Table 16 Largest commodity groups in export to Denmark 2016, excl. fuels (tonnes) and their subgroups

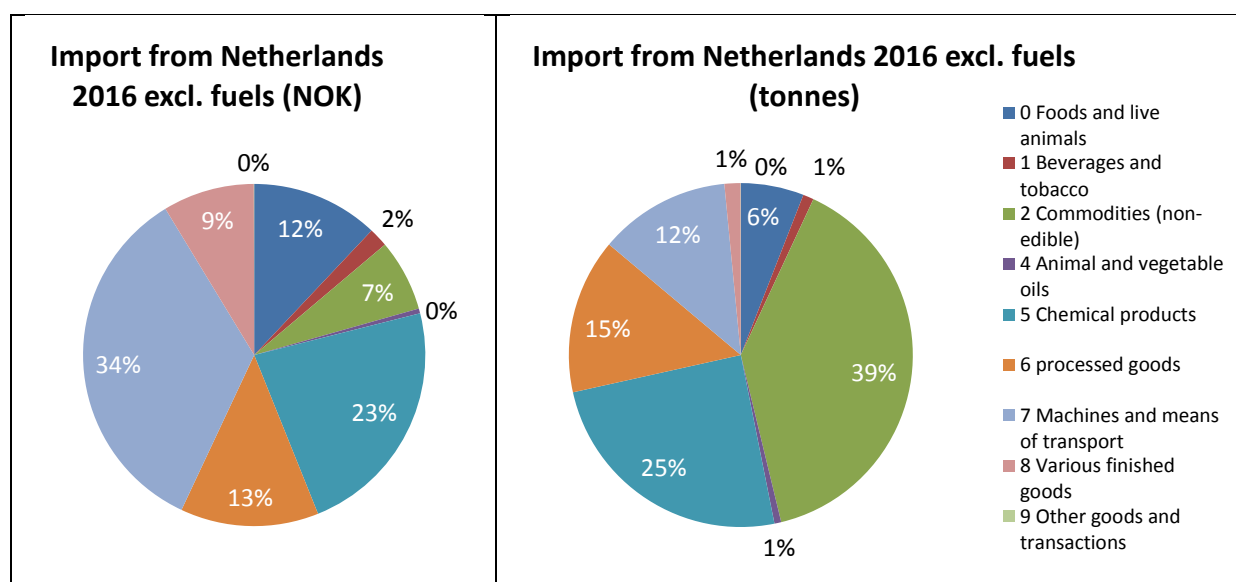
Commodity group	Share of total	Subgroup	Share of total
2 Crude materials, inedible, except fuels	79%	27 Crude fertilizers and crude minerals	74%
		24 Cork and wood	2%
		29 Crude animal and vegetable materials	2%
5 Chemicals and related products	7%	59 Chemical materials and products	4%
		52 Inorganic chemicals	2%
		51 Organic chemicals	1%
6 Manufactured goods	6%	67 Iron and steel	2%
		64 Paper, paperboard and articles thereof	2%
		68 Non-ferrous metals	1%

Source: SSB, table 08809

6.1.4 Netherlands

Netherlands is no. 7 as import partner for Norway in value and no. 3 in export. When looking at weight, Netherlands is no. 6 in import and no. 3 in import. The figure below to the left shows the import from Netherlands in value as regards the concerned commodity groups. They account for 91% of the total import value from Netherlands. (24 billion NOK in total). The figure below to the right shows the import from Netherlands in weight as regards the concerned commodity groups. They account for 79% of the total import weight from Netherlands. (2 million tonnes in total).

Figure 30 Import from Netherlands excl. fuels in value (left) and tonnes (right)



Source: SSB, table 08809

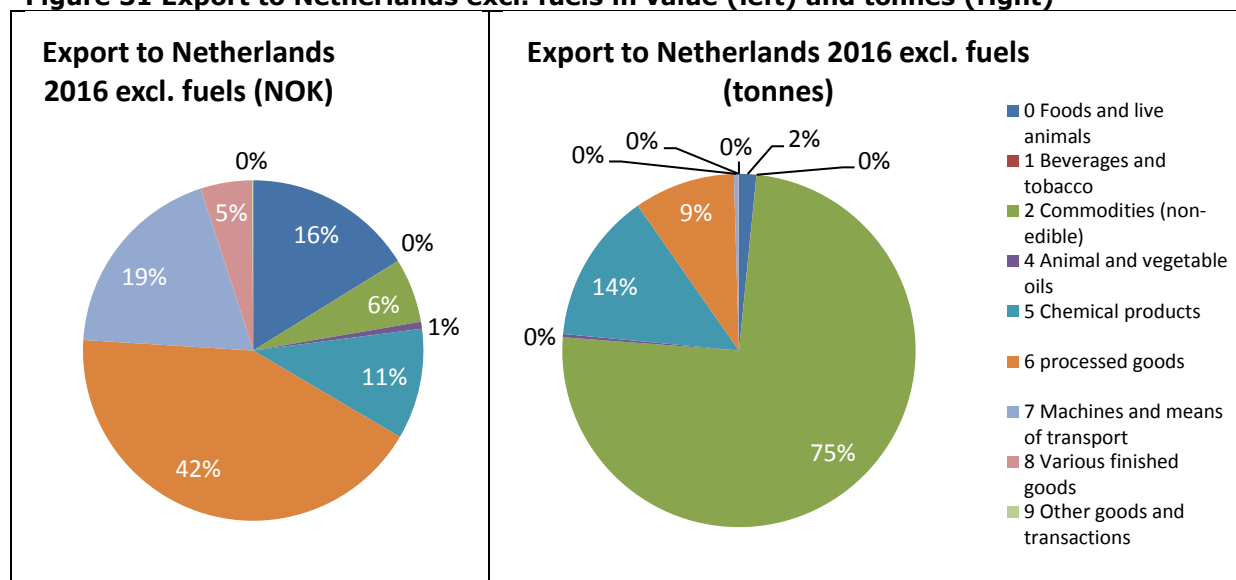
Table 17 Largest commodity groups in import from Netherlands 2016, ex. fuels (tonnes) and their subgroups

Commodity group	Share of total	Subgroup	Share of total
2 Crude materials, inedible, except fuels	39%	29 Crude animal and vegetable materials	31%
		28 Ores and metal scrap	8%
		25 Pulp and waste paper	0%
5 Chemicals and related products	25%	59 Chemical materials and products	12%
		51 Organic chemicals	6%
		52 Inorganic chemicals	4%
6 Manufactured goods	15%	64 Paper, paperboard and articles thereof	5%
		66 Non-metallic mineral manufactures	5%
		67 Iron and steel	2%

Source: SSB, table 08809

The figure below to the left shows the export to Netherlands in value as regards the concerned commodity groups. They account for 35% of the total export value to Netherlands. (79 billion NOK in total). Fuels account for 65% with 52 million tonnes. The figure below to the right shows the export to Netherlands in weight as regards the concerned commodity groups. They account for 31% of the total export weight to Netherlands. (27 million tonnes in total). Fuels account for 69% with 19 million tonnes.

Figure 31 Export to Netherlands excl. fuels in value (left) and tonnes (right)



Source: SSB, table 08809

Table 18 Largest commodity groups in export to Netherlands 2016, excl. fuels (tonnes) and their subgroups

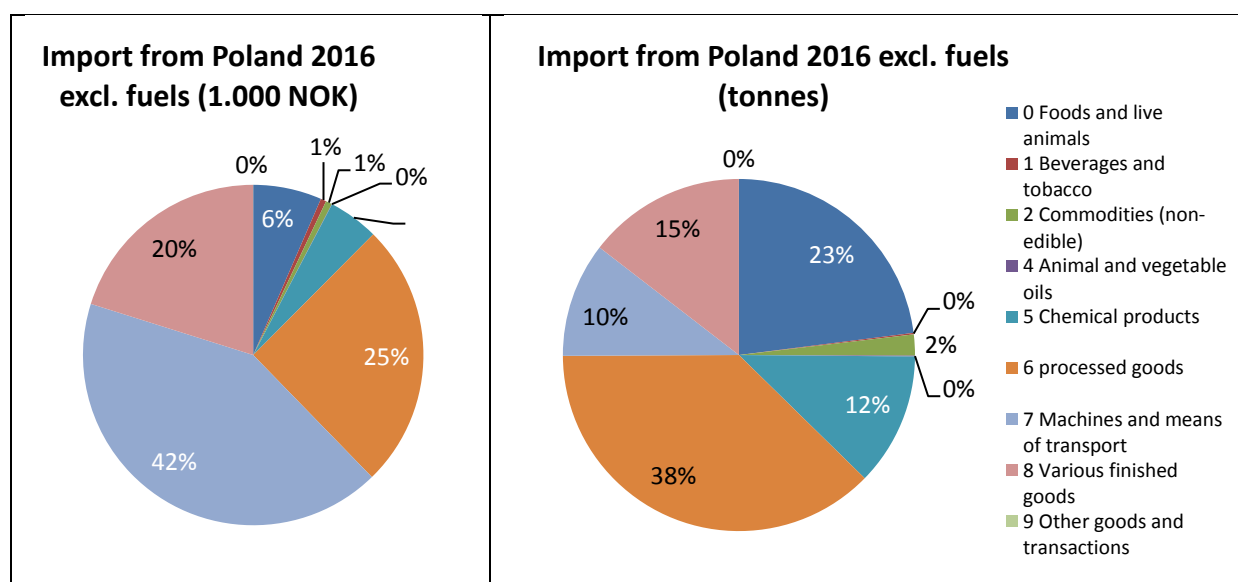
Commodity group	Share of total	Subgroup	Share of total
2 Crude materials, inedible, except fuels	75%	27 Crude fertilizers and crude minerals	54%
		28 Ores and metal scrap	16%
		25 Pulp and waste paper	3%
5 Chemicals and related products	14%	59 Chemical materials and products	10%
		52 Inorganic chemicals	1%
		51 Organic chemicals	1%
6 Manufactured goods	9%	68 Non-ferrous metals	5%
		67 Iron and steel	2%
		66 Non-metallic mineral manufactures	1%

Source: SSB, table 08809

6.1.5 Poland

Poland is no. 8 import partner to Norway as regards value and no. 10 in export. When looking at weight Poland is no. 10 in import and no. 12 in export. The figure below to the left shows the import from Poland in value as regards the concerned commodity groups. They account for 96% of the total import value from Poland. (21 billion NOK in total). The figure below to the right shows the import from Poland in weight as regards the concerned commodity groups. They account for 67% of the total import weight from Poland. (1 million tonnes in total).

Figure 32 Import from Poland excl. fuels in value (left) and tonnes (right)



Source: SSB, table 08809

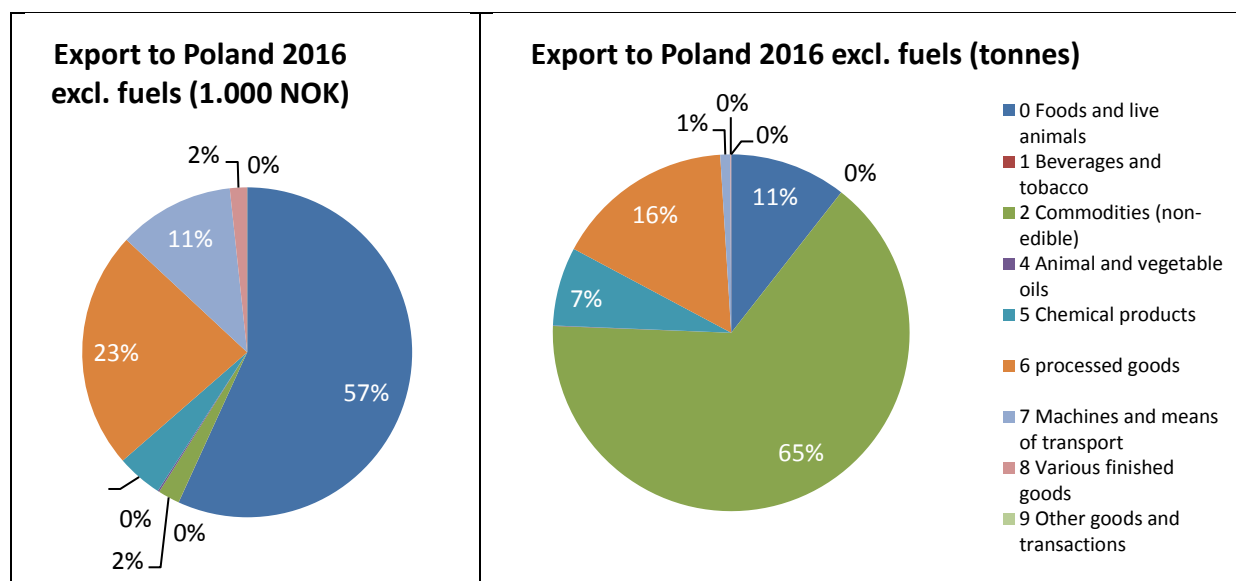
Table 19 Largest commodity groups in import from Poland 2016, excl. fuels (tonnes) and their subgroups

Commodity group	Share of total	Subgroup	Share of total
6 Manufactured goods	38%	63 Cork and wood manufactures (ex furniture)	12%
		69 Manufactures of metals, n.e.s.	11%
		66 Non-metallic mineral manufactures	8%
0 Food and live animals	23%	04 Cereals and cereal preparations	14%
		05 Vegetables and fruit	5%
		08 Feeding stuff for animals	2%
8 Miscellaneous manufactured articles	15%	82 Furniture and parts thereof	8%
		89 Miscellaneous articles	4%
		81 Prefabricated buildings	2%

Source: SSB, table 08809

The figure below to the left shows the export to Poland in value as regards the concerned commodity groups. They account for 98% of the total import value from Poland. (17 billion NOK in total). The figure below to the right shows the export to Poland in weight as regards the concerned commodity groups. They account for 95% of the total export weight from Poland. (2 million tonnes in total).

Figure 33 Export to Poland excl. fuels in value (left) and tonnes (right)



Source: SSB, table 08809

Table 20 Largest commodity groups in export to Poland 2016, excl. fuels (tonnes) and their subgroups

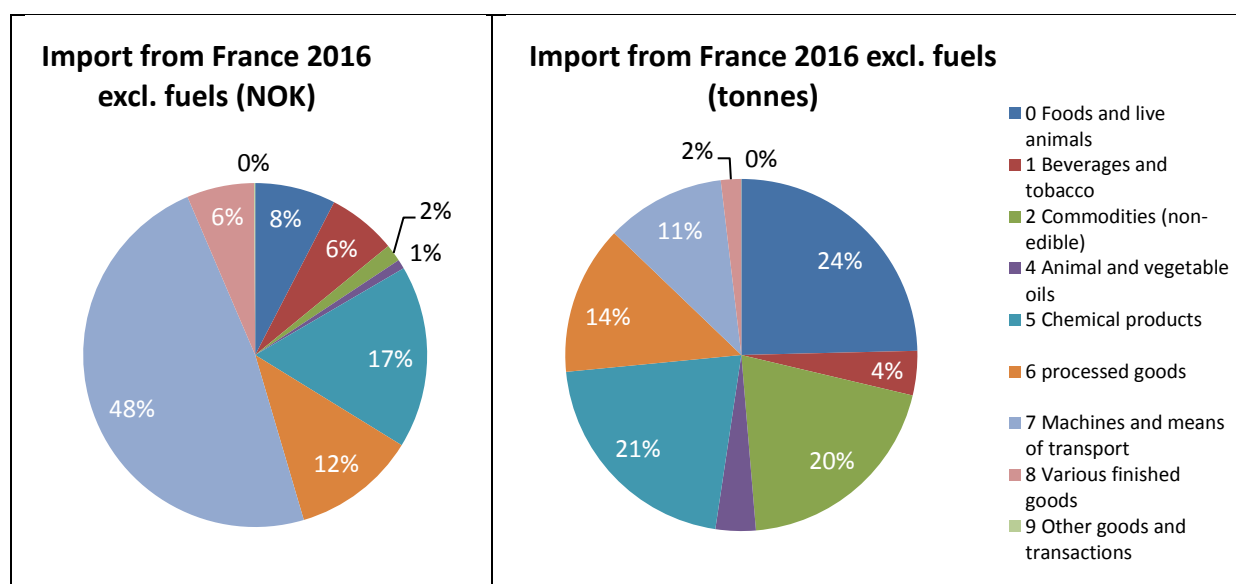
Commodity group	Share of total	Subgroup	Share of total
2 Crude materials, inedible, except fuels	62%	27 Crude fertilizers and crude minerals	56%
		28 Ores and metal scrap	4%
		25 Pulp and waste paper	1%
6 Manufactured goods	15%	68 Non-ferrous metals	7%
		67 Iron and steel	5%
		64 Paper, paperboard and articles thereof	3%
0 Food and live animals	10%	03 Fish, crustaceans, molluscs	10%
		08 Feeding stuff for animals	0%
		05 Vegetables and fruit	0%

Source: SSB, table 08809

6.1.6 France

France is no. 9 as import partner to Norway as regards value and no. 4 as regards export. When looking at weight France is no. 14 as regards import and no. 5 as regards export. The figure below to the left shows the import from France in value as regards the concerned commodity groups. They account for 99% of the total import value from France. (20 billion NOK in total). The figure below to the right shows the import from France in weight as regards the concerned commodity groups. They account for 90% of the total import weight from France. (636,000 tonnes in total).

Figure 34 Import from France excl. fuels in value (left) and tonnes (right)



Source: SSB, table 08809

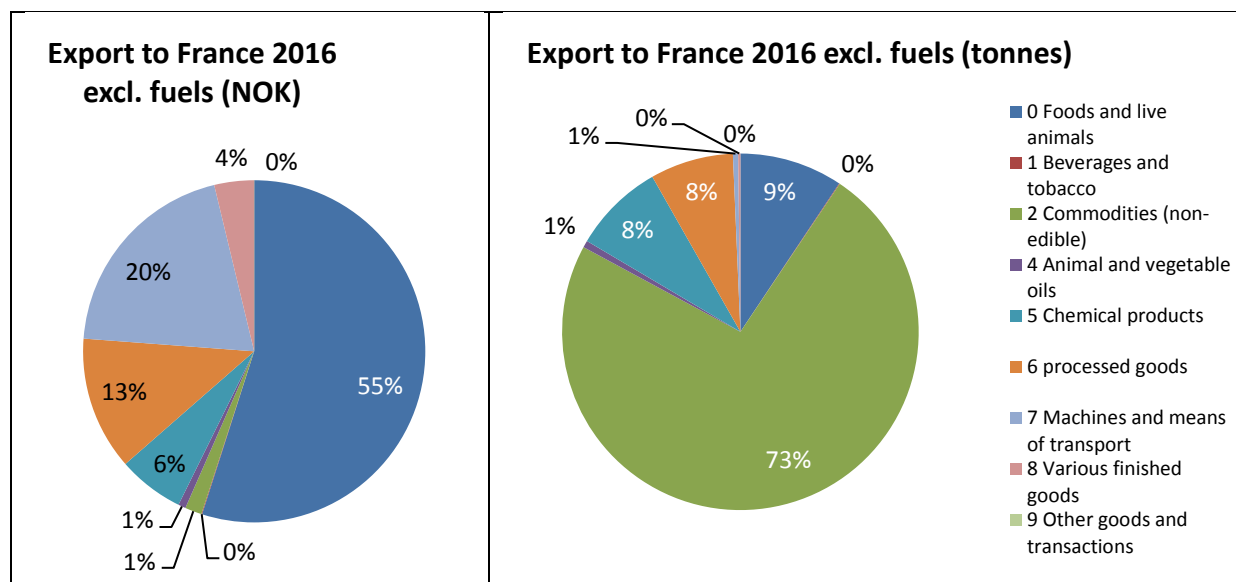
Table 21 Largest commodity groups in import from France 2016, excl. fuels (tonnes) and their subgroups

Commodity group	Share of total	Subgroup	Share of total
0 Food and live animals	25%	05 Vegetables and fruit	14%
		04 Cereals and cereal preparations	6%
		08 Feeding stuff for animals	2%
5 Chemicals and related products	21%	59 Chemical materials and products	7%
		57 Plastics in primary forms	5%
		52 Inorganic chemicals	3%
2 Crude materials, inedible, except fuels	20%	29 Crude animal and vegetable materials	14%
		28 Ores and metal scrap	6%
		23 Crude rubber	0%

Source: SSB, table 08809

The figure below to the left shows the export to France in value as regards the concerned commodity groups. They account for 29% of the total export value to France. (50 billion NOK in total). Fuels account for 71% with 35 billion NOK. The figure below to the right shows the export to France in weight as regards the concerned commodity groups. They account for 7% of the total export weight to France. (20 million tonnes in total). Fuels account for 93% with 18 million tonnes.

Figure 35 Export to France excl. fuels in value (left) and tonnes (right)



Source: SSB, table 08809

Table 22 Largest commodity groups in export to France 2016, excl. fuels (tonnes) and their subgroups

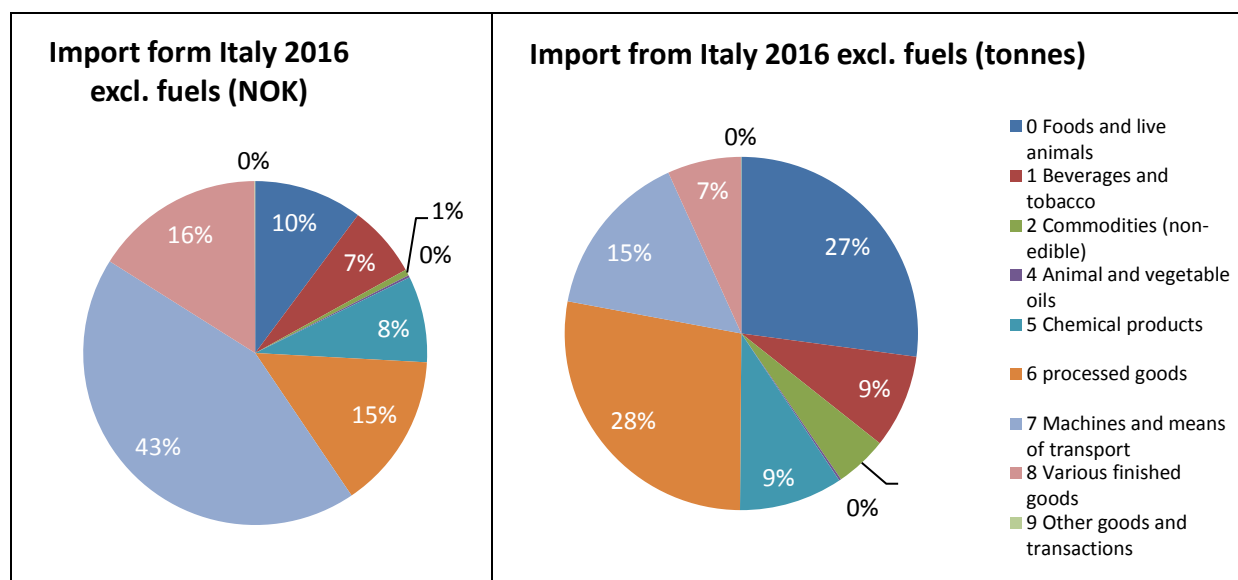
Commodity group	Share of total	Subgroup	Share of total
2 Crude materials, inedible, except fuels	73%	27 Crude fertilizers and crude minerals	71%
		28 Ores and metal scrap	2%
		24 Cork and wood	1%
0 Food and live animals	9%	03 Fish, crustaceans, molluscs	9%
		04 Cereals and cereal preparations	0%
		08 Feeding stuff for animals	0%
5 Chemicals and related products	8%	52 Inorganic chemicals	5%
		59 Chemical materials and products	1%
		51 Organic chemicals	1%

Source: SSB, table 08809

6.1.7 Italy

Italy is no. 10 import partner to Norway as regards value and no. 15 in export. When looking at value Italy is no. 18 as regards import and no. 17 as regards export. The figure below to the left shows the import from Italy in value as regards the concerned commodity groups. They account for 100% of the total import value from Italy. (18 billion NOK in total). The figure below to the right shows the import from Italy in weight as regards the concerned commodity groups. They account for 98% of the total import weight from Italy. (400,000 tonnes in total).

Figure 36 Import from Italy excl. fuels in value (left) and tonnes (right)



Source: SSB, table 08809

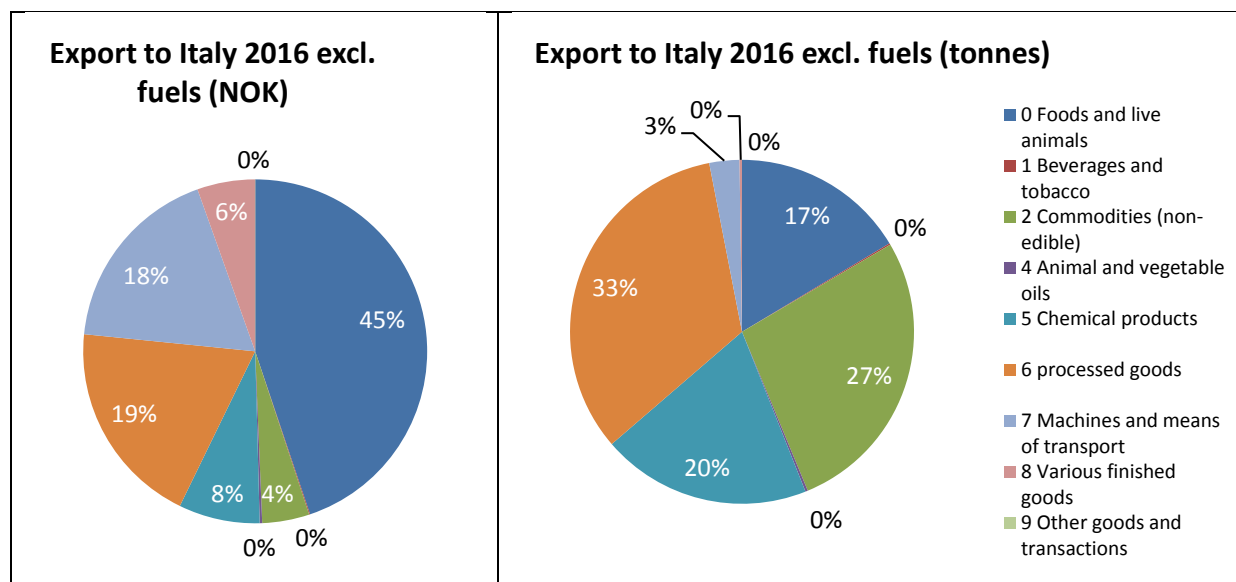
Table 23 Largest commodity groups in import from Italy 2016, excl. fuels (tonnes) and their subgroups

Commodity group	Share of total	Subgroup	Share of total
6 Manufactured goods	28%	66 Non-metallic mineral manufactures	12%
		67 Iron and steel	7%
		69 Manufactures of metal	3%
0 Food and live animals	27%	05 Vegetables and fruit	18%
		04 Cereals and cereal preparations	5%
		09 Miscellaneous foods	1%
7 Machinery and transport equipment	15%	74 General industrial machinery	5%
		77 Electrical machinery and equipment	3%
		72 Machinery for particular industries	3%

Source: SSB, table 08809

The figure below to the left shows the export from Italy in value as regards the concerned commodity groups. They account for 84% of the total export value to Italy. (10 billion NOK in total). The figure below shows the export to Italy in weight as regards the concerned commodity groups. They account for 37% of the total export weight to Italy. (1 million tonnes in total). Fuels account for 63% with 600,000 tonnes, but only 16% of the export value.

Figure 37 Export to Italy excl. fuels in value (left) and tonnes (right)



Source: SSB, table 08809

Table 24 Largest commodity groups in export to Italy 2016, excl. fuels (tonnes) and their subgroups

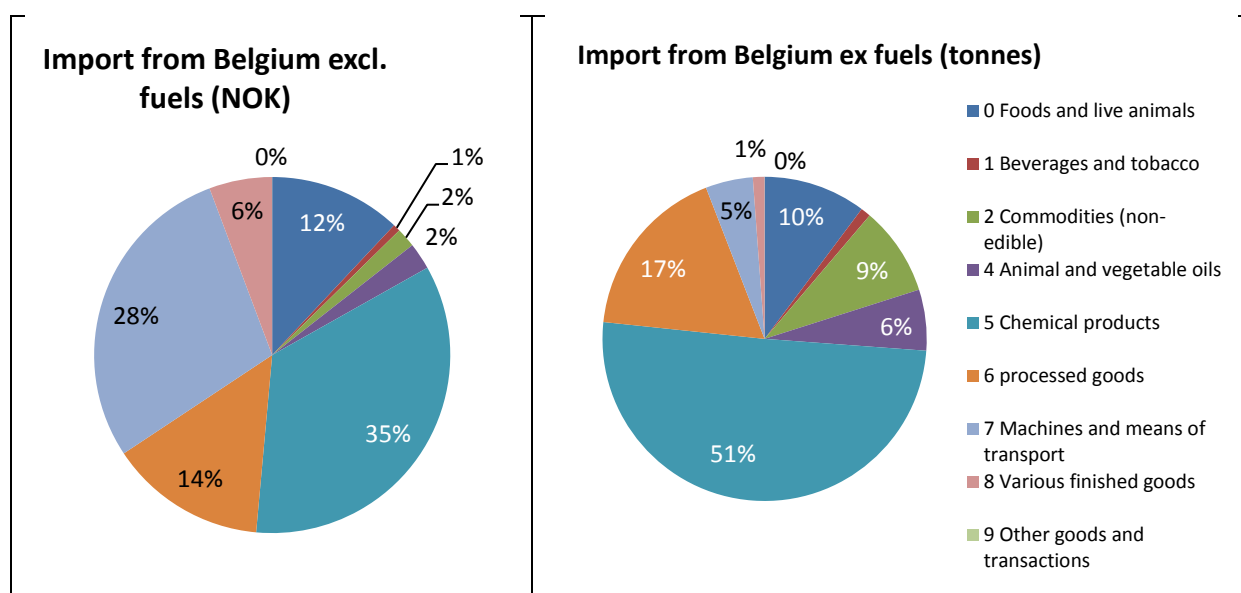
Commodity group	Share of total	Subgroup	Share of total
6 Manufactured goods	33%	68 Non-ferrous metals	18%
		64 Paper, paperboard and articles thereof	9%
		67 Iron and steel	5%
2 Crude materials, inedible, except fuels	27%	27 Crude fertilizers and crude minerals	24%
		21 Hides, skins and furskins, raw	2%
		25 Pulp and waste paper	0%
5 Chemicals and related products	20%	59 Chemical materials and products	10%
		51 Organic chemicals	5%
		52 Inorganic chemicals	2%

Source: SSB, table 08809

6.1.8 Belgium

Belgium is no. 15 import partner to Norway as regards value and no. 6 in export. When looking at weight Belgium is no. 13 in import and no. 5 in export. The import from Belgium totalled 11 billion NOK in 2016, and 2-fuel oils etc. accounted for 1.1 billion NOK thereof. The figure below to the left shows the import from Belgium in value as regards the concerned commodity groups. They account for 90% of the total import value from Belgium. (11 billion NOK in total). The figure below to the right shows the import from Belgium in weight as regards the concerned commodity groups. They account for 64% of the total import weight from Belgium. (812.000 tonnes in total).

Figure 38 Import from Belgium excl. fuels in value (left) and tonnes (right)



Source: SSB, table 08809

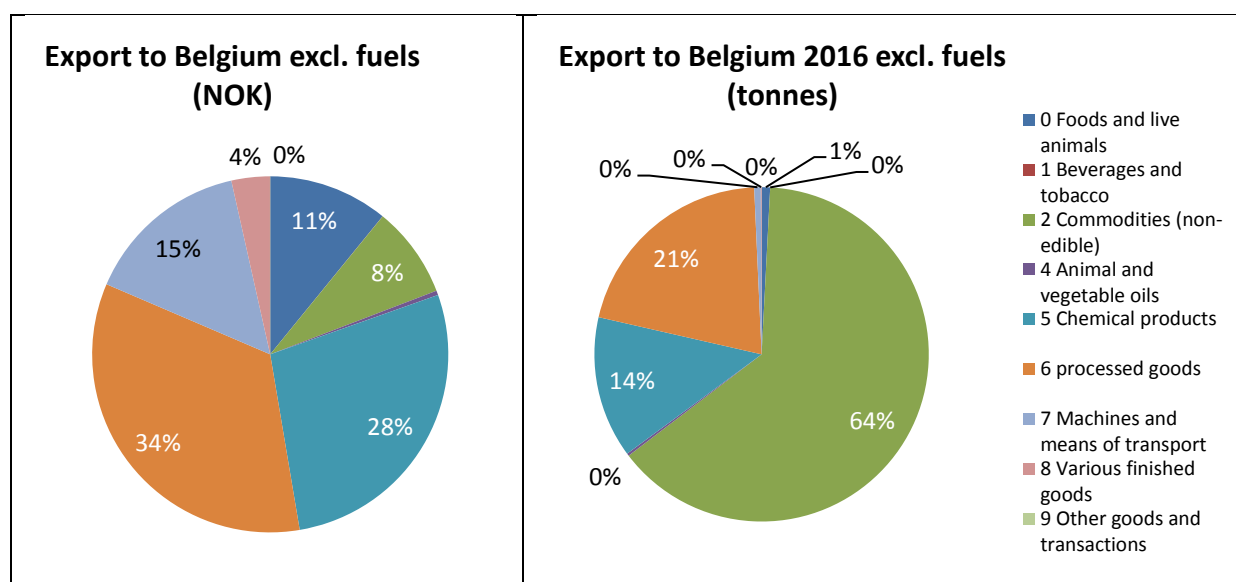
Table 25 Largest commodity groups in import from Belgium 2016, excl. fuels (tonnes) and their subgroups

Commodity group	Share of total	Subgroup	Share of total
5 Chemicals and related products	50%	59 Chemical materials and products	24%
		51 Organic chemicals	10%
		52 Inorganic chemicals	8%
6 Manufactured goods	17%	67 Iron and steel	5%
		69 Manufactures of metal	4%
		63 Cork and wood manufactures	4%
0 Food and live animals	10%	05 Vegetables and fruit	5%
		04 Cereals and cereal preparations	3%
		09 Miscellaneous foods	1%

Source: SSB, table 08809

The figure below to the left shows the export from Belgium in value as regards the concerned commodity groups. They account for 22% of the total export value to Belgium. (33 billion NOK in total). This means that fuels account for 78% with a value of 25 billion NOK. The figure below to the right shows the export to Belgium in weight as regards the concerned commodity groups. They account for 10% of the total export weight to Belgium. (16 million tonnes in total). This means that fuel accounts for 90% with 14 million tonnes.

Figure 39 Export to Belgium excl. fuels in value



Source: SSB, table 08809

Table 26 Largest commodity groups in export to Belgium 2016, excl. fuels (tonnes) and their subgroups

Commodity group	Share of total	Subgroup	Share of total
2 Crude materials, inedible, except fuels	64%	27 Crude fertilizers and crude minerals	51%
		24 Cork and wood	9%
		28 Ores and metal scrap	2%
6 Manufactured goods	21%	64 Paper, paperboard and articles thereof	11%
		67 Iron and steel	5%
		68 Non-ferrous metals	3%
5 Chemicals and related products	14%	51 Organic chemicals	7%
		59 Chemical materials and products	5%
		57 Plastics in primary forms	1%

Source: SSB, table 08809

7 The exports from the Oslo Region

The focus shifts toward the Oslo region and its role in the import and export in Norway.

Generally it's difficult to find data on import and export for the Oslo Region and Statistics Norway import/export data at county level only comprises data for export in value. We have tried to find more data for the region, but we haven't been able to find more data.

The statistics for the counties in the Oslo Region has a different commodity split compared to SITC 9 commodity groups used for Norway as a whole. In order to compare the statistics between the Oslo Region and Norway as a whole, we use the following "translation" based on "Definition of the commodity classification"⁶.

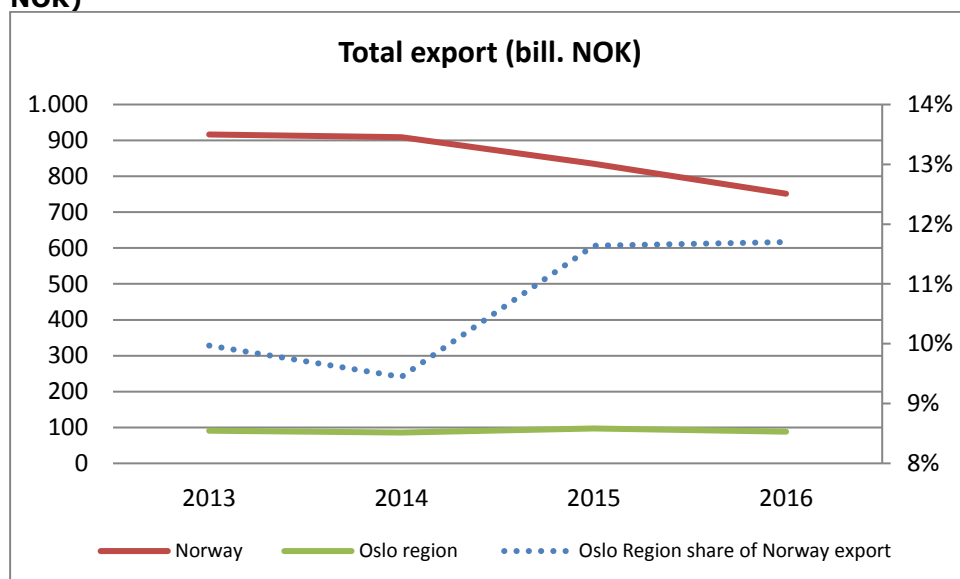
Table 27 "Translation" of commodity groups between SITC 9 and the Norwegian county statistics

SITC 9 grouping statistics	Norwegian County statistic (in English)
0 Food and live animals	Food, beverages, tobacco, etc.
1 Beverages and tobacco	
4 Animal and vegetables oils, fats and wax	
2 Raw materials, inedible	Raw materials, inedible, excl. Fuels
3 Mineral fuels and lubricants	Fuels and lubricants, etc.
5 Chemicals and chemical good	Chemicals and other chemical goods
6 Manufactured products, primarily semi-manufactures	Manufactured products, primarily semi-manufactures
7 Machinery and transport equipment	Machinery and transport equipment
8 Manufactured products, not elsewhere specified	Finished goods and other goods
9 Miscellaneous goods and transactions, not elsewhere specified	

Figure 40 shows a Comparison of total export between Norway and the Oslo Region in value (bill. NOK). Note that the left y-axis shows the value of exports, while the right y-axis shows the Oslo Regions' share of the Norwegian export.

⁶ <http://www.dst.dk/en/Statistik/emner/udenrigsoekonomi/udenrigshandel/udenrigshandel-med-varer>

Figure 40 Comparison of total export between Norway and the Oslo Region in value (bill. NOK)

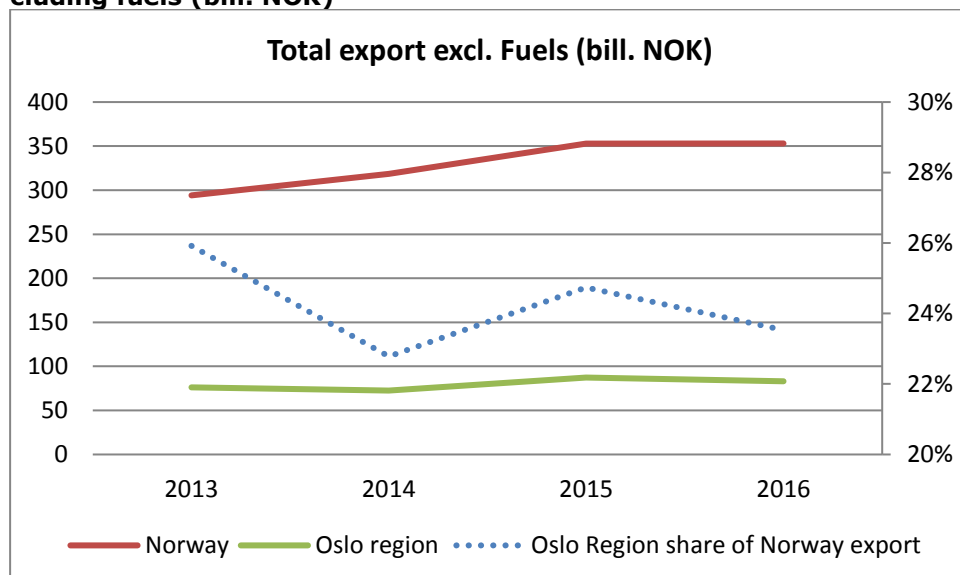


Source: SSB table: 08809

The value of the Oslo Region's export has been just below 100 billion NOK in the last 4 years and that accounts for roughly 10-12% of Norway's total export value.

When excluding the fuel export from the picture, **Figure 41** shows that the Oslo Regions share of the Norwegian export value grows to around 25%

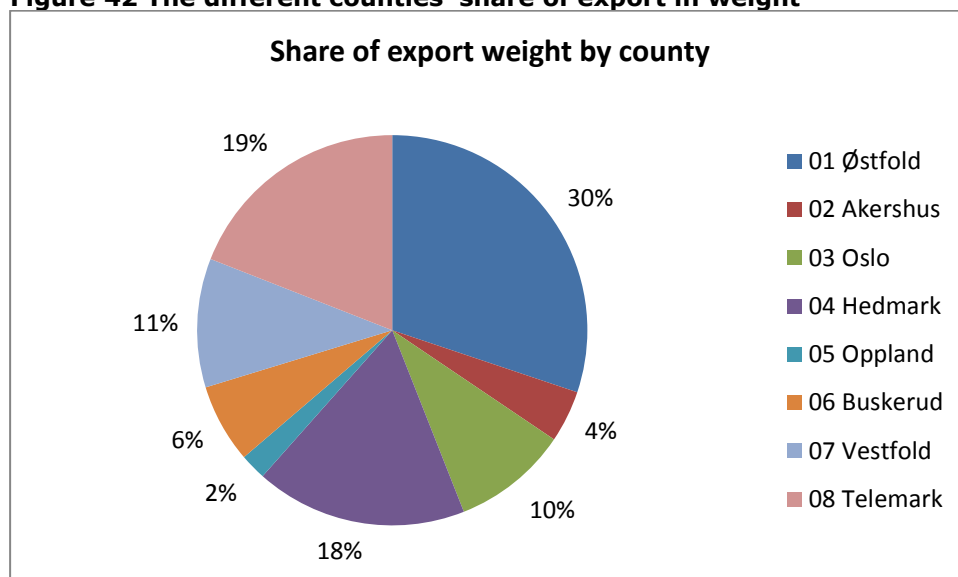
Figure 41 Comparison of total export between Norway and the Oslo Region in value - excluding fuels (bill. NOK)



Source: SSB table: 08809

The counties in the Oslo Region are all different when it comes to the export. **Figure 42** shows each county's share of the Oslo Regions export by weight.

Figure 42 The different counties' share of export in weight

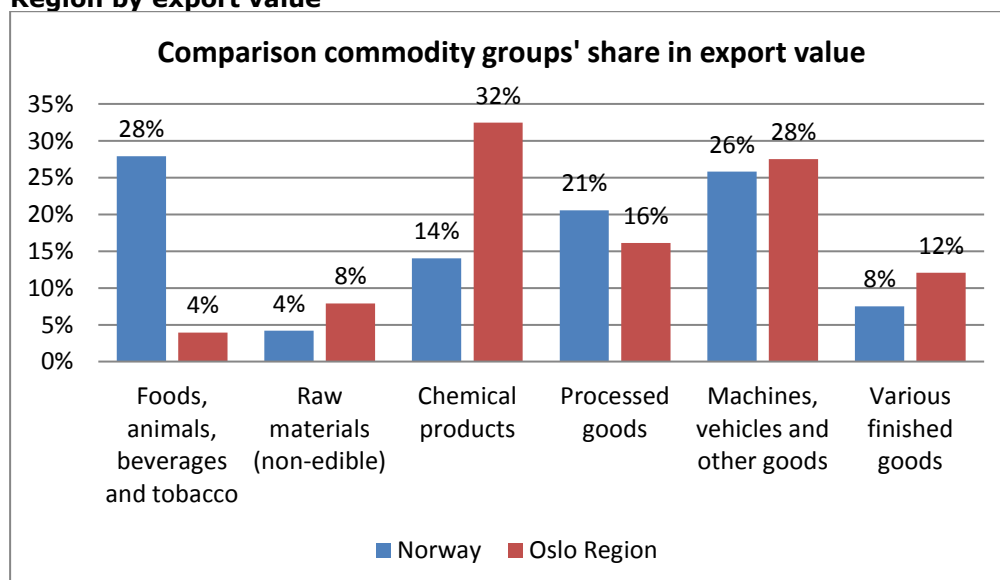


Source: SSB table: 08809 and 10482

Østfold, Hedmark and Telemark accounts for 2/3rds of the regions exports while Oppland, Akershus and Buskerud play a significantly smaller roll.

To see how the regions export by commodity groups aligns with the total Norwegian export a comparison of the shares for the different commodity groups in the Norwegian and in the Oslo Region exports has been made. **Figure 43** shows the comparison.

Figure 43 Comparison of the different commodity groups' share of Norwegian and Oslo Region by export value



Source: SSB table: 08809 and 10482

In the figure above, the picture for the export value shows differences for Norway and the Oslo Region. One notices that the Oslo Regions export of "Foods, animals, beverages and tobacco" is very low compared to the country as a whole. This is most likely due to the lack of fish in the Oslo Regions' export. On the other hand the "Chemical products" play a larger role in the export value for the Oslo Region compared to Norway as a whole

As mentioned before, the statistics for the counties in the Oslo Region only covers the value of the export. In order to try assessing the freight volumes in export from the Oslo Region, we have calculated the value pr. tonnes of freight (NOK/tonnes) for each commodity group based on the freight export statistics for Norway as a whole. **Table 28** shows the average value pr. tonnes for the commodity groups.

Table 28 Average value pr. tonnes for the commodity groups

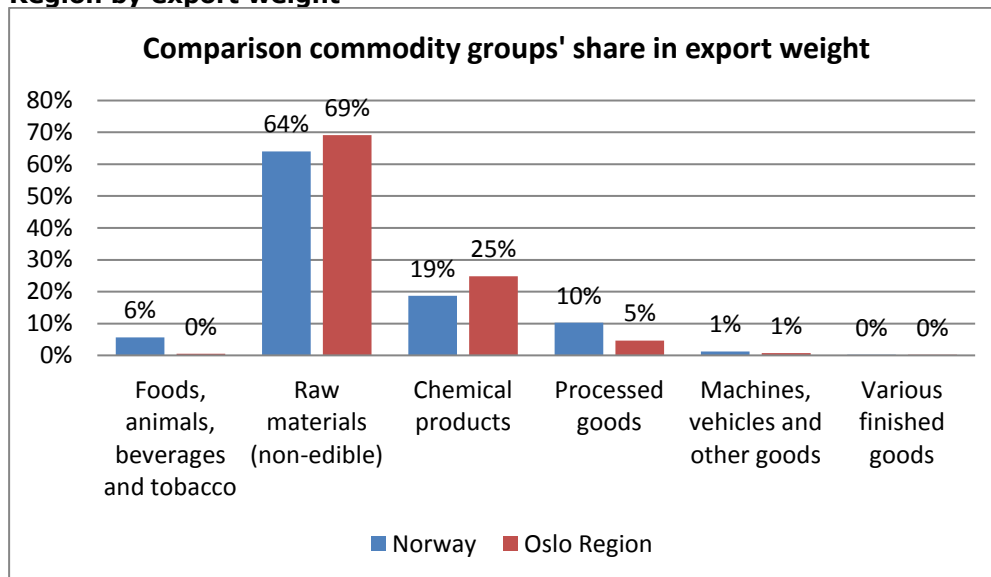
Average value pr. tonnes	NOK/tonnes
Food, animals, beverages and tobacco	31.517
Raw materials excl. fuels	429
Chemical products	4.900
Processed goods	13.124
Machines, vehicles and other goods	141.732
Various finished goods	231.339

Source: SSB table: 08809 and 10482

All data onwards on export by weight from the Oslo Region is based on the values in **Table 28**.

When looking at the export by weight the picture is very different than when looking at export by value. **Figure 44** shows that commodity groups' share in export by weight is almost identical when comparing Norway and the Oslo Region. The reason could be that fish is a relatively high value export commodity, but has a low weight. And that the raw materials and chemical products for the most part are more low value and high weight.

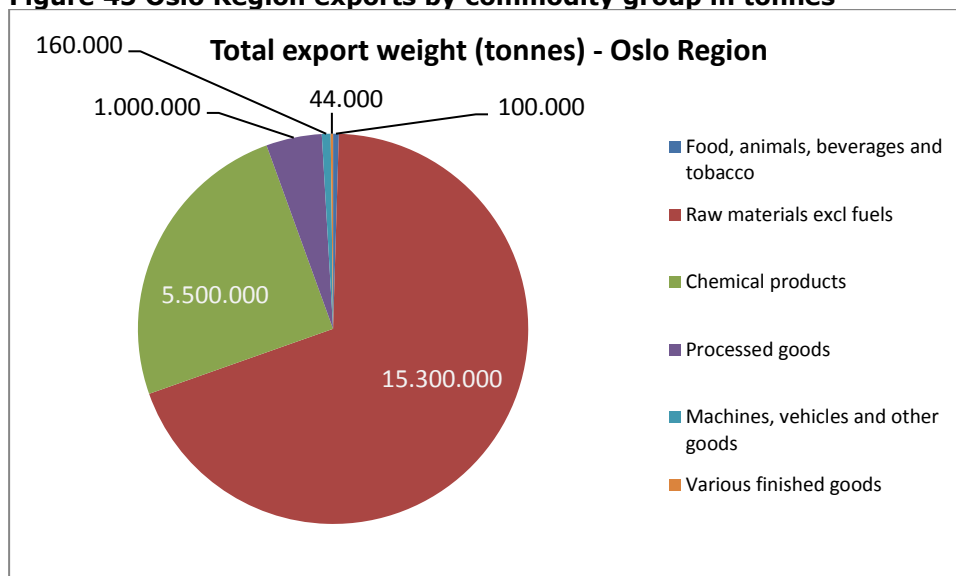
Figure 44 Comparison of the different commodity groups' share of Norwegian and Oslo Region by export weight



Source: SSB table: 08809 and 10482

Figure 45 shows the actual freight volumes in tonnes. "Raw materials" are by far the largest commodity group by weight, it accounts for more than 2/3rds of the export with its 15.3 million tonnes. "Chemical products" accounts for 25% at 5,5 million tonnes and the 3rd largest is "Processed goods" at 5% with 1 million tonnes.

Figure 45 Oslo Region exports by commodity group in tonnes

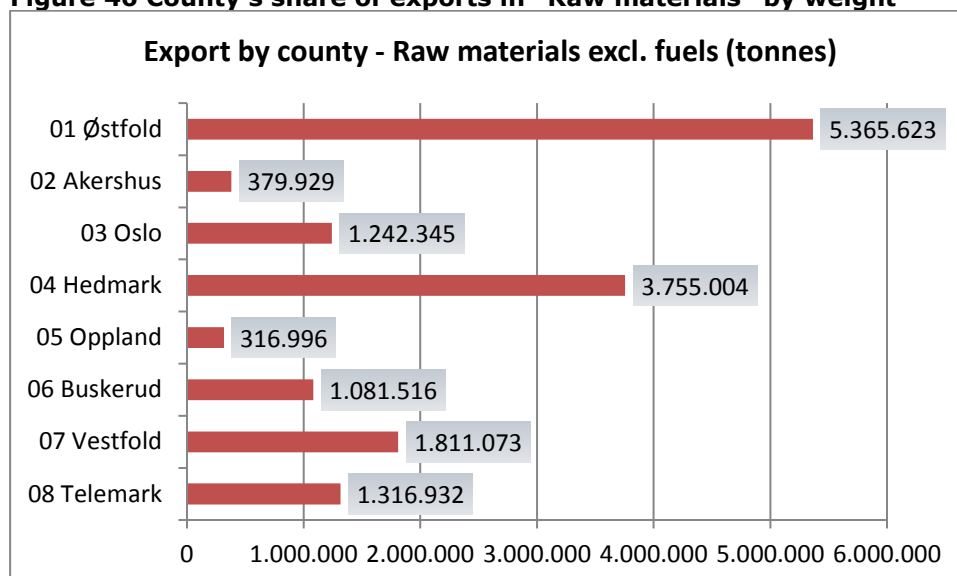


Source: SSB table: 08809 and 10482

In the following 3 figures the three largest commodity groups are shown as a split between the different counties in the Oslo Region.

Figure 46 shows that the counties Østfold and Hedmark account for more than 50% of the export in “Raw materials”.

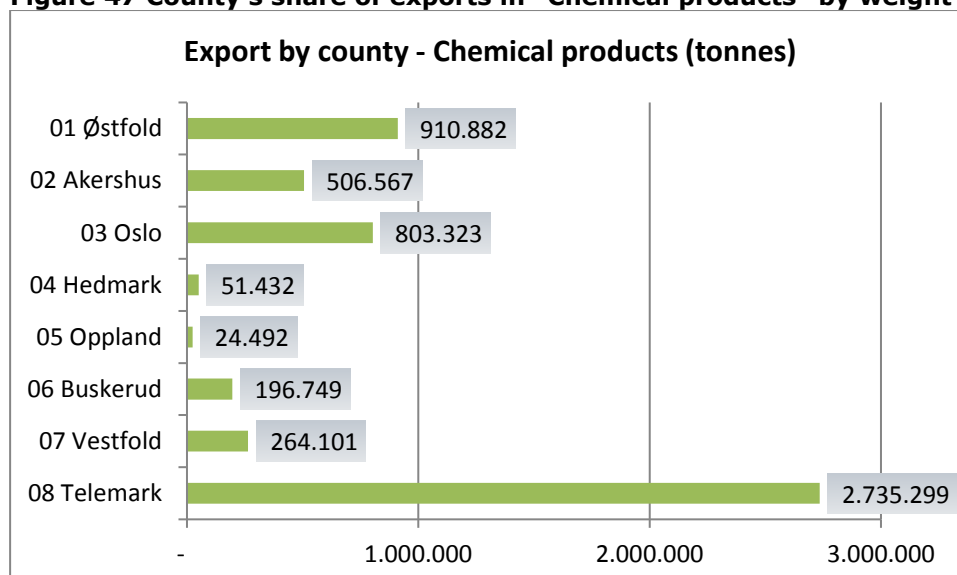
Figure 46 County’s share of exports in “Raw materials” by weight



Source: SSB table: 08809 and 10482

Telemark county is the primary exporter of “Chemical products” with a share of more than 50% and 2,7 million tonnes Østfold and Oslo counties both have almost a million tonnes in “Chemical products” export.

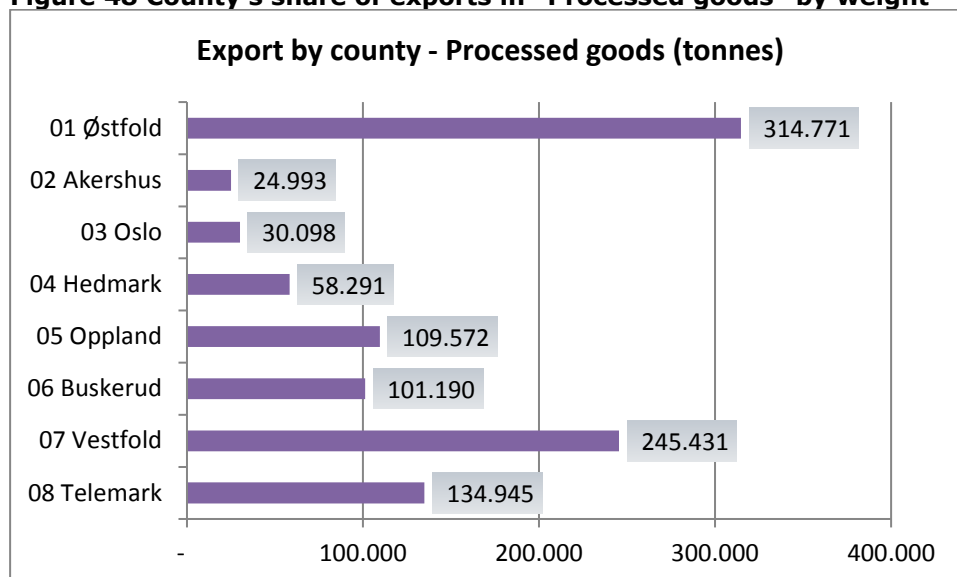
Figure 47 County’s share of exports in “Chemical products” by weight



Source: SSB table: 08809 and 10482

In export of “Processed goods” especially Østfold, but also Vestfold has significant shares of the regions export, as they account for more than 50% with respectively 300.000 and 250.000 tonnes.

Figure 48 County's share of exports in "Processed goods" by weight



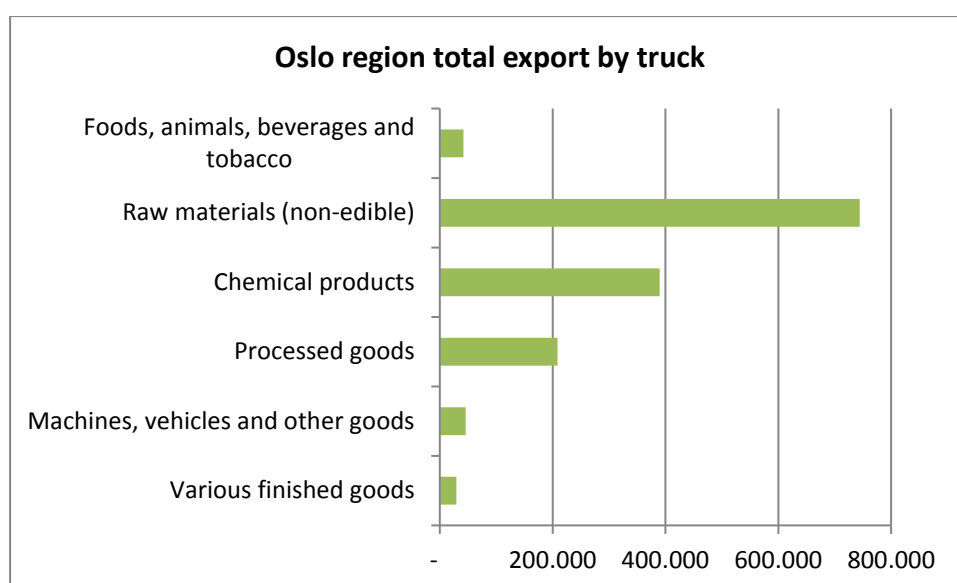
Source: SSB table: 08809 and 10482

7.1 Export by truck from the Oslo Region

To make an estimation of the export by truck from the Oslo Region we have combined the calculated freight volume in weight used in the figures above, with statistic data on transport mode for Norway as whole. See chapter 6.

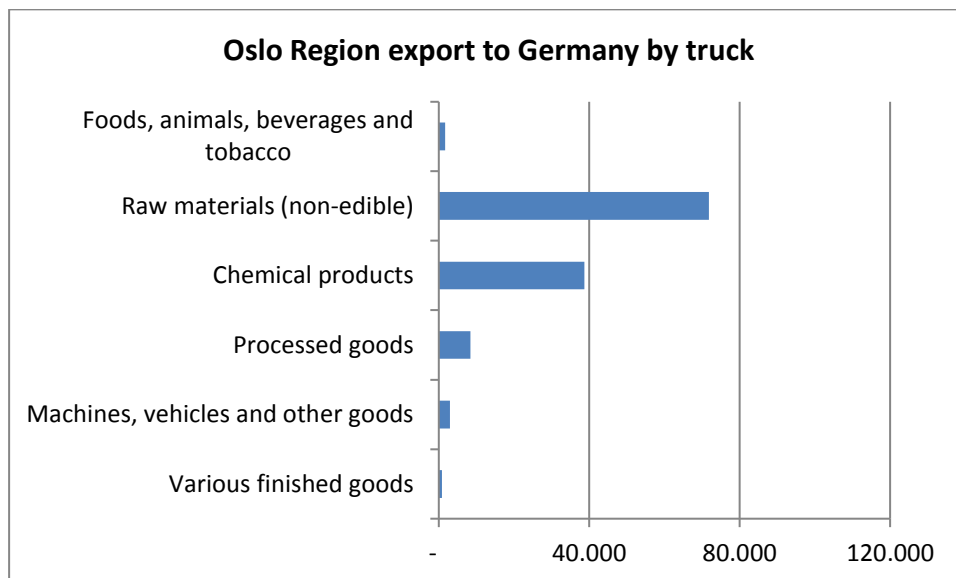
The first figure shows the total export from the Oslo Region split in commodity groups. The primary 3 export commodity groups from the previous section "Raw materials", "Chemical products" and "Processed goods" also accounts for the biggest shares when it comes to export by truck.

Figure 49 Oslo region total export by truck



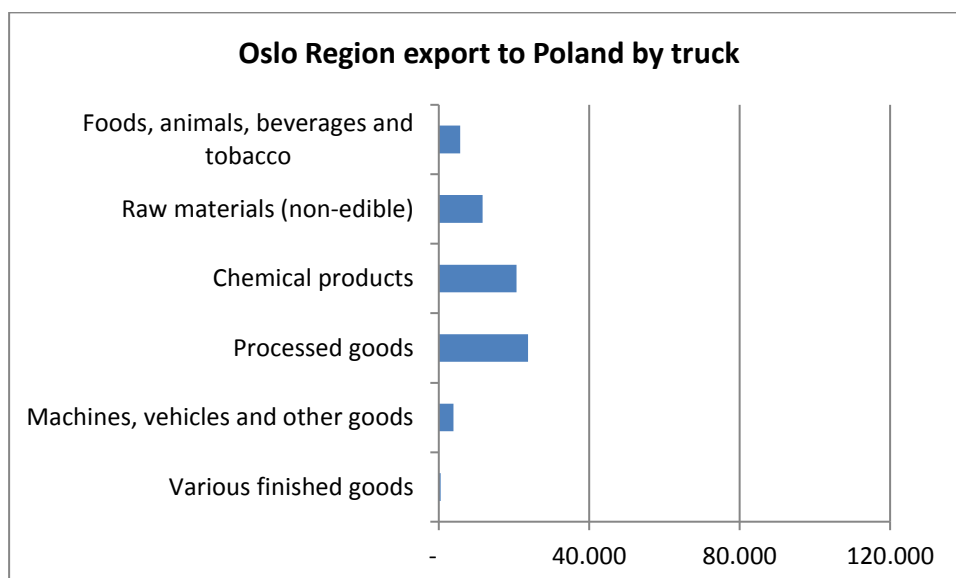
Germany is one of Norway's primary trade partners and the figure below shows that the export to Germany is very similar to the total export from the region. Compared to the regions total export by truck Germany account for less than 10%.

Figure 50 Oslo Region export to Germany by truck



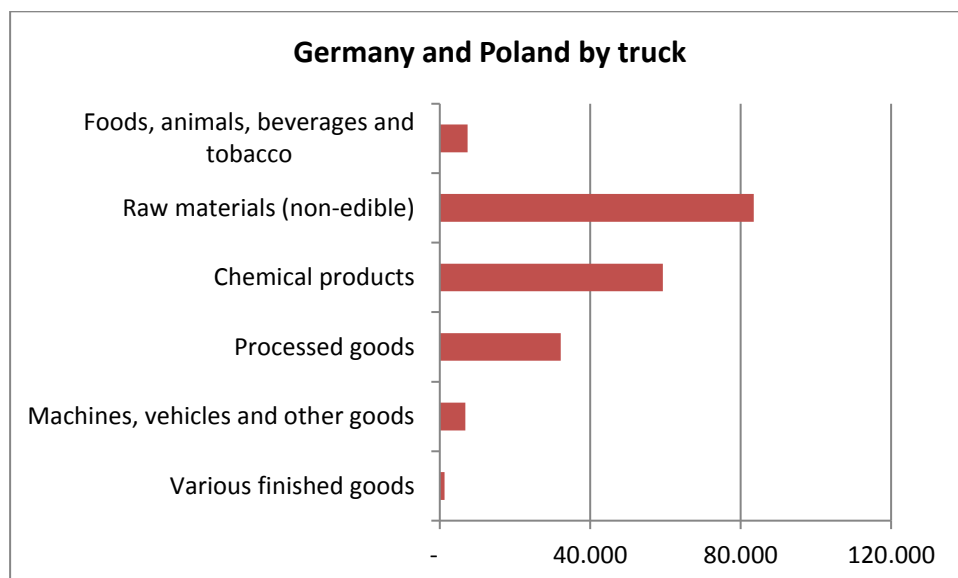
That picture changes a bit when looking at the regions export to Poland. It's still the same 3 commodity groups that have the largest volumes, but in the opposite order with "Processed goods" as the largest. Poland accounts for less than 10% of the regions export by truck.

Figure 51 Oslo Region export to Poland by truck



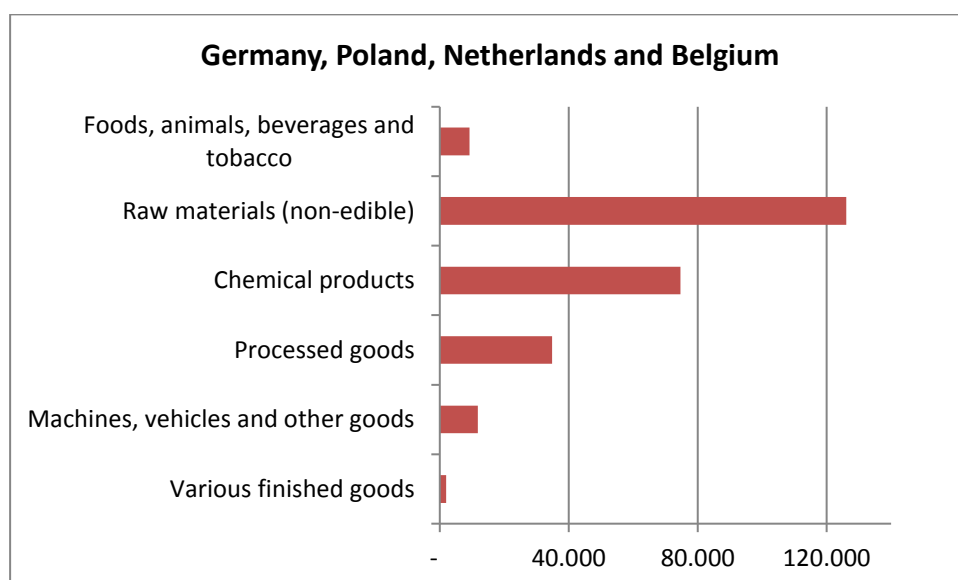
The picture of the combined export to Germany and Poland by truck is dominated by the export to Germany and the combined share of the regions export by truck is around 15%.

Figure 52 Oslo Region export to Germany and Poland by truck



The figure below shows the split and volumes when combining regions export to Germany, Poland, Netherlands and Belgium by truck. Collectively these countries account for close to 20% of the regions export.

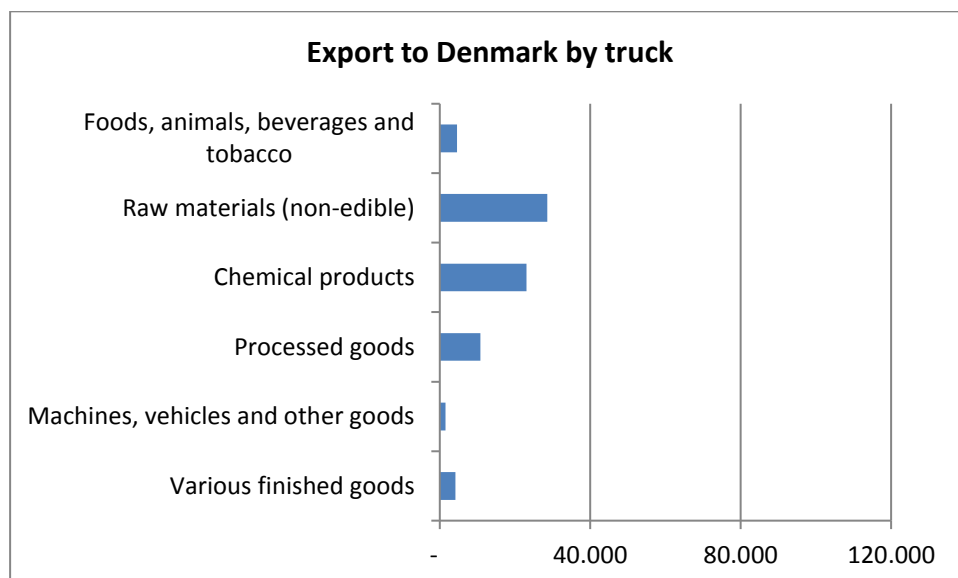
Figure 53 Oslo Region export to Germany, Poland, Netherlands and Belgium by truck



The Scandinavian countries Denmark and Sweden are transit countries for most of Norways export by truck to the other European countries.

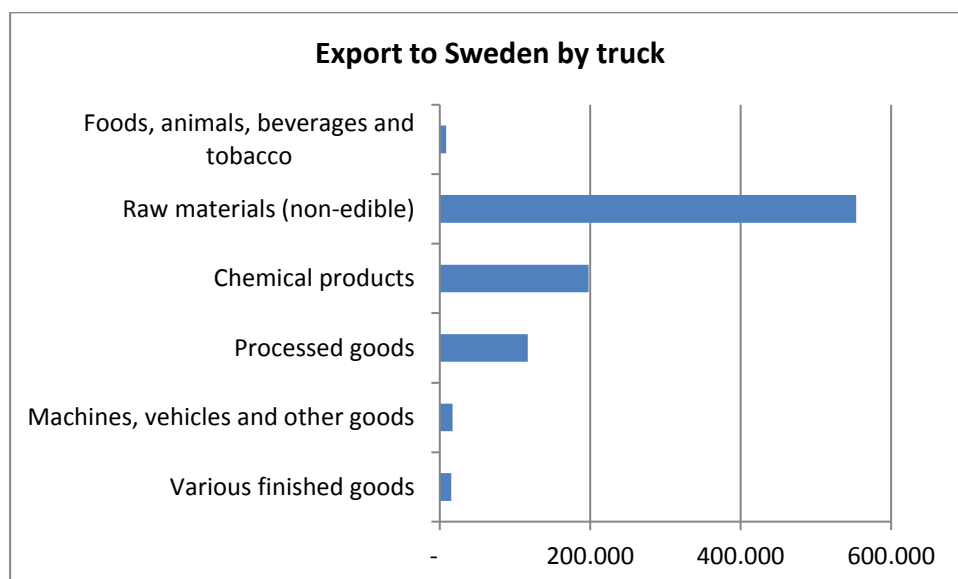
The export to Denmark by truck is very limited and accounts only for around 5%.

Figure 54 Export to Denmark by truck



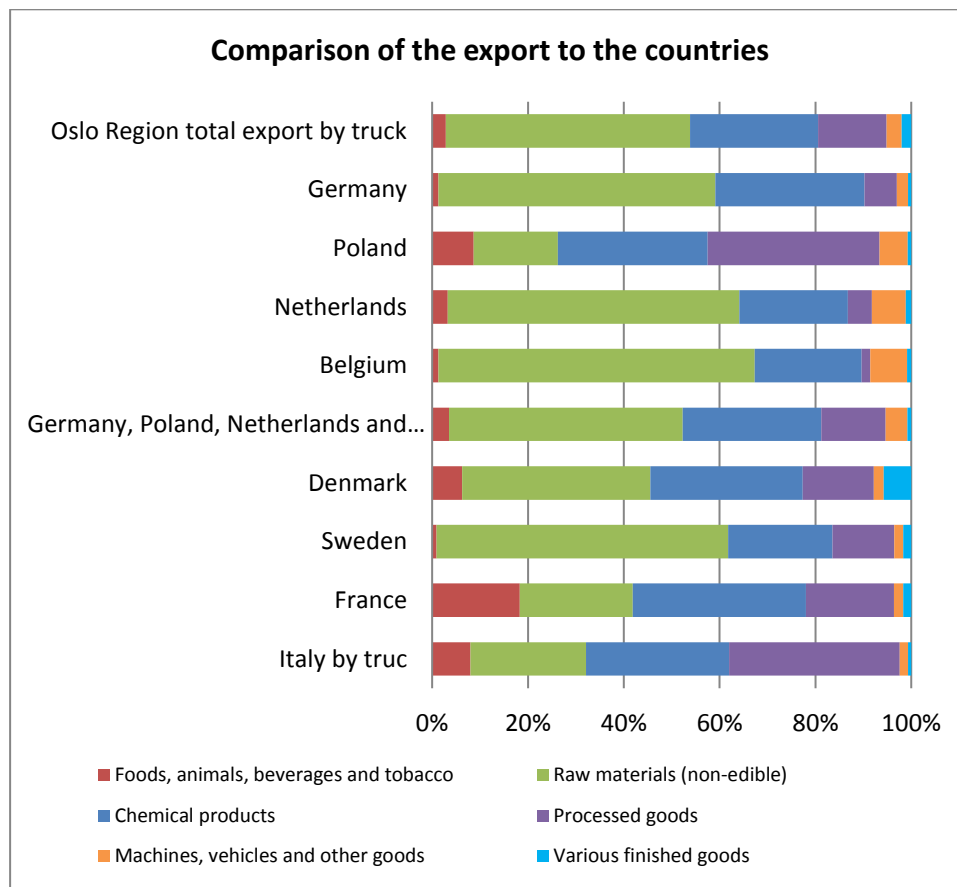
Sweden on the other hand is the absolute primary country for the regions export by truck. Sweden accounts for more than 50% percent of this export.

Figure 55 Export to Sweden by truck



When comparing the regions export by truck to the relevant countries there are differences. "Raw materials" are generally has the largest share of the volume and "Chemical products" as the second largest. For Poland, France and Italy "Foods, animals, beverages and tobacco" play a relative bigger role compared to the other countries. "Processed goods" are relatively large in the export to Poland and Italy. In the export to Netherlands and Belgium "Machines, vehicles and other goods" play a relatively larger role.

Figure 56 Comparison of the export to the countries



Conclusion on Oslo Region export

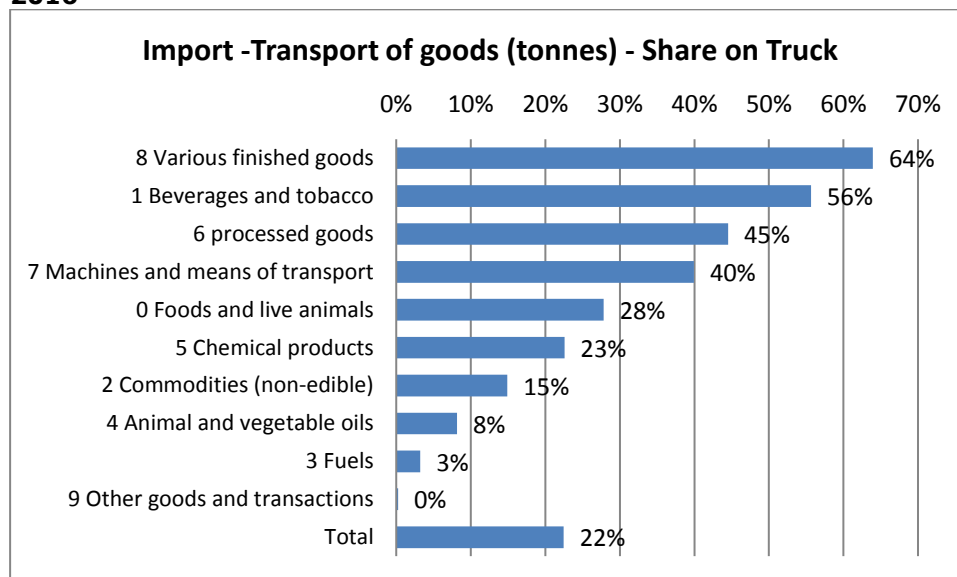
The data on the exports from the Oslo Region provides a picture of the export and points to commodity groups which can have potential for being transferred to greener transport. On the other hand the data for both the export and especially the import are limited. We calculated the volumes in weights based on national statistic, our insight into the transport modes used and destinations are limited and it's not possible to get the data on SITC 2 level to look further into the commodity groups and see where the real potentials are.

8 Potential modal shift for freight on road

In this project the focus is to shift freight transport on road to rail or sea. Therefore it is important to identify the commodity groups which are transported by truck on the road. And further on which specific sub commodity groups that have potential for modal shift.

The following tables show road transport share of total transports for each commodity group in import and export. It should be noted that this is the way the cargo is transport across the Norwegian border, other modes are probably also used in the different transport chains, for example ferry/RoRo in order to cross the sea between the European Continent and Scandinavia.

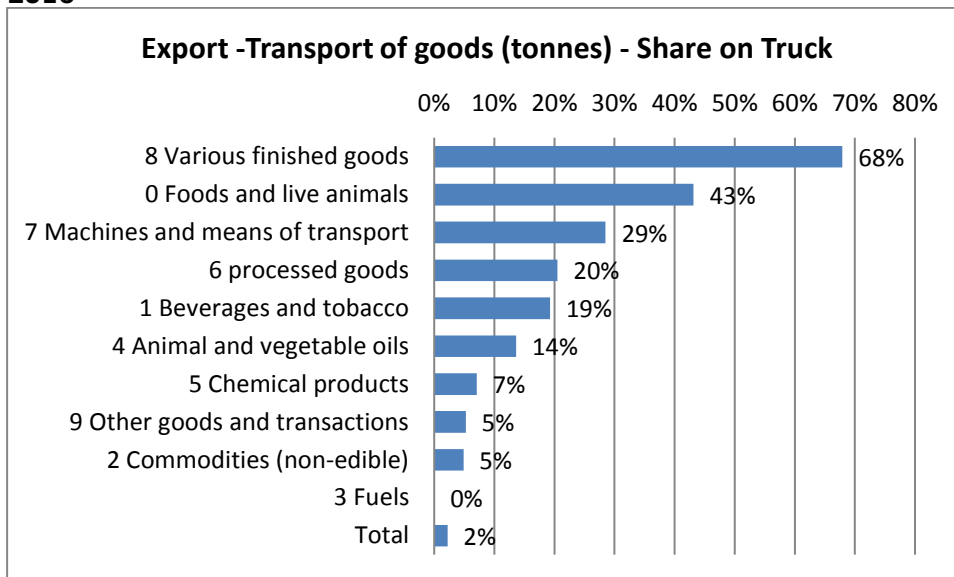
Figure 57 Road transport share of total transports for each commodity group – import 2016



Source: SSB, table 08812

Compared to the commodity groups with the largest volumes in tonnes in import, only the commodity group "Processed goods" shows up in top 5 when looking at share for road transport. This shows that large volumes of freight does not always indicate potential modal shift from road to rail or sea.

Figure 58 Road transport share of total transports for each commodity group –export 2016



Source: SSB, table 08812

The picture for the export is similar to the import. But notice that the road transport share of total imports is 22%, while only 2% in total exports. This is of course due to the different commodity types, size of batches etc. but also the large tradition of using shipping in Norway.

9 Countries as hub (non-direct transports)

When looking into the data regarding country of departure being different from country of origin, a first look at the use of different hubs can be assumed.

According to the Trafikverket Survey in Western ports and ports in Blekinge, the share of transport that are between terminals, or at least has a terminal as departure or arrival point is between 20 and 30%. Therefore it could be assumed that some 25% are transports via hubs. But, the hubs can be quite different. Some companies have central hubs for Scandinavia, strategically located to fit their company logistics. Some forwarding companies have a number of hubs, of which some are specialised in for example fresh or frozen cargo.

We have looked into the possibilities of hubs in Sweden, Denmark, Germany and Poland. Please note that this only concerns the import transports arriving by truck when entering Norway. This means that there is no knowledge about the first part of the transport towards Norway, as well as that this does not include the transports from Norway.

Most transport chains today are multimodal, as they make use of more than one mode, especially for transports between the Continent and Scandinavia. For trucks this could mean that they use ferry/RoRo on part of the transport or even go by rail. And the largest share uses the ferries between Poland/Northern Germany and Scania/Blekinge.

It is only a small share that goes by road all the way. For a transport between Germany and Norway the road transport chain would mean to go via the Padborg border and then the Öresund Bridge and the Svinesund Bridge to enter Norway. This routing seems very unlikely, although depending on where the hubs are, the transport chains do not always take the shortest and more direct route.

9.1.1 Sweden as a hub for import by road

When looking at the transports with Sweden as country of departure and other countries and Continents as country of origin, the following picture is given. The basis is import transports by truck 2016 and the largest part is probably via Svinesund. The import transport by truck to Norway with Sweden as country of departure amounts to 4.2 million tonnes all in all, and thereof 87% or 3.6 million tonnes are transports with Sweden as country of origin. The remaining some 560,000 tonnes originates from other countries and the overall split can be seen below.

Table 29 Sweden as hub, based on import to Norway by truck 2016

Sweden as hub, based on import to Norway by truck 2016		
Germany	Sweden	91.425
Poland	Sweden	58.423
Denmark	Sweden	15.011
France	Sweden	28.808
Netherlands	Sweden	25.275
Italy	Sweden	21.499
Belgium	Sweden	13.455
Other European countries		116.979
Europe except UK		370.875
UK – probably Short Sea	Sweden	20.322
Overseas		
Asia	Sweden	150.081
Middle & North America	Sweden	12.588
Africa	Sweden	5.531
South America	Sweden	1.607
Oceania	Sweden	184
Overseas via Sweden		169.991
All Sweden as hub		561.188

Source: SSB, table 06320

It is not possible to see which transport mode is used for the transport to Sweden, but we assume that the overseas transports arrive by ship in Gothenburg and that transports from UK arrive by short sea transport. For Belgium and Netherlands there is also a large possibility that short sea transport is used, but there are also truck transports all the way from the 2 countries.

The Svinesund analysis also show that a large amount of trucks go via Gothenburg. There are also possibilities to have continental shipments for both Sweden and Norway in the same truck from the Continent, and then make a consolidation of Norwegian cargo for example in Gothenburg, for the onwards journey. This is especially used when the Norwegian loads from the Continent are LCL (Less than Container Load, or also less than a full truck) and the forwarder offers “daily services”.

9.1.2 Denmark as a hub for import by road

When looking at the import transports by truck some 690,000 tonnes are via Denmark as country of departure. The bulk of this 80% or some 550,000 tonnes also have Denmark as country of origin. Some 141,000 tonnes originates from other countries and with Denmark as country of departure.

Table 30 Denmark as hub, based on import to Norway by truck 2016

Denmark as hub, based on import to Norway by truck 2016	
Poland	16.179
Germany	15.084
Italy	9.661
France	9.493
Belgium	7.511
Spain	6.903
Sweden	5.704
Netherlands	4.117
UK	3.290
Other European countries	17.340
Europe excl. Denmark	95.282
Overseas	
Asia	38.900
Middle & North America	4.891
Africa	1.133
South America	927
Oceania	79
Overseas in all	45.930
All Denmark as a hub	141.212

Source: SSB, table 06320

9.1.3 Germany as a hub for import by road

When looking at Germany the total import transports to Norway by truck with Germany as country of departure amounts to 523,000 tonnes and the part that also has Germany as country of origin amounts to 87% thereof, with 454,000 tonnes.

Table 31 Germany as a hub based on import to Norway by truck 2016

Germany as a hub based on import to Norway by truck 2016	
Poland	8.836
Italy	7.910
Sweden	7.768
France	6.160
Netherlands	4.767
Denmark	4.441
Belgium	2.149
Other European countries	26.173
Overseas	
Asia	23.938
Middle & North America	4.960
South America	3.469
Africa	1.056
Oceania	875
Overseas in all	34.298
All Germany as a hub	102.502

Source: SSB, table 06320

9.1.4 Poland as a hub for import by road

The import transports to Norway by truck with Poland as country of destination amounts to 355,000 Tonnes and hereof the transports that originates in Poland accounts for 97% or 344,000 tonnes. As could have been expected, there is only a small volume that seems to be using Poland as a hub.

Table 32 Poland as a hub for import to Norway by truck 2016

Poland as a hub for import to Norway by truck 2016	
Sweden	1.825
Germany	810
Netherlands	467
Belgium	351
Denmark	320
France	236
Italy	223
Other European countries	2.819
Total Europe	7.051
Overseas	
Asia	3.205
Middle & North America	181
South America	49
Africa	46
Oceania	1
Total Overseas	3.482
All Poland as a hub	10.533

Source: SSB, table 06320

The volumes are very low and some of the above also looks a bit strange. For example that transports from Sweden and Denmark would go to Poland, for the final leg towards Norway. That there is a small volume from overseas is not all that strange as the Port of Gdansk has overseas calls by both Maersk Line and Ocean Alliance on a weekly basis. At the same time there have been strikes at the Port of Gothenburg throughout a long period of time, and some of containers for the Port of Gothenburg could have been re-routed to Gdansk.

9.1.5 Netherlands as hub for import by road

The Netherlands volume as country of destination amounts to 292,000 tonnes and thereof 52% or 152,000 tonnes also have Netherlands as country of origin.

Table 33 Netherlands as hub for import to Norway by truck 2016

Netherlands as hub for import to Norway by truck 2016	
Germany	9.178
Belgium	5.748
France	5.697
Poland	3.297
Italy	2.713
Sweden	1.582
Denmark	1.536
Other European countries	32.483
Overseas	
South America	24.228
Asia	18.793
Africa	18.709
Middle & North America	14.944
Oceania	449
Total Overseas	77.123
All Netherlands as a hub	135.357

Source: SSB, table 06320

That the largest part of the volumes with Netherlands as hub originates from overseas is not strange, as Rotterdam is the largest sea port in Europe and very often the first port in Europe for the overseas ships to call.

9.1.6 Italy, Belgium and France as hubs for import to Norway by road

Italy, Belgium and France only have smaller volumes where the cargo originates from another country. The volume with Italy as country of departure is all in all 212,000 tonnes and thereof 97% or 206,000 tonnes also have Italy as country of origin. The volume with Belgium as country of departure amounts to 121,000 tonnes and thereof 64% or 77,000 tonnes also originate from Belgium. The overseas volume is 18,000 tonnes and with Antwerp as one of the growing ports in the northern range this is not so strange. The volume from other European countries amounts to 26,000 tonnes. The volume with France as country of departure amounts to 127,000 tonnes and thereof 91% of 116,000 tonnes originates in France.

9.1.7 Conclusions on the 8 countries as hub in Norwegian import by road

According to the statistics some 310,000 tonnes from other countries are using Germany, Poland, Italy, France, Belgium and Netherlands as hubs in the import by road to Norway. For Sweden and Denmark some 700,000 tonnes from other countries are using Denmark and Sweden as hub in the Norwegian import by road.

Therefore an assumption could be that some 25% are transports via hubs.

10 Assessment of direct transports

In this step we will make an attempt to assess the amount of direct transport - that is the transport that goes directly between the shipper and the receiver. This will be an assessment, since there are no statistics about direct transports and hence not so easy to find any information.

The Trafikverket survey of Western ports and ports in Blekinge gives the following indications as regards the use of terminals in the international road-based traffic. This would then indicate that the rest of the cargo could be "direct transport". But, at the same time, there are different definitions of what a terminal is. For some it is a terminal for consolidation of cargo, mainly run by a forwarder. But, there are large industrial, trade companies and similar that have own terminals.

- Gothenburg – Frederikshavn route: 20-30 % comes from a terminal and the same share is going to a terminal.
- Gothenburg – Kiel route: 25 % loading at terminal and 27 % unloading at terminal.

This would indicate that about 25% of the cargo is terminal cargo.

On the other hand, we have also looked into the Norwegian statistics about import by truck by road. The statistics available is SSB table 06320 – Import by truck with commodities, country of origin, country of departure and truck nationality. This table only includes import transports that have come in on road via a border, and this means that trucks on ferries etc. are not included. The commodity groups are based on CTSE, ie. not totally comparable to SITC, which is used in the other trade statistics.

In this statistics we have analysed the data as regards the following countries: Sweden, Denmark, Poland and Germany as they are within or in the vicinities of the Scandria-corridor.

The data over the different countries and their "direct transport" in Norwegian import by truck shows the following picture for 2016:

Table 34 Import by truck 2016, same country of origin and country of departure

Import by truck 2016, same country of origin and country of departure									
Tonnes	Belgium	Denmark	France	Italy	Netherlands	Poland	Sweden	Germany	Sum 8 countries
Sum	76.708	549.014	116.229	206.379	152.437	344.217	3.626.294	454.370	5.525.648
Share	1%	10%	2%	4%	3%	6%	66%	8%	100%

Source: SSB, table 06320

As can be seen above, the closer you get to Norway the larger the volume in "direct transport" is, which is quite natural.

In the following you find the details about the largest commodity groups in "direct transport" in import from Germany, Poland, Denmark and Sweden.

10.1.1 Germany

The "direct transports" in import from Germany by truck 2016 shows the following:

Table 35 "Direct transport" Import from Germany by truck 2016

"Direct transport" Import from Germany by truck 2016	Tonnes
Chemicals	87.461
Miscellaneous manufactured articles	86.029
Machinery and transport equipment (excl. ships and aircraft)	65.781
Other food products, animal feeding stuffs, beverages, tobacco	57.731
Metal manufactures	47.172
Lime, cement and other mineral articles	38.779
Metals	35.408
Crude minerals other than ore	8.573
Other crude materials	7.213
Petroleum and petroleum products, gas	6.318
Fertilizers	4.036
Wood, cork	4.005
Non-ferrous metal ores	2.140
Oil seeds and oil nuts, animal and vegetable oils, fats and oils	2.082
Fruit and vegetables, fresh	875
Solid fuel	467
Cereals	158
Special transactions	128
Tars from coal and natural gas	14
Iron ore, scrap iron	-
Total	454.370

Source: SSB, table 06320

The table above shows that there is a large potential of direct transport flows from Germany to Norway that potentially could be shifted to greener transport.

10.1.2 Poland

The "direct transports" in import from Poland by truck 2016 shows the following:

Table 36 "Direct transport" Import from Poland by truck 2016

"Direct transport" Import from Poland by truck 2016	Tonnes
Miscellaneous manufactured articles	110.136
Metal manufactures	58.605
Lime, cement and other mineral articles	54.263
Machinery and transport equipment (excl. ships and aircraft)	31.451
Other food products, animal feeding stuffs, beverages, tobacco	22.444
Chemicals	20.142
Fruit and vegetables, fresh	15.927
Metals	12.665
Fertilizers	7.789
Wood, cork	6.934
Other crude materials	2.218
Crude minerals other than ore	883
Solid fuel	358
Special transactions	141
Cereals	109
Petroleum and petroleum products, gas	100
Oil seeds and oil nuts, animal and vegetable oils, fats and oils	52
Iron ore, scrap iron	-
Non-ferrous metal ores	-
Tars from coal and natural gas	-
Total	344.217

Source: SSB, table 06320

Also for Poland there is a large share of direct transport flows that potentially could be shifted towards greener transport. There are 2 main routes used, via the ferries in Swinoujscie and Gdynia, although there are probably also some road transports via Germany, even if this seems to be a much longer route.

10.1.3 Netherlands, Belgium, France and Italy

There are also large volumes of trucks in "direct transports" in import from Netherlands, Belgium, France and Italy, as can be seen below. These volumes could of course also be seen as potential volume for a new intermodal service by rail or ferry between Southern Baltic Sea and the Oslo Area.

Table 37 Largest commodity groups in "direct transports" import by truck 2016

"Direct transports" by truck 2016	Netherlands	Belgium	France	Italy	Total
Fruit and vegetables, fresh	40.080	8.458	11.881	43.733	104.152
Other food products, animal feeding stuffs, beverages, tobacco	20.276	13.648	22.652	38.775	95.351
Miscellaneous manufactured articles	22.979	11.273	16.011	21.136	71.399
Machinery and transport equipment (excl. ships and aircraft)	10.915	11.712	14.877	28.607	66.111
Chemicals	16.069	12.112	13.984	14.681	56.846
Metals	8.150	5.671	15.907	21.256	50.984
Lime, cement and other mineral articles	5.617	2.016	13.684	27.668	48.985
Metal manufactures	5.973	8.931	3.036	8.158	26.098
Other crude materials	17.630	989	367	886	19.872
Petroleum and petroleum products, gas	734	564	748	256	2.302
Oil seeds and oil nuts, animal and vegetable oils, fats and oils	1.174	714	53	255	2.196
Non-ferrous metal ores	1	23	1.887	1	1.912
Crude minerals other than ore	292	216	758	612	1.878
Wood, cork	893	220	123	56	1.292
Fertilizers	758	48	217	5	1.028
Solid fuel	663	-	-	-	663
Cereals	35	-	14	290	339
Tars from coal and natural gas	178	112	-	-	290
Special transactions	20	1	30	3	54
Iron ore, scrap iron	-	-	-	1	1
Total	152.437	76.708	116.229	206.379	551.753

Source: SSB, table 06320

10.1.4 Denmark

When looking at the "direct transports" in import from Denmark by truck, it is quite natural that a large volume is done in direct transport. Norway and Denmark are neighbouring countries, although there is a sea and hence the need of crossing the sea, either by ferry, RoRo or in some cases the Øresund Bridge. The following picture of the import transports arriving to Denmark by truck evolves:

Table 38 "Direct transport" import from Denmark by truck 2016

"Direct transport" import from Denmark by truck 2016	Tonnes
Other food products, animal feeding stuffs, beverages, tobacco	132.409
Miscellaneous manufactured articles	125.412
Chemicals	97.145
Lime, cement and other mineral articles	64.219
Machinery and transport equipment (excl. ships and aircraft)	26.065
Metal manufactures	25.888
Metals	22.693
Oil seeds and oil nuts, animal and vegetable oils, fats and oils	13.104
Crude minerals other than ore	10.783
Fruit and vegetables, fresh	10.130
Other crude materials	9.005
Wood, cork	3.859
Petroleum and petroleum products, gas	3.794
Cereals	1.562
Solid fuel	1.322
Non-ferrous metal ores	746
Fertilizers	684
Tars from coal and natural gas	133
Special transactions	59
Iron ore, scrap iron	2
Total	549.014

Source: SSB, table 06320

10.1.5 Sweden

"Direct transports" on truck between Sweden and Norway in this case means the imported cargo that have Sweden as both country of origin and country of departure. That there is such a large volume that is direct is not very strange, as Sweden and Norway are neighbouring countries and have a very long border together. Thus making road transport the natural choice for transports. But, this also means that there is a large share of the transports that use other borders than the Svinesund border as they come from Middle and Northern Sweden.

There is only a very small share of the volume that is estimated to originate from Scania and therefore potentially could be shifted into a ferry between the Continent and Norway. There are already train connections between Scania and Norway, although they still are far from fully utilised. Therefore we have not elaborated further as regards the Swedish volumes.

Table 39 “Direct transport” Import from Sweden by truck 2016

“Direct transport” Import from Sweden by truck 2016	Tonnes
Wood, cork	963.088
Miscellaneous manufactured articles	627.035
Chemicals	453.963
Lime, cement and other mineral articles	342.805
Other food products, animal feeding stuffs, beverages, tobacco	202.081
Petroleum and petroleum products, gas	175.911
Machinery and transport equipment (excl. ships and aircraft)	146.858
Metals	142.754
Other crude materials	132.573
Metal manufactures	121.390
Crude minerals other than ore	88.157
Iron ore, scrap iron	80.175
Fertilizers	58.947
Oil seeds and oil nuts, animal and vegetable oils, fats and oils	36.532
Solid fuel	18.869
Cereals	13.389
Non-ferrous metal ores	11.983
Fruit and vegetables, fresh	7.220
Special transactions	2.539
Tars from coal and natural gas	25
Total	3.626.294

Source: SSB, table 06320

10.1.6 Conclusions on direct transport

There are almost 800,000 tonnes in direct transport in the Norwegian import from Germany and Poland, and further potential when also including the other mentioned countries on the European Continent. Therefore there should be sufficient potential for new offers of greener transport services.

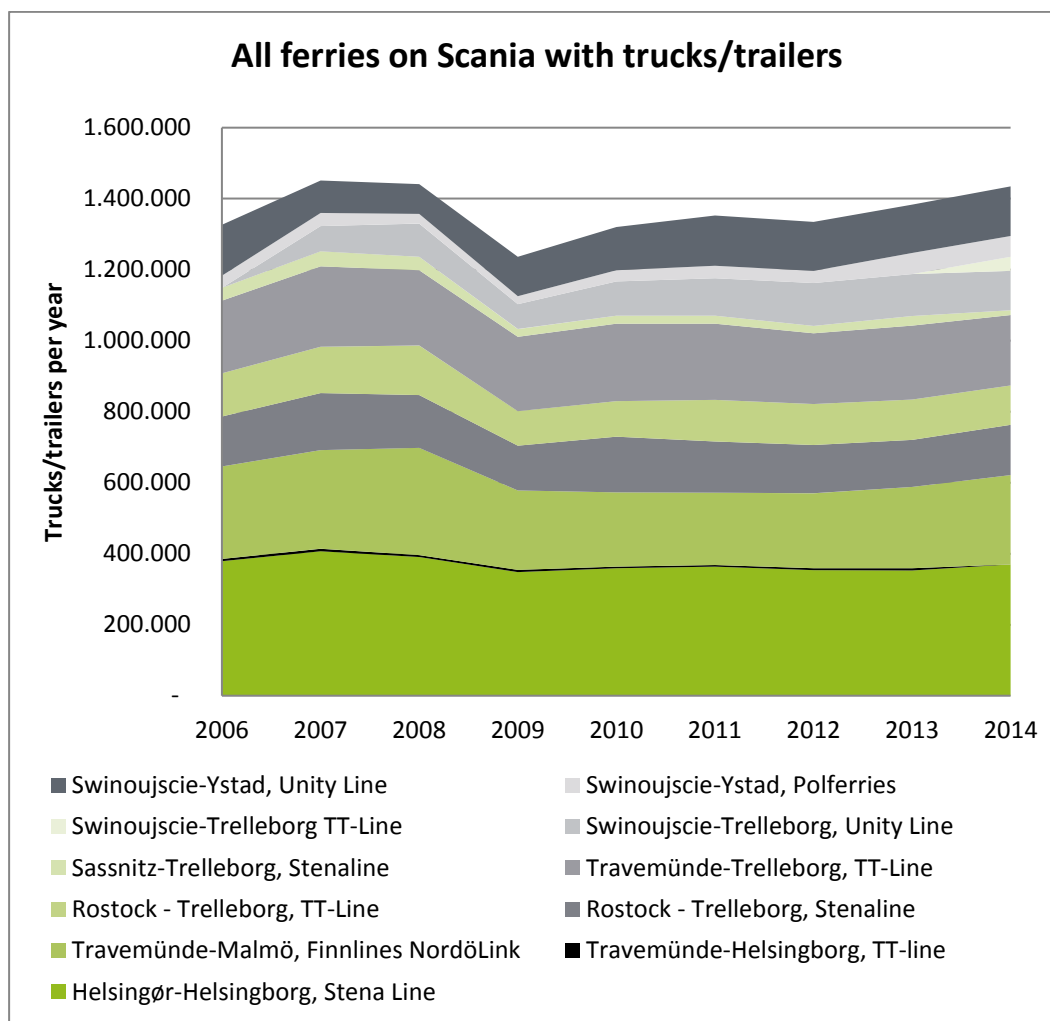
The direct transports in import from Denmark and Sweden most probably use other routes than the potential new service that the feasibility study will look into.

11 Traffic on Germany and Poland

A large part of the trucks that use the Svinesund Bridge also use the ferries in southern Sweden that was very obvious in the Svinesund Analysis from 2013. Whether there have been large changes in the routings since then is hard to say, as there is no available updated data. When the Trafikverket Survey is finalised also for the Scania ports, we will know more about this.

Shippax publishes ferry statistics at the end of June every year, and unfortunately the latest version is not yet available and further to this the ferry lines do not always report their volumes directly, wherefore the data does not include the full year 2014 for all the ferry lines. The figure below shows the total of all the RoRo lines in Scania, towards Denmark, Germany and Poland. As can be seen, the numbers have been fluctuating, but most lines seem to have a steady increase in the volume.

Figure 59 All ferries on Scania with trucks/trailers

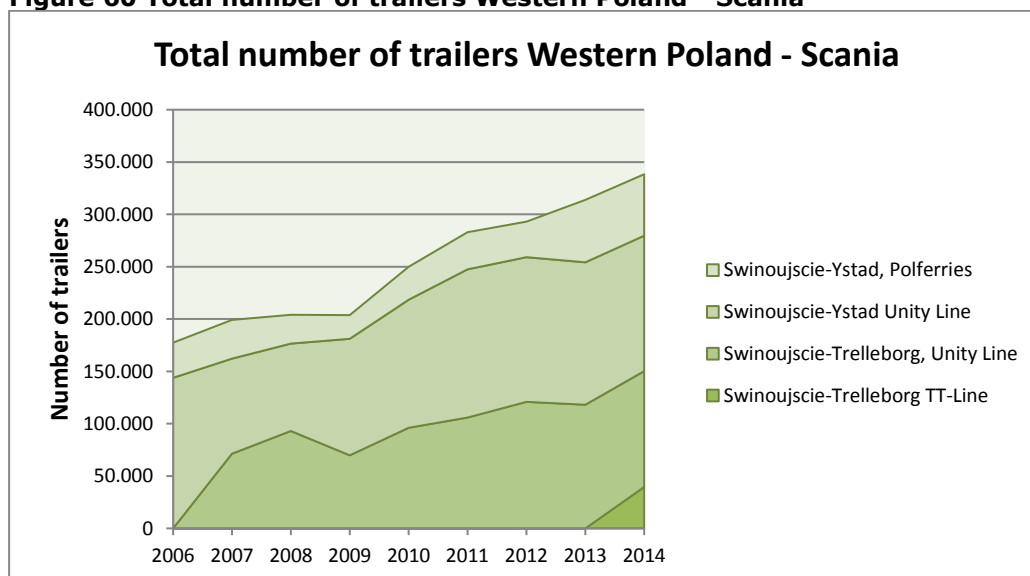


Source: Shippax, Ports of Sweden and own estimations

The trend for the 10-year period is increase in truck/trailer traffic on the ferries with Scania, from more than 1,33 million units in 2006 to a dip in 2009 to 1,24 million and then to some 1,38 in 2013. The figure for 2014 did not include reporting from all ferry lines, as not all of them have reported their numbers for the whole year of 2014. We have therefore estimated the total volume to 1.43 million trucks/trailers in 2014.

The RoRo traffic between Scania and Poland has grown significantly during the last decade, as can be seen below. Unity Lines started up the route Swinoujscie – Trelleborg in 2007 and TT Line started on the same route in 2014. In 2006 some 177,000 trucks/trailers were transported and in 2014 some 338,000 units, which means almost a doubling of the number of units over the period. Although Polferries suffered a loss of volume during the financial crisis, Unity Line did not, as they started the Trelleborg route in 2007 and some of the volume was then transferred from the Ystad-route. The ferry routes Poland – Scania account for two third of the RoRo volume with trucks/trailers between Poland and Sweden.

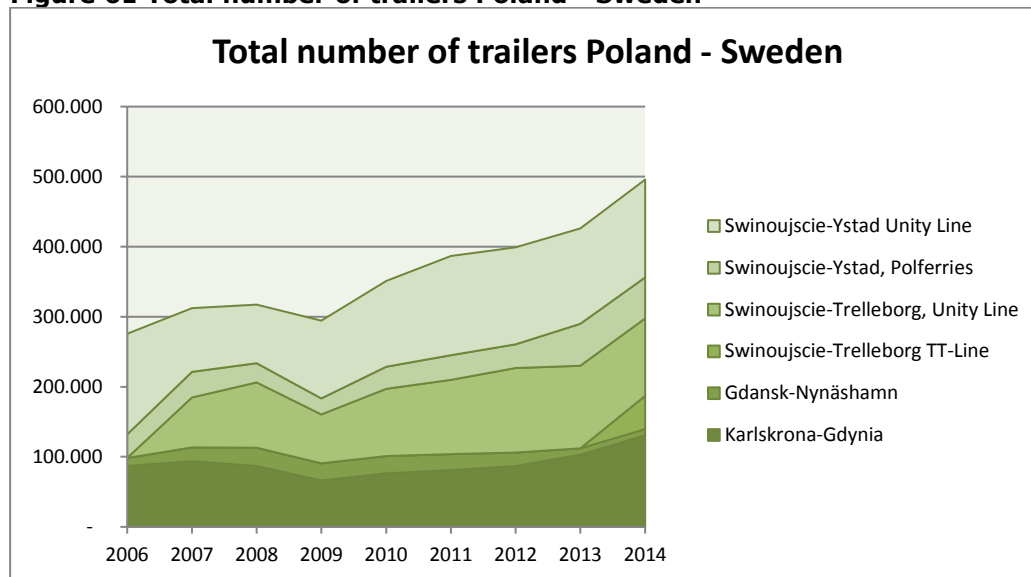
Figure 60 Total number of trailers Western Poland - Scania



Source: Shippax, Ports of Sweden and own estimates

As a comparison, all ferry lines between Sweden and Poland can be seen below, with an increase from 223,000 trucks/trailers in 2006 to almost 500,000 in 2014, more than a doubling.

Figure 61 Total number of trailers Poland - Sweden



Source: Shippax, Ports of Sweden and own estimates

11.1 Routing split according to Trafikverket Survey of Swedish ports

The Scandria2Act Survey that will be conducted by Trafikverket in Southern Swedish ports etc. during 2017 could be the key to solving the problem about updated details regarding routings, especially as regards the Scania ports that account for a large share of the road transports with Norway. But, as this second part of the survey will not be available until the Autumn, we need to use the Svinesund Analysis from 2013.

The first part of the Trafikverket survey was performed in the autumn of 2016⁷, "Freight Transports 2016, Survey of Western Swedish ports and ports in Blekinge". We received a presentation-pdf with conclusions from the survey on 5 May 2017, which we have analysed. The detailed data has not been available, but there are some interesting facts in the survey, although the questions towards the hauliers did not specifically look at transports with Norway.

Interesting results from the first part of the survey of Swedish ports:

Gothenburg – Frederikshavn route:

- 91 % trips for Danish destinations or 64 % trips from Denmark
- 20-30 % comes from a terminal and the same share is going to a terminal
- 15 % came from Gothenburg area – 9 % were going to the Gothenburg area

This route is mainly used for Danish cargo.

Varberg-Grenå route:

- 95 % trips going to Denmark
- 63 % trips from Denmark

This route is mainly used for Danish cargo.

⁷ Godstransport 2016, TRV 2013/45076, date: 2017-01-02, presentation

Gothenburg – Kiel route:

- 30 % of the drivers were from the Netherlands
- 24 % had loaded in the Gothenburg area
- 26 % trips were going to The Netherlands, 24 % to Germany and 23% to Denmark
- 25 % loading at terminal and 27 % unloading at terminal
- 25% trips from the Netherlands, 23 % from Denmark and 16 % from Germany
- 15-16 % dangerous cargo, which seems to be a very high share

Noticeable is the large share of Danish cargo using this ferry between Gothenburg and Germany. Further also that Dutch cargo accounts for the largest share, not German cargo.

Karlskrona – Gdynia route:

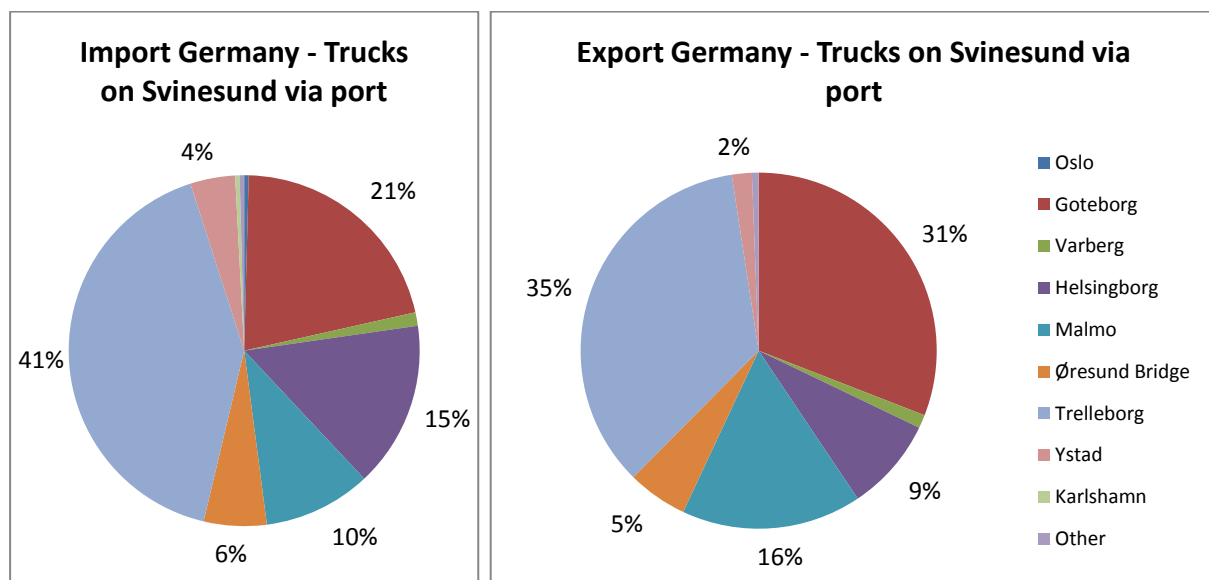
- 91 % drivers were Polish
- 85 % had destination Poland
- 40% had gone from Norway towards Poland

Noticeable is, that 15 % of trips were with destinations beyond Poland (probably Belarus and on-wards).

11.2 Routing split Germany according to the Svinesund Analysis

The Svinesund Analysis gives a good picture of how the routing split for road transport in trade with Germany was in 2013, although there might have been slight changes in the years since 2013.

Figure 62 Routing split in Norwegian trade with Germany 2013



Source: Svinesund Analysis 2013

The Main ports for road based import from Germany to Norway in 2013 were:

- Trelleborg – 41%
- Göteborg – 21%
- Helsingborg – 15%
- Malmö -10%
- Øresund Bridge – 6%

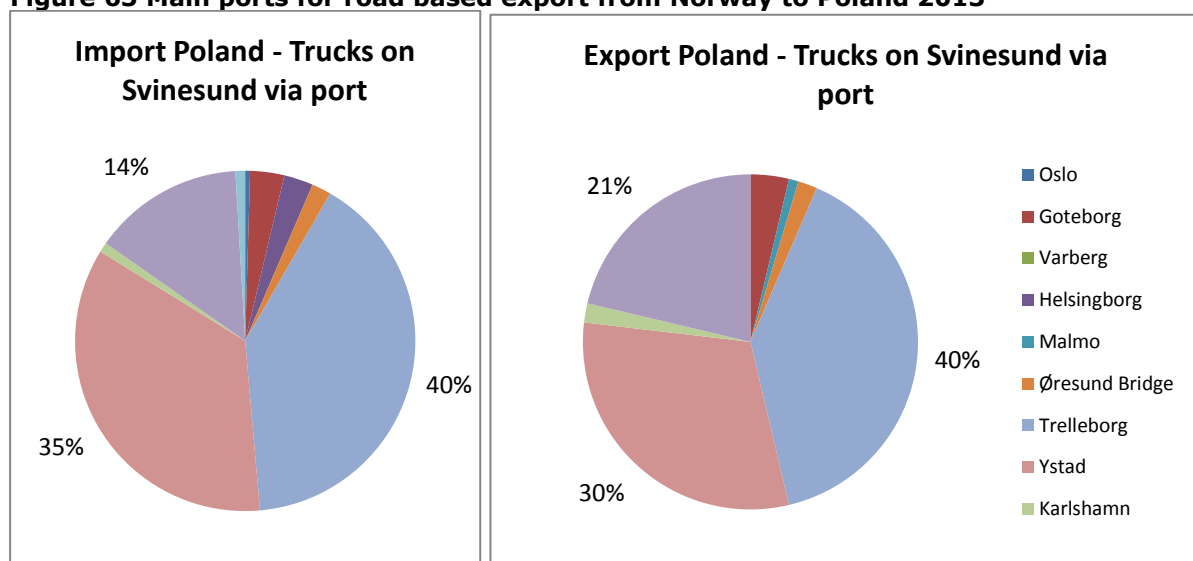
The Main ports for road based export from Norway to Germany in 2013 were:

- Trelleborg – 35%
- Göteborg – 31%
- Malmö -16%
- Helsingborg – 9%
- Øresund Bridge – 5%

In road-based export and import between Norway and Germany the ports Trelleborg and Gothenburg accounts for over 60% of the traffic according to Svinesund Analysis.

11.3 Routing split Poland according to the Svinesund Analysis

Figure 63 Main ports for road based export from Norway to Poland 2013



Source: Svinesund Analysis 2013

The Main ports for road based import from Poland to Norway in 2013 were:

- Trelleborg – 40%
- Ystad – 35%
- Karlskrona – 14%

The Main ports for road based export from Norway to Poland in 2013 were:

- Trelleborg – 40%
- Ystad - 30%
- Karlskrona – 21%

In road-based trade between Norway and Poland the three biggest ports Trelleborg, Ystad and Karlskrona accounts for 90% of the traffic.

11.4 Road volume Germany and Poland

The table below shows the total volume by road in import and export on Poland and Germany, as well as the volumes where the countries are hubs for other countries and the volume of “direct transport”. Further we have put in our estimations as regards the export volume by road from the Oslo Region, based on the assumptions and calculations described in chapter 8.

Table 40 Road volume on Germany and Poland

Tonnes	Germany			Poland		
	Import to Norway	Share of total	Export from Norway	Import to Norway	Share of total	Export from Norway
Total Norway by road	565.714		342.742	422.649		377.697
hub for other countries	102.502	18%		10.533	2%	
"direct transport"	454.370	80%		344.217	81%	
Calculated for Oslo Region			124.379			66.079
Share of total export			36%			17%

Source: SSB Table 08812, 08809, 10482 and own estimations

11.5 Important ports and terminals

The ports that probably would be most interesting for a new ferry or RoRo service are the ports that already today have large ferry traffic between Scandinavia and the Continent, as this would only add to the existing activities and many of the hauliers and forwarders already use these ports.

Good hinterland connections on road, rail and maybe inland waterway are also vital, in order to ensure a large catchment area for a new route and that many different areas in the hinterland have the possibility to use the new service.

On German side, this would mean the port of Lübeck or the port of Rostock and both of them have very good hinterland connections also on rail.

In Poland Swinoujscie would be a very good port and maybe also Gdynia, although that would mean longer transport times for a ferry Gdynia-Oslo, compared to Swinoujscie-Oslo. Both have had excellent development in their ferry traffic towards Sweden and they also invest in further development of the ports.

In order to shift road transports between the Continent and Norway to more environmentally-adapted modes, there is a need to find out more in detail what services and service levels that would be needed from the shippers and what could influence their choice to change to Ferry/RoRo or rail for these transports. Further, there is a need to go into which service levels, such as transport time etc. that could be achieved with a short sea/ferry solution, as well as looking into the possibility of daily connections.

The terminals that would be the most interesting for intermodal connections with Alnabru for example, would be Hamburg and Malmö, with the possibility for connection to other terminals either en route or in the different intermodal networks that are available through different service providers. There is also a need for a better service level and a thorough look at the price level.

Hamburg as is has intermodal connections to all parts of Germany but also to the whole of Europe. Malmö as it is the largest intermodal terminal in Southern Sweden and also have a very good intermodal network. The operator is also very keen on developing the terminal, and new cranes will increase the terminal capacity with 75% in the beginning of 2018. But there is also a need to look into other possible terminals, so ensure the suitable service level for the many shippers, forwarders and hauliers.

12 Future development

In this chapter a short description the development of the corridor is made as regards:

- Infrastructure development
- Infrastructure capacity
- Trade development
- Transport development
- Development of Infrastructure charges

12.1 National Transport Plans for Norway

On 19 June 2017 the Norwegian Parliament, Stortinget, decided upon the National Transport Plan (NTP) in Norway for 2018-2029 and hereby the Governmental proposal for the Norwegian transport system for the coming 12 years was adjusted on some points. Now the different transport authorities will prepare action plans detailing the NTP 2018-2029, as well as describe the measures to be carried out in the coming years, with main focus on the first 6 years.

A special Rail Freight Package with the following prioritisations:

- Electrification of stretches
- New rail links in Elverum, Kongsvinger and Hokksund
- Upgrade of the Alnabru terminal, the central hub for rail freight in Norway
- Terminal measure for smaller terminals
- Construction of new or extension of existing crossing tracks

By 2032, the Norwegian rail network will be equipped with the ERTMS, the Common European Signaling and Security System. By the end of the NTP period in 2029, large parts of the railway infrastructure will therefore be equipped with a new signal system.

12.2 National Transport Plans Sweden

The Swedish National Transport Plan for the coming 12 years will be decided upon by the Swedish Government during the spring of 2018 and therefore it is far from certain at this point, which projects that will be prioritized in the upcoming 12-year plan.

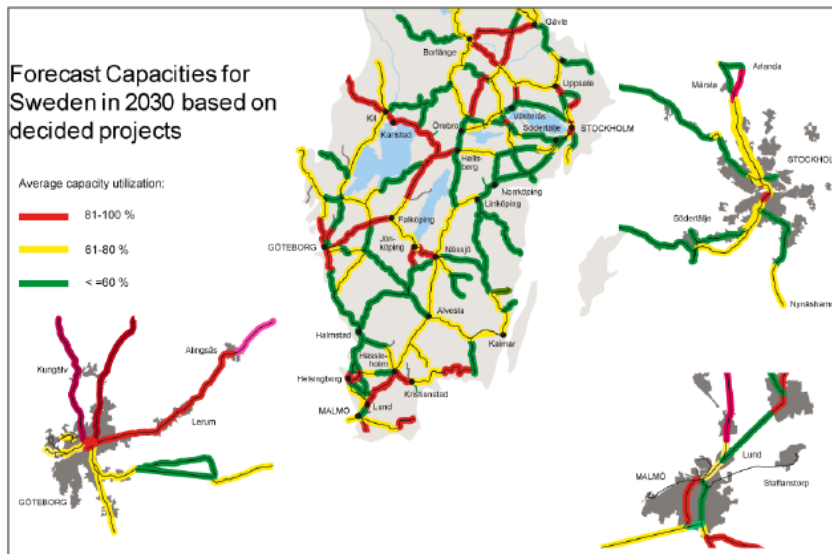
12.3 Infrastructure development until 2030

In order to find out which infrastructure bottlenecks that possibly will exist by 2030, compared to the infrastructure development planned for the coming years, the study of the Scandinavian-Mediterranean core network corridor has been consulted. The study was made in 2014 and looked into the decided infrastructure projects in the ScanMed Corridor, which goes through Scania, as well as critical issues as regards possible bottlenecks that can influence the transport system in the future. Part of the information from the ScanMed study has been updated, especially as regards the major Danish infrastructure projects, where delays have occurred since the ScanMed study was published in 2014.

12.3.1 Rail infrastructure capacity

The main infrastructure bottlenecks in the 2014 study are seen in the rail infrastructure. As can be seen in the maps of rail capacity below, there are capacity constraints foreseen on different parts of the main rail sections in the corridor in the years to come.

Figure 64 Forecast capacities for Swedish rail sections in 2030 based on decided projects in the Swedish National Plan



Source: Scandinavian-Mediterranean Corridor – Draft Final report

The above figure reveals that rail capacity is expected to be exhausted in 2030 on several sections of the rail network in the Scandria-corridor, especially around the areas of Gothenburg, Helsingborg, Malmö, Trelleborg, Hässleholm and Ystad. These connect to the most important ports as regards ferry connections with the Southern Baltic ports in Germany and Poland.

Figure 65 Forecast capacities for Danish and southern Swedish rail sections in 2020, based on already decided projects until 2020



Colour of sections: red – no capacity, yellow – limited capacity, green – free capacity
Source: Scandinavian-Mediterranean Corridor – Draft Final report

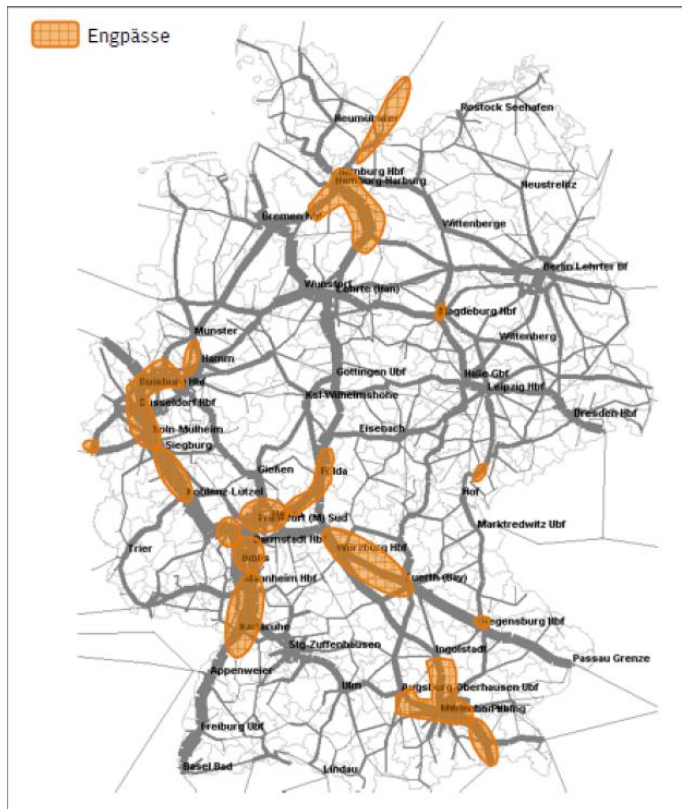
The figure above concerns rail network capacity by 2020 and includes a complete electrification of the Danish railway network (the whole project is expected finalised by 2026). The complete Danish rail network will also receive a new signalling system and this is expected finalised by 2023. There is a bottleneck by Vordingborg, which will be removed after the construction of the new Storstrøm Bridge, expected to be finalised by 2022.

The major project Fehmarn Belt Fixed Link establishes a fixed direct connection between Scandinavia and continental Europe. In the future, freight trains will be able to avoid the 160 km longer detour via the Great Belt. This will create a strong transport corridor between the Öresund region in Denmark/Sweden and Hamburg in Germany. The Fehmarn Belt Fixed Link has been delayed several years and is now expected finalised by 2028.

The scenario above does not include the completion of the double-track extension of the southern access to the Fehmarn Belt Fixed Link in the German hinterland railway network, which will be finalised a few years after the opening of the Femern Belt Link.

The figure below shows the forecast bottlenecks for German rail sections until 2030, and as can be seen, important parts of the network will have capacity restraints.

Figure 66 Forecast bottlenecks for German rail sections in 2030



Source: Scandinavian-Mediterranean Corridor – Draft Final report

When looking at the level of infrastructure investments in Germany, which is the lowest among the Scandria-countries (see figure on page 33) there seem to be a mismatch to the expected infrastructure restraints.

12.3.2 Road infrastructure capacity

Unfortunately the ScanMed study does not include a map over expected capacity constraints in the road network in Sweden or Denmark in the future. We have therefore listed the major critical issues and works in the road infrastructure in Western Sweden, Scania, Denmark and Northern Germany in the near future:

- E6 Pålén-Tanumshede
- E6 sections in the Gothenburg area
- Tunnels and a new bridge in Gothenburg (West Swedish Agreement)
- E6 sections in Scania
- Køge Bugt Motorway near Copenhagen, expansion finalised by 2018
- Puttgarden – Oldenburg
- A7 Rader Hochbrücke with speed limits for heavy trucks, new bridge expected by 2026
- Other A7 sections where expansion is going on

For northern Germany the picture below shows the road sections where larger congestion is expected for 2025. Dark blue sections will have congestion more than 300 hours per year. Light blue sections will have congestion more than 100 hours per year.

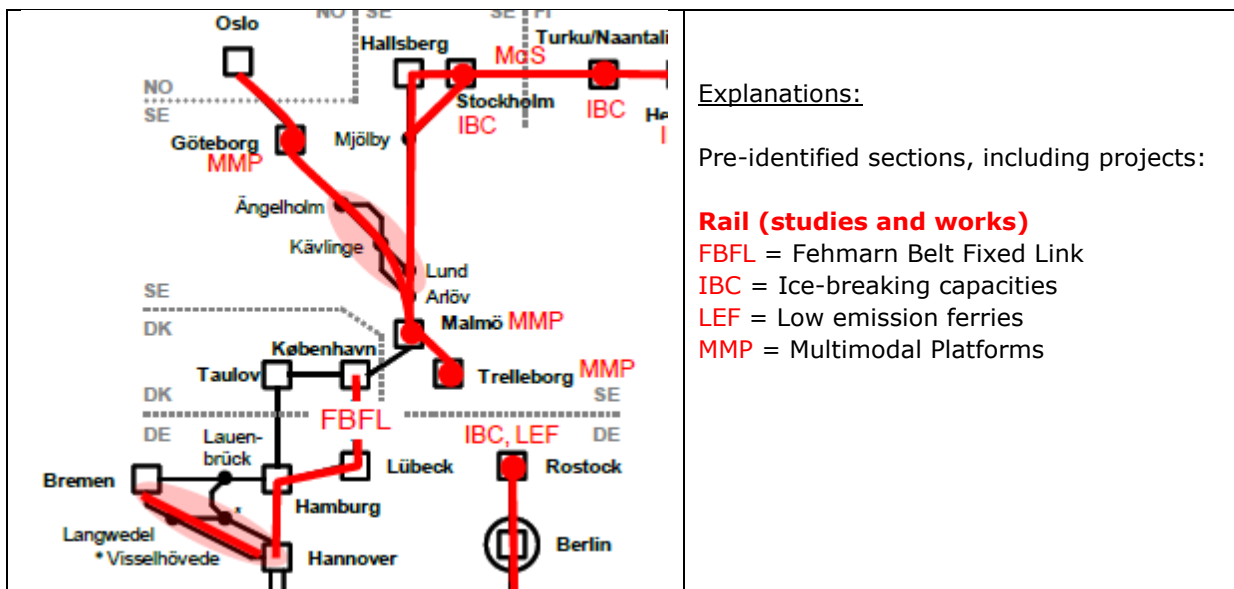
Figure 67 Forecast capacities for German road sections in 2025 based on road network 2015 (BMVI 2014)



Source: ScanMed study

The ScanMed study also includes a figure where the major multimodal infrastructure development plans are included as can be seen below.

Figure 68 Overall picture of upcoming major multimodal infrastructure development



Source: ScanMed study 2014

12.4 Trade development until 2021

There are different predictions as regards the economic development of different global regions.

The International Monetary Fund, IMF assumes in the latest World Economic Outlook⁸ (WEO) the following annual average increases in different regions (assumed until 2021):

Table 41 IMF World Economic Outlook

IMF World Economic Outlook		Average annual increase of GDP at constant prices, 2015-2021
World	191 countries	3,5%
Major advanced economies (G7)	Canada, France, Germany, Italy, Japan, United Kingdom, and United States.	1,6%
European Union	28 countries	1,9%
Emerging market and developing	152 countries	4,7%
Commonwealth of Independent States	12 countries	1,0%
Emerging and developing Asia	29 countries	6,4%
Emerging and developing Europe	12 countries: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Hungary, Kosovo, FYR Macedonia, Montenegro, Poland, Romania, Serbia, and Turkey	3,2%
ASEAN-5	Indonesia, Malaysia, Philippines, Thailand, and Vietnam	5,2%

Source: IMF World Economic Outlook

Prospects differ sharply across countries and regions according to WEO, with emerging Asia in general and India in particular showing robust growth and sub-Saharan Africa experiencing a sharp low down. There is a more subdued outlook foreseen for advanced economies, fx. regarding Brexit and uncertain fate of institutional and trade arrangements between the United Kingdom and the European Union.

12.5 Infrastructure charges

The transport modes have different manners in order for the users to pay for the use of the infrastructure, and this also varies from country to country. The basis is that the user should pay for the direct costs and there are different systems to collect the charges in different countries. The charges are mainly distance-related and time-based, as well as depending on the type of vehicle and engine. Some also include cost of air and noise pollution.

EU sets common rules on road infrastructure charging⁹ and also regarding internalisation of external costs of road transport. In the future all transport modes will have to fully pay for the external effects from traffic, such as noise and air pollution. This internalisation of external cost is already partly introduced in different countries, for example the noise surcharge for rail freight wagons in Germany, and the higher charges for lower Euro Class truck engines in different countries. Many

⁸ <http://www.imf.org/external/pubs/ft/weo/2016/02/weodata/index.aspx>

⁹ http://ec.europa.eu/transport/modes/road/road_charging/charging_hgv_en

large cities also have infrastructure charges for use of the local infrastructure, for example Stockholm, Gothenburg and Oslo.

There are also discussions about introducing further charges in order to internalise the external costs of transport further, and partly also as means to shift road freight transport towards the more environmentally-friendly rail and sea transport. One example is the road traffic tax that is discussed in Sweden and also has been discussed in other countries. There were discussions about such a tax in Denmark a few years ago, but the suggested system was rejected.

12.5.1 Rail infrastructure charges

The different countries have different systems as regards how they charge the rail freight operators for the use of the rail infrastructure. The charges should cover the direct costs for the use of the infrastructure. The normal is that there is a basis charge for the specific route based on the number of km – and the type of train, weight etc. Thereto there are different surcharges, for example environmental surcharge for diesel traction, noise surcharge and for the different services used en route, such as shunting etc.

In Germany the charges are depending on type of train as well as type of route. Between 2016 and 2017 the charges increased between 2.4% and 2.7%, depending on route type.

Noise from “old” rail freight wagons is a large issue, especially in Germany. There have schemes with support for those that implement quieter breaks on freight wagons. Therefore there is also a surcharge for noise from rail freight wagons of 3% of the total infrastructure route fee. The surcharge was 2.5% in 2016.

Table 42 German rail infrastructure route fees for freight trains for 2017, excl. noise surcharge

Longdistance routes	EUR/routekm	Express freight trains	Standard freight trains
Route class	Fplus	16,45	9,97
	F1	8,40	5,09
	F2	5,82	3,53
	F3	5,23	3,17
	F4	5,05	3,06
	F5	3,71	2,25
	F6	4,97	3,01

Source: DB Netze¹⁰, The highest route class is for the high speed rail network, where freight trains are not allowed.

The rail infrastructure charges in Denmark and Sweden are calculated at some 0.004 kr (SEK or DKK) per tonnekm on the normal rail routes, and quite a lot lower than the German charges. Thereto there are different surcharges depending on what type of route, train, engine etc. The charges for use of the infrastructure on the fixed links – Great Belt Link (some 6,400 DKK) and Öresund Bridge (some 6,000 SEK) are much higher seen per km.

In Sweden the charges are set to increase quite heavily over the coming years and this is a much discussed issue amongst the rail freight operators, as they feel it makes it more difficult to shift freight from road to rail.

¹⁰ https://fahrweg.dbnetze.com/fahrweg-de/produkte/trassen/trassenpreise/trassenpreise_2017.html

The Norwegian rail charges for freight trains are 0.625 NOK per trainkm. There are also charges for cancelling planned trains and the charges depend on how long in advance the trains are cancelled.

12.5.2 Road infrastructure charges

The road freight operators also pay infrastructure charges and these are different in different countries.

In Norway there is a long tradition for infrastructure charges when constructing roads, but also congestion charges in the larger cities. Since 2015 it is compulsory for trucks above 3.5 tonnes to have a toll tag – a special OBU (On-Board-Unit) - in the vehicle and the vehicle must be linked with the tag through an agreement with a service provider (toll tag company) in order to pay for the toll charges on Norwegian roads. There are different toll tags that are valid in Norway; the Norwegian AutoPASS, BroBizz from Øresund and Storebælt, AutoBizz from Scandlines and GO-Box from Austria. Some of them can also be used on ferries and fixed links – bridges – especially in Scandinavia.

In Sweden, Denmark, Luxemburg and the Netherlands heavy vehicles with minimum weight of 12 tonnes have to pay for a Eurovignette in order to use the motorways and toll highways. The tariff is based on engine type and number of axles of the vehicle. In 2017 a Euro 6 - Euro 2 truck with 3 axles pay 750 EUR and with 4 axles or more 1,250 EUR. An old Euro 1 truck with up to 3 axles pays 960 EUR and with 4 or more axles 1,550 EUR.

The Eurovignette is based on the EU-directive 1999/62/EC on Charging of Heavy Goods Vehicles for use of certain infrastructure (Eurovignette Directive), with updates (Directive 2006/38/EC and Directive 2011/76/EU). The 2017 Work Programme of the European Commission confirms that the Eurovignette Directive review is planned to take place in the second quarter of 2017.

Further to the Eurovignette, they also need to pay for passage of fixed links as the Øresund Bridge and the Svinesund Bridge as well as for ferries, for example through a OBU from BroBizz or AutoBizz.

In Germany the trucks have to pay "LKW Maut"¹¹ for the use of motorways and selected federal trunk roads. The trucks need to have a special On-Board-Unit (OBU) for this, to calculate the exact fees for the specific roads that have been used. The fees differ depending on the emission class of the truck and the number of axles. A 3-axled truck with Euro6 engine pays 0.113 EUR/km and should it have 5 axles or more, the truck should pay 0.135 EUR/km. An old 3-axled truck with Euro 1 engine and 3 axles pays 0.196 EUR/km and with 5 axles or more the truck should pay 0.218 EUR/km. Within a few years the Maut will also be introduced for cars in Germany.

Other European countries also have toll systems for heavy trucks¹². For many of them a special OBU is needed in order to calculate the fees – and this also means that trucks in international traffic have different OBUs in their truck cabin.

13 Forecasts and scenarios

This chapter looks at different forecasts and scenarios for the transport development in the coming years until 2030 and partly also beyond. The forecasts are different in the different countries and

¹¹ https://www.toll-collect.de/en/toll_collect/rund_um_die_maut/maut_tarife/maut_tarife.html

¹² <https://www.dkv-euroservice.com/gb/services/toll/toll-services-by-country/more-countries/>

also partly based on differences in the assumptions as well as in the forecast year and base year, wherefore they are not fully comparable. Sources for prognosis and scenarios include the following; The Norwegian Base Prognosis for freight 2018-2027; The Swedish 2040 Prognosis from Trafikverket; and ITF Transport Outlook 2017.

Prognoses, forecasts and scenarios are based on a lot of different assumptions at a certain point of time and the assumptions could also change over time and other events could occur that will influence development in other directions. A prognosis/scenario should give a hint about the future development, but should never be seen as the full truth, as nobody is able to see into the future.

International Transport Forum, ITF published on 30 January 2017 the ITF Transport Outlook 2017 with an overview of recent trends and near-term prospects for the transport sector at a global level, as well as long-term prospects for transport demand to 2050, for freight (maritime, air and surface), passenger transport (car, rail and air) and CO2 emissions¹³.

13.1 The Norwegian Base Prognosis for freight 2018-2027

According to the Norwegian Base Prognosis for freight for the period 2018 – 2027¹⁴, made for the work with the Norwegian National Transport Plan (NTP), the road transport volumes are expected to increase with 3.2% in 2018 for import/export, with 2.4% annually for the period 2018-2022 and with 1.9% annually for 2022-2028.

Assumptions: The forecast is based on expectations as regards economic and population development. The following demographics have been developed for Norway as a whole in the years until 2050:

Table 43 Demographics in Norway between 2014 and 2050

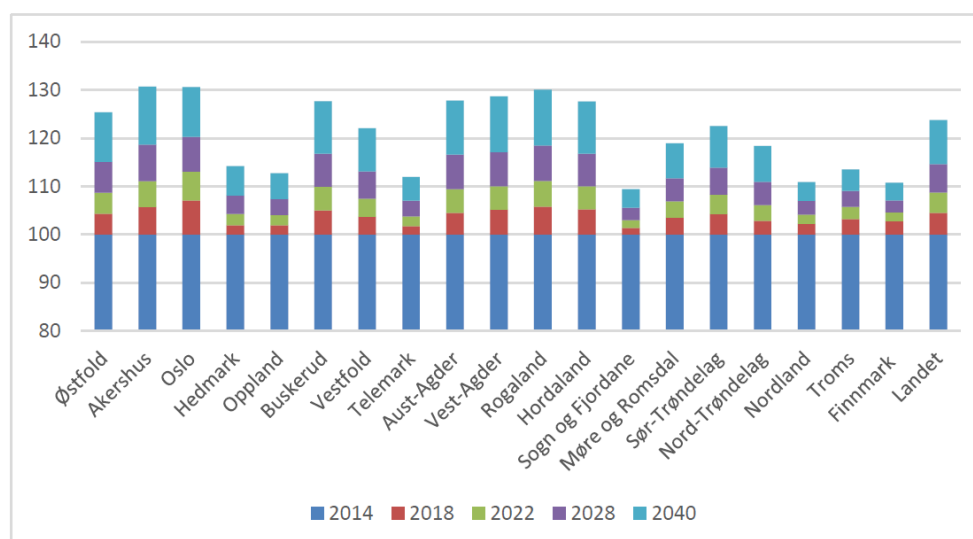
Year	2014	2018	2022	2028	2040	2050
Population	5.109.056	5.340.334	5.556.058	5.857.231	6.323.562	6.611.174
Increase in period		4,5%	4,0%	5,4%	8,0%	4,5%

Source: TØI report 1393/2015

¹³ <http://www.itf-oecd.org/transport-outlook-2017>

¹⁴ Forecasts for Norwegian freight transport – NTP 2018-2027, TØI 1393/2015

Figure 69 Demographics on regional level in Norway from 2014



Source: SSB, Region Population Progress 2016¹⁵

Table 44 Demographics in the Oslo Region counties 2016 and 2040

County	2016	2040	%
Østfold	290.000	354.000	22%
Akershus	595.000	768.000	29%
Oslo	658.000	854.000	30%
Hedmark	195.000	221.000	13%
Oppland	189.000	212.000	12%
Buskerud	278.000	347.000	25%
Vestfold	245.000	297.000	21%
Telemark	172.000	192.000	12%
Total Oslo Region	2.622.000	3.245.000	24%
% of total Norway	50%	51%	
Total Norway	5.241.000	6.331.000	21%

Source: SSB, Region Population Progress 2016

13.2 Swedish Trafikverket Prognosis for 2040¹⁶

The growth of the global economy is estimated to 3% annually in the years towards 2040. Average annual growth rates:

- Asia and Oceania 3.9%

¹⁵ <https://www.ssb.no/befolkning/artikler-og-publikasjoner/regionale-befolkningsframskrivinger-2016-2040-flytteforutsetninger-og-resultater>

¹⁶ <http://www.trafikverket.se/for-dig-i-branschen/Planera-och-utreda/Planerings--och-analysmetoder/Samhallsekonisk-analys-och-trafikanalys/Kort-om-trafikprognoser/>

- Africa south of Sahara 3%
- Central and Eastern Europe 2.7%
- Latin America 2.6%
- MENA 1.9%
- North America 2.3%
- The Nordic Countries 2%
- Other parts of Western Europe 1.9%

The Swedish commodity trade increases by 150% between 2012 and 2040 in monetary terms, according to the prognosis.

The total growth in tonnes for the period 2012 – 2040 is estimated to 59%.

- Swedish domestic freight traffic is estimated to grow with 1.4% annually, from 213 million tonnes in 2010 to 295 million tonnes in 2040.
- The transit traffic is estimated to grow with 1.9% annually in the period, from 7 to 11 million tonnes.
- Swedish international freight traffic is expected to grow faster, the export with 2.2% annually, from 84 to 141 million tonnes and the import with 3% annually, from 81 million tonnes in 2012 to 163 million tonnes in 2040.

The largest increase is expected in the commodity group high-value goods (267% in the period) and this is mainly through increase in the international transport, where the import of high-value goods (355% in the period) is expected to increase heavily.

The annual increases of the transport work within the different transport modes are estimated to:

- 1.6% annually for rail freight
- 1.8% annually for road freight
- 2.3% annually for sea freight

13.3 ITF Transport Outlook 2017

Continued strong growth in transport demand, both passenger and freight, means that even in the most optimistic ITF scenario, transport CO₂ emissions in 2050 will still be at 2015 levels of around 7.5 giga-tonnes, according to ITF projections for global transport demand. This scenario already assumes that new technologies and changed behaviour lead to significantly less CO₂ being emitted.

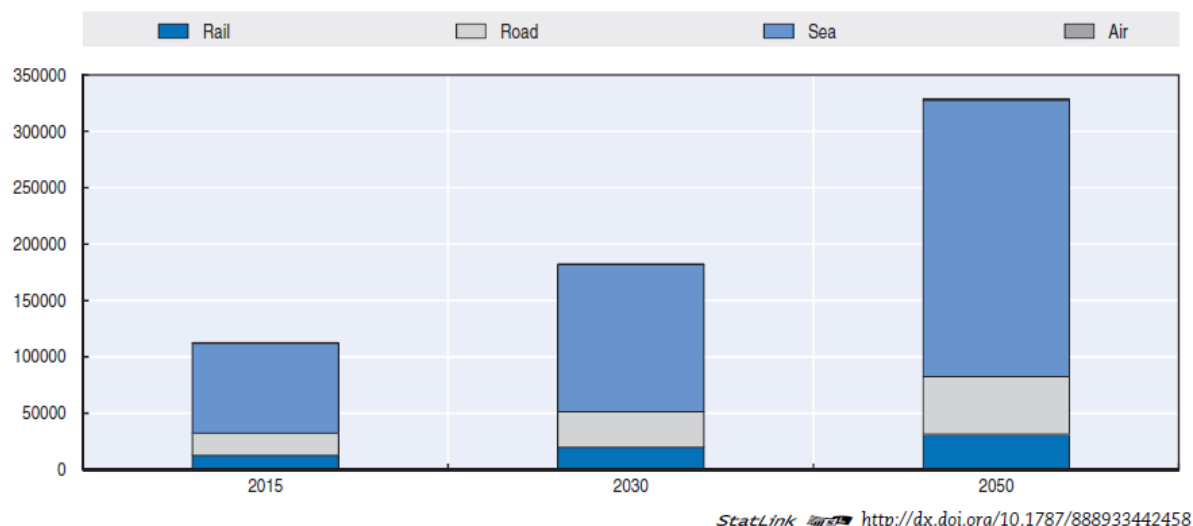
On a global level, a key factor for the difficulty in reducing transport CO₂ emissions over the long run is shifting global trade patterns. As trade moves to regions with a lack of rail or waterway infrastructure, greenhouse gas emissions from road freight will almost double. Driven by more trade among the region's emerging economies, freight transport on intra-Asian routes will grow particularly strongly, by as much as 250% to 2050. Operational measures such as truck-sharing, route optimisation or relaxation of delivery windows to optimise use of transport capacity would help to mitigate the emission increases.

In the ITF Transport Outlook's less optimistic baseline scenario, a doubling of global transport demand will lead to an increase of transport CO₂ emissions of 60% between 2015 and 2050.

13.3.1 Growth of freight transport demand towards 2030 and 2050

The global freight transport demand is expected to grow 3.3% annually until 2030, whereas thereafter to grow slightly lower, 3.1% annually. Maritime transport accounts for the largest share, growing from 71% in 2015 to 75% in 2050.

Figure 70 Freight transport demand by mode, Global Baseline scenario, billion tonne-km



Source: ITF Transport Outlook 2017

The following annual growth rates are foreseen for the different transport modes in a global perspective.

Table 45 Annual growth rate for freight transport demand, compared to GDP

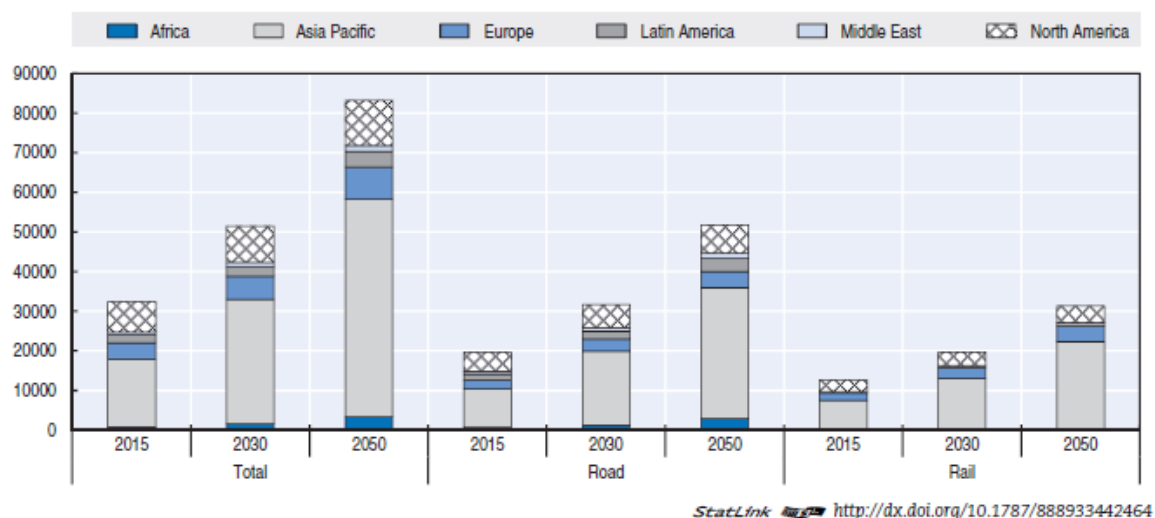
	2015-30	2015-50
GDP	2.7	2.5
Freight transport demand	3.3	3.1
Rail	3.0	2.6
Road	3.2	2.8
Aviation	5.6	5.4
Sea	3.4	3.3

Source: ITF Transport Outlook 2017

13.3.2 Surface freight development, ITF Baseline scenario

The total global surface freight (road and rail) is expected to grow from 32,000 billion tonne-km in 2015 to some 83,000 billion tonne-km in 2050, accounting for some 25% of the total global freight demand. Freight transport increases in all regions, but most of the growth will occur in developing economies, with volumes tripling in the non-OECD economies, to represent almost 80% of all surface freight transport demand in 2050.

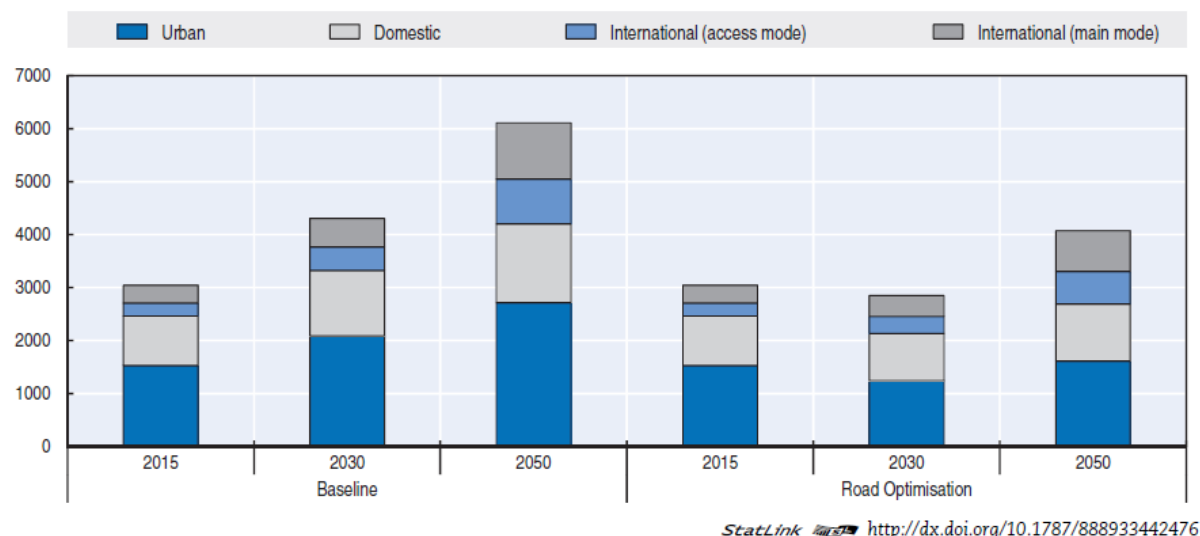
Figure 71 Surface freight tonne-km by regions, ITF Baseline scenario, billion tonne-km



Source: ITF Transport Outlook 2017

The fastest growth takes place in Africa, by a factor 3.7 from 2015 to 2050, although from a very low level. In Asia the transport work will increase by a factor 3.2 from 2015 to 2050, accounting for more than two-thirds of all global surface freight. Within Asia there are large differences, with some 50% for Japan and by a factor 3.5 in Southeast Asia. In Europe the surface freight transport work is projected to double and in North America to grow only by 50%.

Figure 72 ITF Road freight activity by sector, billion vehicle-km



Source: ITF Transport Outlook 2017

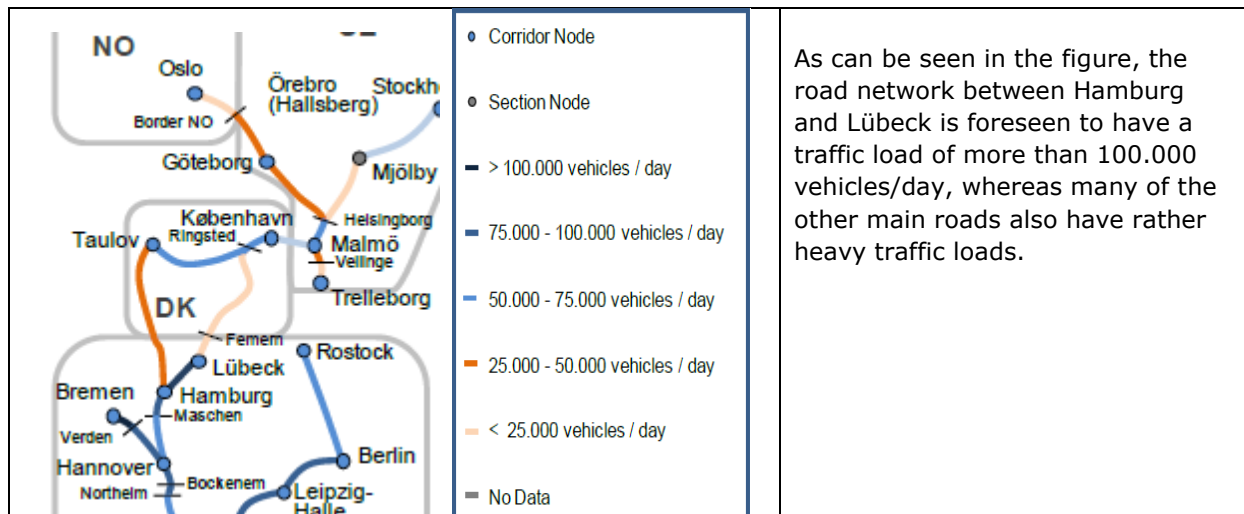
ITF has also made a Road Optimisation Scenario, as can be seen in the above comparison with the ITF Baseline Scenario, where freight transport operators optimise their load factors and decrease the number of empty trips via a collection of measures, incl. route optimisation, asset sharing between companies etc. It is also expected that delivery windows are relaxed, which has a large impact, especially for urban freight.

The Road Optimisation scenario reduces the vehicle-km to some 60% of the level in the Baseline Scenario. Further to this the Scenario also is influenced by disruptive technologies, such as autonomous trucks, Internet of Things etc.

13.4 Visualised forecast for 2030

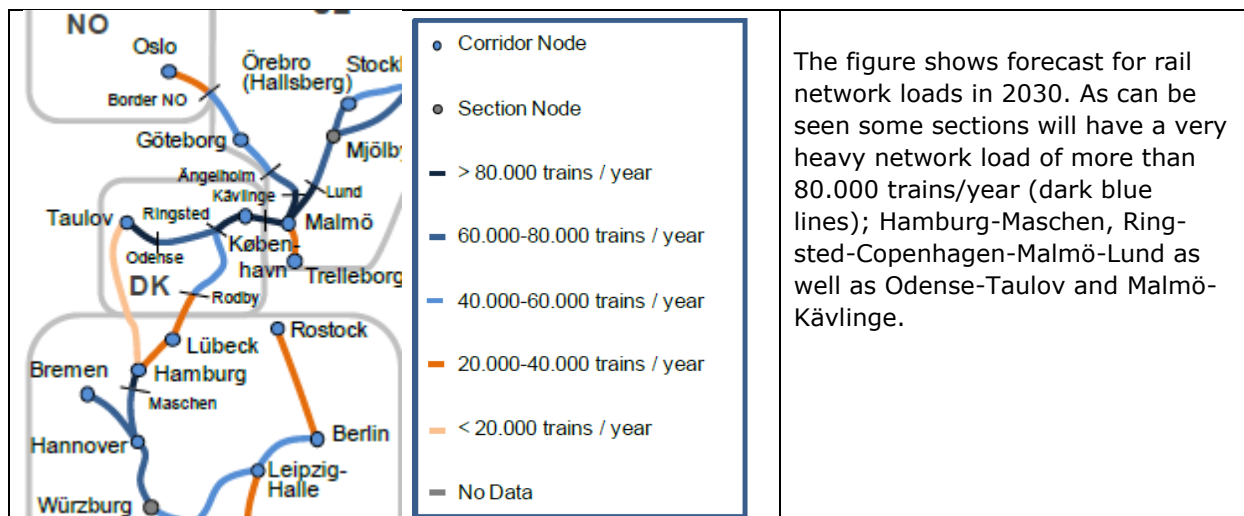
The ScanMed study has made visualisations based on the different forecasts for 2030 that were available as the study was concluded in 2014.

Figure 73 Forecast for road traffic loads in the North-western part of the ScanMed Corridor in 2030



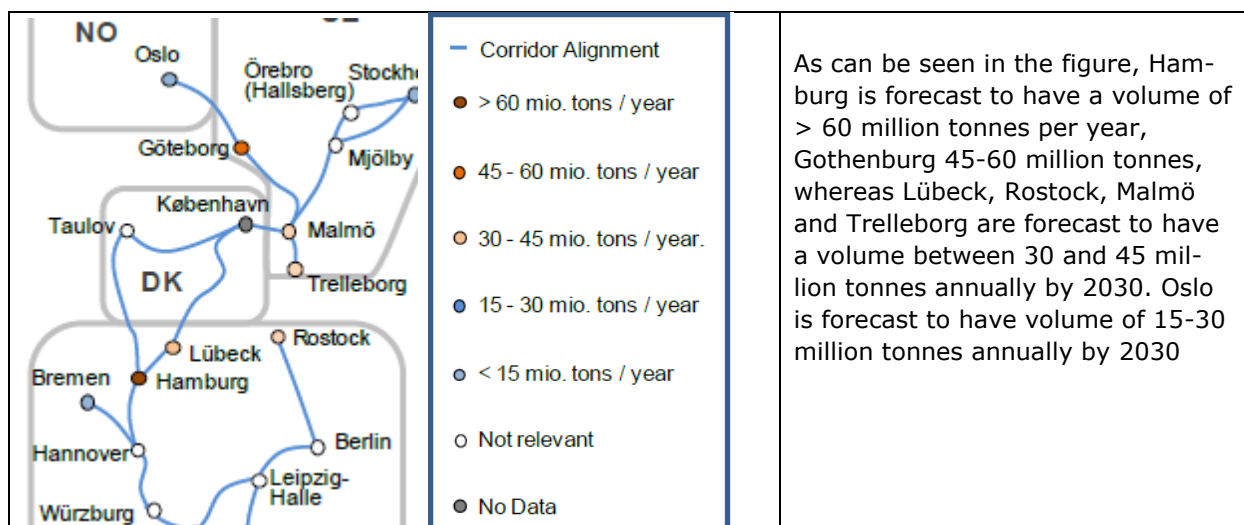
Source: ScanMed study 2014

Figure 74 Forecast for rail traffic loads in the Southern Baltic Sea Region in 2030



Source: ScanMed study 2014

Figure 75 ScanMed study forecast for sea port freight volumes in the Southern Baltic Sea Region



Source: ScanMed study 2014

13.5 Conclusions on forecasts, prognoses and scenarios

The freight transports are in all the different scenarios and forecasts expected to grow significantly over the coming years towards 2030, 2040 and 2050. They are however not easy to compare with each other as they have different basis years, sources and assumptions. ITF expects a doubling of the global surface freight transport (road and rail) between 2015 and 2050 in the ITF Baseline Scenario. The Road Optimisation Scenario foresees that the road sector can reduce the number of vehicle-km with 40%, compared to the Baseline Scenario, due to a large focus on optimisation, through for example optimising routes, asset sharing and new technologies.