



**Aalborg Universitet**

**AALBORG UNIVERSITY**  
DENMARK

## **Transport system concepts and definitions**

Kristiansen, Jørgen; Johannsen, Hans Henrik Winther; Hansen, Leif Gjesing; Hansen, Carsten Jahn

*Publication date:*  
2005

*Document Version*  
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

*Citation for published version (APA):*

Kristiansen, J., Johannsen, H. H. W., Hansen, L. G., & Hansen, C. J. (2005). Transport system concepts and definitions. Aalborg: SUTRANET + Department of Development and Planning, Aalborg University.

### **General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- ? Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- ? You may not further distribute the material or use it for any profit-making activity or commercial gain
- ? You may freely distribute the URL identifying the publication in the public portal ?

### **Take down policy**

If you believe that this document breaches copyright please contact us at [vbn@aub.aau.dk](mailto:vbn@aub.aau.dk) providing details, and we will remove access to the work immediately and investigate your claim.



SUTRANET WP 1 Working paper:

# Transport Systems Concepts and Definitions

## Acknowledgement

This paper has been written as part of the SUTRANET project (Work Package 1). SUTRANET ('Sustainable Transport Research & Development Network in the North Sea Region') is a project within the framework of the Interreg IIIB North Sea Programme.

The paper has been elaborated by a team of researchers at Aalborg University, Department of Development and Planning. It has benefited from useful comments and contributions received from other partners of SUTRANET, notably Napier University, FHK, Erasmus University, SINTEF, and TØI. The present version provides a preliminary basis and revisions are envisaged. The intention is to elaborate the paper based on further comments and suggestions from the SUTRANET project partners and others, including written outputs under Work Packages 2-3 in particular.

Aalborg University, Department of Development and Planning, June 2005

Jørgen Kristiansen  
Hans Henrik W. Johannsen  
Leif Gjesing Hansen  
Carsten Jahn Hansen

## Acronyms used in the Paper

EC	European Commission
EDI	Electronic Data Interchange
EU	European Union
FP4	EC Fourth Framework Programme for Research and Development
IT	Information Technology
LoLo	Lift On/Lift Off (e.g. of containers)
MONS	Motorways of the Northern Seas
NSM	North Sea Motorway
NSR	North Sea Region
NTN	Nordic Transport political Network
NVF	Nordisk Vejteknisk Forbund (Nordic Road Association)
R&D	Research and Development
RoRo	Roll On/Roll Off (e.g. of trailers)
SCM	Supply Chain Management
SME	Small and Medium-sized Enterprise
SSS	Short-Sea Shipping
TEN-T	Trans-European Transport Network
TEU	Twenty-foot Equivalent Unit (a standard unit equal to one 20 ft long container)
UK	United Kingdom
WP	Work Package (SUTRANET)



## Table of Contents

	<b>Page</b>
<b>1. Transport Concept Definitions</b>	<b>1</b>
Multimodality	1
Intermodality	1
Transport Chains	2
Supply Chain Management	2
Transport Corridors	3
Transport and Logistics Centres	4
Ropax Vessels etc.	5
Ferry Transport	6
Freight Transport Units	6
Short-sea Shipping	6
Motorways of the Sea	7
<b>2. The North Sea Motorway(s)</b>	<b>9</b>
<b>3. Seaports in the NSR</b>	<b>10</b>
Categories of seaports	10
North Sea Ports in Norway	11
North Sea Ports in Western Sweden	11
North Sea Ports in Jutland	12
North Sea Ports in the UK	13
North Sea Ports in Belgium, the Netherlands and Northern Germany	13
Overview of Seaports in the NSR	14
<b>4. Criteria for the Selection of NSR Seaports</b>	<b>16</b>
<b>References</b>	<b>17</b>



## Introduction

The aim of this paper is to facilitate a consistent terminology throughout the written contributions of the SUTRANET project. The paper presents a description of transport systems concepts and definitions, with a particular focus on intermodal transport in the North Sea Region (NSR).

The first section presents a list of transport concept definitions. The following sections discuss the 'North Sea Motorway' concept, present an overview of seaports in the North Sea Region (NSR), and suggest some criteria that could be applied for the selection of seaports in the NSR to be included in the SUTRANET project research and case studies.

## 1. Transport Concept Definitions

The concepts to be described and defined in this section are:

- Multimodality;
- Intermodality;
- Transport chains;
- Supply Chain Management (SCM);
- Transport corridors;
- Transport and logistic centres;
- Ropax vessels etc.;
- Ferry transport;
- Freight Transport Units;
- Short-sea shipping (SSS);
- Motorways of the sea.

### Multimodality

Multimodality implies that there is more than one modal option on a particular route or in a particular transport corridor. This implies that there is a **choice between at least two different modes** of transport (e.g. between road and rail, or between road/rail and ferry transport/short-sea shipping).

### Intermodality

The Commission in COM(97) 243 final document suggests the following definition:

*Intermodality is a characteristic of a transport system that allows at least two different modes to be used in an integrated manner in a door-to-door transport chain.*

Intermodal transport indicates that at least two different modes (e.g. road and rail, road and ferry transport/short-sea shipping, or rail and ferry transport/short-sea shipping) are involved in constituting a door-to-door transport chain for individual freight shipments or passenger services.



In 1999, the TRILOG Research and Development (R&D) project under the EC Fourth Framework Programme for R&D (FP4) presented the definition of intermodal freight transport ('freight intermodalism') as follows:

*The optimal integration of different transport modes, enabling an efficient and cost-effective use of the transport system through seamless, customer-oriented door-to-door services, whilst favouring competition between transport operators.*

Passenger transport, at various levels, differs from freight transport in terms of institutional setting, organisation and technology. Nevertheless, the above mentioned definition could be applied as well to intermodal transport systems, which are primarily concerned with passenger services.

## Transport Chains

The INFOSTAT project (R&D project under FP4) has defined a transport chain as:

*A sequence of transport modes used to carry a certain quantity of goods from its origin to its final destination. Along the chain, one or more transshipments may take place.*

It is important to note, that a similar definition could be applied to passenger transport systems.

## Supply Chain Management

The Supply Chain Management (SCM) concept is related with the transport chains. SCM could be described as *"A management philosophy that seeks to integrate business processes in the supply chain from point of origin to point of consumption in order to meet customers' requirements... The perspective is the supply chain as a whole, not the individual companies or entities in the supply chain"*<sup>1</sup>.

Several similar definitions have been suggested<sup>2</sup>, e.g.:

- *"Supply chain management covers the flow of goods from supplier through manufacturing and distribution chain to end-user"*.
- *"An integrative approach to dealing with the planning and control of total materials flows from suppliers through end-users"*.
- *"The supply chain encompasses all activities associated with the flow and transformation of goods from the raw materials stage (extraction), through to the end-user, as well as associated information flows. Material and information flow both up and down the supply chain. Supply chain management is the integration of these activities through improved supply chain relationships to achieve sustainable competitive advantage"*.

---

<sup>1</sup> Source: Slides presented by the Scandlines' CEO at the conference 'Towards an integrated transport market in the Northern Dimension area by 2010' (in Billund, Denmark, November 2002).

<sup>2</sup> From a sample of definitions of supply chain management presented in the book: 'Understanding Supply Chains – Concepts, Critiques and Futures' (Oxford University Press, 2004).

It has been stated (in the case of the Baltic Sea Region) that SCM could be viewed as a facilitator of regional development through establishing closer and long-term relationships between companies within and outside the region, by enhancing cooperation between transport services and infrastructure entities in the region, and by stimulating the development of small and medium-sized enterprises (SMEs) to create new industrial capacity in the region.

## Transport Corridors

There is no commonly agreed definition of a transport corridor.

The NVF Dictionary, version 2 (Nordic Road Association, Technical Committee No. 53, September 2002) describes a transport corridor as *“A set of essentially parallel transport facilities offering alternative mode choices between two points”*.

Another project within the Interreg IIIB North Sea Programme, the ‘Nordic Transport political Network’ (NTN Phase II), is actually organised around a geographically defined transport corridor, i.e. ‘the NTN corridor’. The NTN project has issued a publication<sup>3</sup> that presents the challenges and some definitions applied to the NTN corridor. In this publication a transport corridor is briefly and simply defined as *“All resources for transport of goods (and passengers) between two geographical areas”*. The particular corridor in focus of the NTN project *“...covers the transport systems in southwestern Norway, western Sweden, western Denmark and Schleswig-Holstein. The NTN corridor embraces the resources that can secure efficient freight transport between the regions in the corridor and Central and Eastern Europe”*. Thus the corridor concept in this case is confined to the resources, facilities and services that are available to ensure efficient freight transport within the corridor, and the external connections. Geographically it is identical to the scope of the ‘Nordic Link’ corridor (see below).

So far the focus in relation to transport corridors has been on freight transport. It may be considered to include the mobility aspects as well, such as high-speed ferry services and the function of regional airports as ‘gateways’.

A distinction is often made between an ‘**economic**’ corridor and a ‘**transport**’ corridor. In the NSR and SUTRANET perspective a transport corridor is conceivably to be linked with socio-economic activities and to be broadly defined as **a geographical sequence of strongly interconnected sub-regions** (sources: the INFOSTAT and MESUDEMO R&D projects under FP4). The MESUDEMO project advised that it is crucial also to identify the economic corridors that constitute the sources (origins and destinations) of the traffic that flows through the particular transport corridor.

The transport corridor definition is closely related the functional region concept (see the SUTRANET Working Paper: ‘Regional Development Perspectives and Concepts in the North Sea Region’). A transport corridor represents an important structure to serve and strengthen the functional characteristics of a region, as well as the corridor could provide important interconnections and communication between two or more separate functional regions.

---

<sup>3</sup> NTN, November 2003: Transport corridors. Facts and development trends.



Two examples of transport corridor concepts that have been presented related with Jutland are the 'Nordic Link' and 'West link'. Nordic Link is defined to include transport of freight and related services in a geographical corridor covering Hamburg and Schleswig-Holstein, Jutland, western Sweden (including Gothenburg) and southern Norway (including Oslo). The Nordic Link corridor has been promoted by a number of transport companies, including ferry operators, in the corridor. The Westlink corridor takes the point of departure from the Port of Hanstholm in north-western Jutland. It is initiated by local governments in western Norway and around the Hanstholm port. The stated aim of Westlink is to enhance cooperation between ports and commercial companies in the areas around the North Sea, particularly Hanstholm, western Norway, eastern UK and the North Atlantic.

The specification of transport corridors in the NSR is to be further elaborated in the SUTRANET project, including examples/cases in the SUTRANET study areas.

## Transport and Logistics Centres

A transport and logistics centre is a centre handling transport with a view to the logistic requirements. In this relation it is relevant to repeat the definition of a 'logistic family' (quoted from: Freight Transport Statistics – Statistical sources and requirements for freight transport modelling. ISP Series No. 264. Department of Development and Planning, Aalborg University, December 2000):

*A logistic family is a grouping or classification of commodities, with a view to how they are being handled and transported from a logistical point of view. Thus they are featuring similar logistical requirements that are more closely related to manufacturing and commercial behaviour, ref. economies of scope.*

A Work Package 3 draft report<sup>4</sup> describes a transport centre as a commercial area offering a location in connection with the physical infrastructure that is attractive to transport operators. Thus a transport centre could be a node in a transport network but this is not always the case. The WP 3 report presents the following definition of a logistics centre:

*A defined area within which all activities relating to transport, logistics and the distribution of goods – both for national and international transit, are carried out by various operators on a commercial basis.*

In this sense a logistics centre could be characterised as a **semi-infrastructure facility**. It is both commercial (established and managed by a neutral legal body, preferably by a Public-Private-Partnership arrangement) and a facility that must be open to allow access to all competing companies and operators. The WP 3 report advises that a logistics centre, in order to encourage intermodal transport, "should preferably be served by a multiplicity of transport modes (road, rail, deep sea, inland waterway, air)".

---

<sup>4</sup> SUTRANET WP 3, March 2005: *Analysis of Institutional and Organisational Solutions in the Development of Transport & Logistics Centres.*

Transport and logistics centres are normally specified according to their place in a network hierarchy, but several definitions have been suggested. A recent Danish study report<sup>5</sup> suggests the following hierarchal classification of transport centres:

- a. National centre of particular European importance;
- b. National centre of some European importance;
- c. National centre of regional (within the country) importance;
- d. Regional centre (within the country);
- e. Area centre of local importance.

This classification could be modified and simplified in the SUTRANET project with a view to the transnational context and NSR perspective and involve:

- I. TEN-T centres;
- II. North Sea Region (NSR) centres;
- III. National/local centres.

**Class I** centres are located in one of the transport corridors served by the Trans-European Transport Network (TEN-T). They offer handling of more than one mode of transport ('multimodality'), and an integrated co-operation with a range of other European transport centres about routing and EDI/IT etc.

**Class II** centres are located in a major transport corridor in the NSR, but a corridor not necessarily included in the TEN-T. Class B centres are part of a transport network that provides access to areas outside the NSR via the TEN-T. They should also provide a certain degree of 'intermodality' and serve European and international traffic to some extent.

The **Class III** category includes centres of mainly national or local influence. Some of these centres may have a potentially favourable location, and could develop to be of eventual importance to the overall connectivity and functioning of transnational networks within the NSR, such as providing transshipment between short-sea shipping and the hinterland connections.

In the SUTRANET context, the transport and logistical centres under analysis should be functioning as important nodes or transshipment points in the NSR transport network and systems. This implies that the transport and logistic centres will most probably be located in a seaport provided with handling facilities for ferries, container ships and/or RoRo ships or similar types of unit load ships. The centre should be served by both road and rail infrastructure facilities and connections on the land side. The transport and logistics centre will, however, only be a part of a seaport that constitutes a node in the NSR transport network.

## Ropax Vessels etc.

The 'Ropax' concept is related with RoRo (roll on/roll off) vessels<sup>6</sup>. A RoRo vessel typically carries a mixture of rolling cargo dominated by road trailers (lorries and unaccompanied semi-

---

<sup>5</sup> Ministry of Environment, December 2002 (in Danish): *Transport i det kompetente og innovative Danmark*.



trailers), but also containers loaded on special wagons. The RoRo vessel is mainly considered as a freight ship. The term 'Ropax' indicates that a Ropax vessel is able to serve both passengers and freight on vehicles/trailers. It is combining the cargo capacity of a RoRo vessel with the passenger amenities of a modern ferry.

## Ferry Transport

Ferry services could include both passengers and freight. The services are scheduled i.e. they take place according to a regular time table and are often relatively frequent.

In order to qualify as a ferry route, the maritime link in question must connect overland road and/or rail infrastructure at both ends of the route. Thus the ferry route is mainly one link only in a passenger trip or freight transport chain consisting of roads and/or railway connections at both ends.

Some types of ferries serve passengers only (unaccompanied, by bus or by passenger cars), and in a few cases ferries serve goods only (lorries, unaccompanied semi-trailers, railway wagons). However, most of the present ferry services in the NSR provide for combined passenger and freight transport onboard the same vessel (e.g. a Ropax vessel). Ferries could appear in the form of RoRo vessels.

## Freight Transport Units

Some relevant terms for unit loads are:

### TEU (or teu).

A 'TEU' means a standard 'Twenty-foot Equivalent Unit', which is equal to one standard 20 ft long container. A 40 ft container represents 2 TEU. One 13.6 m long standard trailer is also equivalent to 2 TEU.

### Intermodal Transport Unit (ITU).

An ITU means a container, swap-body or semi-trailer suitable for intermodal transport.

### Cargo Transport Unit (CTU).

A CTU means a freight container, swap-body, vehicle, railway wagon ('railroad car'), or any similar unit.

## Short-sea Shipping

The EC report: 'Maritime Policy. European Union legislation and objectives for sea transport' (European Commission Directorate-General for Transport and Energy, Brussels 2002) states that "*Short sea shipping is an efficient, cost-effective and environmental-friendly component of Europe's*

---

<sup>6</sup> The present description is based on several websites, including [www.stenaroro.com](http://www.stenaroro.com); [ing.dk/forum](http://ing.dk/forum); [en.wikipedia.org/Wiki/Containers](http://en.wikipedia.org/Wiki/Containers); [www.tropical.com](http://www.tropical.com); [www.containerhandbuch.de](http://www.containerhandbuch.de).

transport system. In 2000, it accounted for 43% of the total freight movement within the EU, measured in tonne-kilometres. Road Haulage's share in the same year was 45%".

According to the EU website [www.shortsea.info](http://www.shortsea.info), short-sea shipping (SSS) is defined as follows:

*“Shortsea shipping means the movement of cargo and passengers by sea between ports situated in geographical Europe or between those ports and ports situated in non European countries having a coastline on the enclosed seas bordering Europe. Shortsea shipping includes domestic and international maritime transport, including feeder services along the coast, to and from the islands, rivers and lakes. The concept of shortsea shipping also extends to maritime transport between the Member States of the Union and Norway and Iceland and other States on the Baltic Sea, the Black Sea and the Mediterranean”.*

The website describes that SSS in Europe includes all destinations, which are bordering the EU territory, and that SSS constitutes an alternative to road transport. It is further pointed out that SSS “is the intermodal transport of Intra-European cargo on a door-to-door basis, usually in containers or trailers. A large part of the transport traject is done by sea... Shortsea shipping in containers can be multimodal; by road, by rail and by inland barge”.

## Motorways of the Sea

In 2003, EC introduced the concept ‘motorway of the sea’ as part of a second revision/amendment of the Community guidelines for the development of the TEN-T<sup>7</sup>. An Article 12a concerning motorways of the sea was inserted in the guidelines, saying that:

*“The trans-European network of motorways of the sea shall aim to concentrate flows of freight on a few sea routes in order to establish new viable, regular and frequent maritime links for the transport of goods between Member States in order to reduce road congestion and improve access to peripheral and island States”.*

Article 12a further requires that:

- *Motorways of the sea shall consist of facilities and infrastructure concerning at least two ports in two different Member States.*
- *Projects of common interest of the trans-European network of motorways of the sea shall be proposed by at least two Member States. New links shall be established from a category A port (see the following Section 3 on seaports in the NSR); and proposals shall bring together at least shipping companies and ports located in one of the maritime regions as defined in TEN-T project No. 21 (see below).*

The motorways of the sea have been specified in the report: ‘Trans-European Transport Network – Revised proposals on guidelines and financial rules’ (European Commission, Directorate-General for Energy and Transport, 2004). The aim of the ‘motorways of the sea’ is, as indicated in the

---

<sup>7</sup> European Commission, 2004: Trans-European Transport Network. Revised proposals on guidelines and financial rules (Directorate-General for Energy and Transport, 2004)



revised proposals on Community guidelines, to establish new transnational maritime links at the same level of importance as motorways and railways in the TEN-T. According to the guidelines *“These maritime routes will improve the links with countries isolated by natural barriers and with islands and other peripheral countries”*. A number of measures have been recommended in the guidelines that could *“encourage the rapid development of such routes by consolidating freight on a few maritime routes starting from a limited number of ports in order to increase their potential viability”*, such as:

- simplifying customs and administrative checks (as already introduced at intra-Community borders on motorways), and developing electronic reporting for port authorities;
- providing port facilities preferably reserved for this activity (RoRo terminals, logistics equipment, parking spaces, facilities for lorry drivers) and direct access to ports (including open rail access);
- ensuring navigability throughout the year.

The EC report further specifies the requirements for **launching proposals** (under a ‘call for proposals’) for developing new maritime links in order **to gain Community co-funding** for implementation of incentive accompanying measures. Such measures could include access infrastructure, port infrastructure and electronic management systems. The report mentions that *“the most difficult step is choosing the ports that could be part of a motorway of the sea”*.



## 2. The North Sea Motorway(s)

The above mentioned EC report, in Annex, adds 'Motorways of the Sea' as TEN-T project No. 21 in the 'Priority projects declared to be of European Interest, April 2004' (see the SUTRANET paper 'Regional Development Perspectives and Concepts in the North Sea Region'). This project indicates two motorways of the sea in northern Europe and two motorways of the sea in southern Europe. The former consist of:

- *Motorway of the Baltic Sea (linking the Baltic Sea Member States with Member States in central and western Europe, including the route going through the channel North Sea/Baltic Sea (Kiel Canal));*
- *Motorway of the sea of western Europe (connecting Portugal and Spain, via the Atlantic Arc, to the North Sea and the Irish Sea.*

In both cases the indicative date for project completion is 2010. Both of the above mentioned motorways of the sea connects to the North Sea via the English Channel (from the 'Atlantic Arc'), and via the Kiel Canal and Kattegat from the Baltic Sea. However, **there is no direct indication and inclusion of 'the 'North Sea Motorway', which has still to be elaborated and the institutional setting to be clarified.** This elaboration could include issues such as: the circumstance that Norway is not an EU member state but a 'third country'; transit maritime traffic through the North Sea; and the identification of potential ports in the NSR seaboard to be part of the motorways of the sea.

In March 2005, the North Sea Programme Steering Committee approved the project 'Northern Maritime Corridor (NMC II) – Motorways of the Northern Seas (MONS)<sup>8</sup>. This project aims at promoting the Northern Maritime Corridor as 'Motorway of the Northern Sea' and integrating it into the TEN-T.

A preliminary presentation of the main/principal NSM routing is provided in the SUTRANET paper on regional development perspectives and concepts. The MONS is directly connected with the SUTRANET proposal of a main branch of the North Sea Motorway (NSM) via the Norwegian Sea.

---

<sup>8</sup> Source: Interreg North Sea Region News Letter 9 (April 2005). See also the NMC II Project Description (dated Stavanger, 30-11-04).

### 3. Seaports in the NSR

This section discusses the categories and criteria for ranking of seaports in the NSR, and provides a listing of existing seaports in each of the countries surrounding the North Sea.

#### Categories of Seaports

The revised Community guidelines for the TEN-T (EC, 2004) defines three categories of seaports to be included in the TEN-T:

- International seaports (category A);
- Community seaports (category B);
- Regional seaports (category C).

The category B ports are mainly of national interest, and the category C ports have mainly a local importance.

This categorisation is based on quantitative criteria (transport volumes served, e.g. annual freight or passenger throughput), or on their location on islands and in peripheral regions. A range of ports on the Swedish west coast, on the seaboard of Jutland, north-western Germany and the Netherlands, and on the UK east coast, are categorised as TEN-T maritime A-ports.

Several A-ports on the German and Dutch North Sea coast also serve the continental inland waterways.

The ports in Norway are not included in the A-port classification, but the Norwegian ports that are classified as 'national ports' (see below) are at the same level of importance as the A-ports in EU Member States.

In the SUTRANET project it is relevant to concentrate the focus on selected A-ports that have an important transnational and international function as an integrated node in the NSR transport network. The 'long-list' of A-ports presented in this section could form a basis for such selection. However, a majority of the A-ports listed in the following sub-sections may have potentials as community or regional seaports only in the future transport network located in the NSR.

The following sub-sections present a short overview of the NSR related seaports in each country as presently reflected. The port structure is, however, very dynamic and changing rapidly. Some ports may cease to play a significant functional role, whilst new port locations might offer potentials in the NSR network.

## North Sea Ports in Norway

The port structure in Norway has been defined within the Norwegian National Transport Master Plan. The port structure consists of two levels or categories, i.e. national ports and local ports. The National Transport Master Plan identifies ten (10) national ports.

The national Norwegian ports are required to offer a standard and freight volume that provides regular and frequent ship services on unit loads and containers. They are also expected to be well connected with and served by land-based (hinterland) transport infrastructure.

The location of the national ports in Norway is shown on the overview map below. The ports of Bodø and Tromsø in northern Norway do not fall within the NSR territory but belongs to the Northern Periphery. Thus the Norwegian national ports that could be part of the NSR transport networks are:

- Oslo;
- Grenland;
- Kristiansand;
- Stavanger;
- Karmsund;
- Bergen;
- Aalesund;
- Trondheim.



A further specification is required. As an example, Bergen is the largest port in Norway and in Scandinavia in terms of the annual throughputs measured in tonnes. However, most of this throughput consists of export of crude oil, and if liquid bulk is excluded the port would be ranked at a lower level.

The rest of the ports (such as some ferry ports) are categorised as local ports. The primary function of these ports is to serve the locally based economy, and they are not envisaged to have any significant influence on the overall NSR transport networks. However, the ferry ports in Egersund, Larvik and Langesund on the Norwegian south coast presently (2005) offer ferry service connections with ferry ports in North Jutland in Denmark.

## North Sea Ports in Western Sweden

Considering the extension of the eligible area of the Interreg IIIB North Sea Programme, the ports in southern Sweden (mainly Scania) should be included. However, the focus area of the SUTRANET project starts in the southern part of Kattegat. This leaves the following ports situated on the west-coast of Sweden as potential nodes of the NSR transport networks:

- Uddevalla;
- Gothenburg;



- Varberg;
- Halmstad.

The port of Gothenburg has a special status and importance as the largest container port located at the north-eastern area of the North Sea Region.

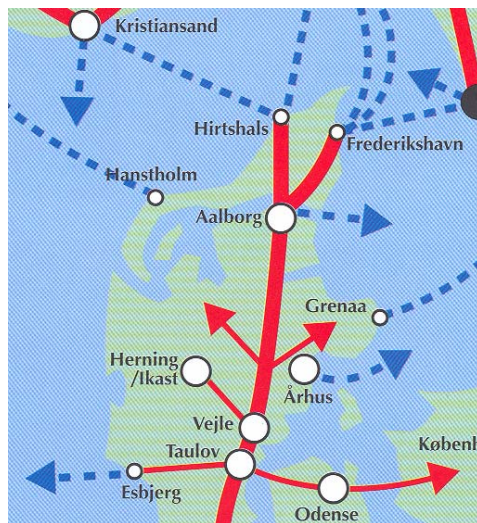
Smaller ports serving mainly local traffic (such as Strömstad near the Norwegian border and Lysekil) are not included.

## North Sea Ports in Jutland

The whole of Denmark is included in the eligible area of the Interreg IIIB North Sea Programme, but traditionally the eastern part of Denmark and southern Sweden are more oriented towards the Baltic Sea Region. Thus it makes sense that SUTRANET concentrates on the ports located along the Kattegat, Skagerrak and North Sea coasts. The Danish national authorities have not presented a national transport master plan that could define the ports of national and international importance and priority. However, the Danish Ministry of Transport and Maritime Authority have issued some guidelines regarding the development of ports in Denmark<sup>9</sup>.

The ports in Jutland that have been identified as A-ports in the TEN-T are of potential relevance to the NSR transport networks. These are presented on the following overview map (except for the port of Fredericia):

- Hirtshals;
- Frederikshavn;
- Aalborg;
- Hanstholm;
- Aarhus;
- Grenaa;
- Esbjerg;
- Fredericia.



(Source: Nordic Link brochure)

A few of these ports may fall below a quantitative criterion (e.g. an annual throughput threshold in number of TEUs) such as the ports of Grenaa and Hanstholm. However, the Port of Hanstholm in particular has got potentials in the NSR context due to its geographical location.

The Port of Fredericia has a substantial annual throughput in terms of tonnes, but this production mainly consists of bulk.

<sup>9</sup> Ministry of Transport and Danish Maritime Authority (in Danish), 2002: Den Blå Landevej. Havneudvikling – strategiske valg.



## North Sea Ports in the UK

Several seaports along the east-coast of the UK facing the North Sea, from the Thames in the south to the north-eastern point of Scotland in the north, are part of the NSR transport networks. However, several of them may be excluded following a categorisation according to selection criteria. Also the main ports in the Orkney Islands and Shetland Islands should be included. The ports are listed (from south to north) below and indicated on the overview map.

### *Haven:*

- Colchester
- Harwich;
- Felixstone;

### *Wash and Northern East Anglia:*

- Lowestoft;
- Great Yarmouth;
- King's Lynn;
- Port Sutton Bridge;
- Boston;

### *Humber:*

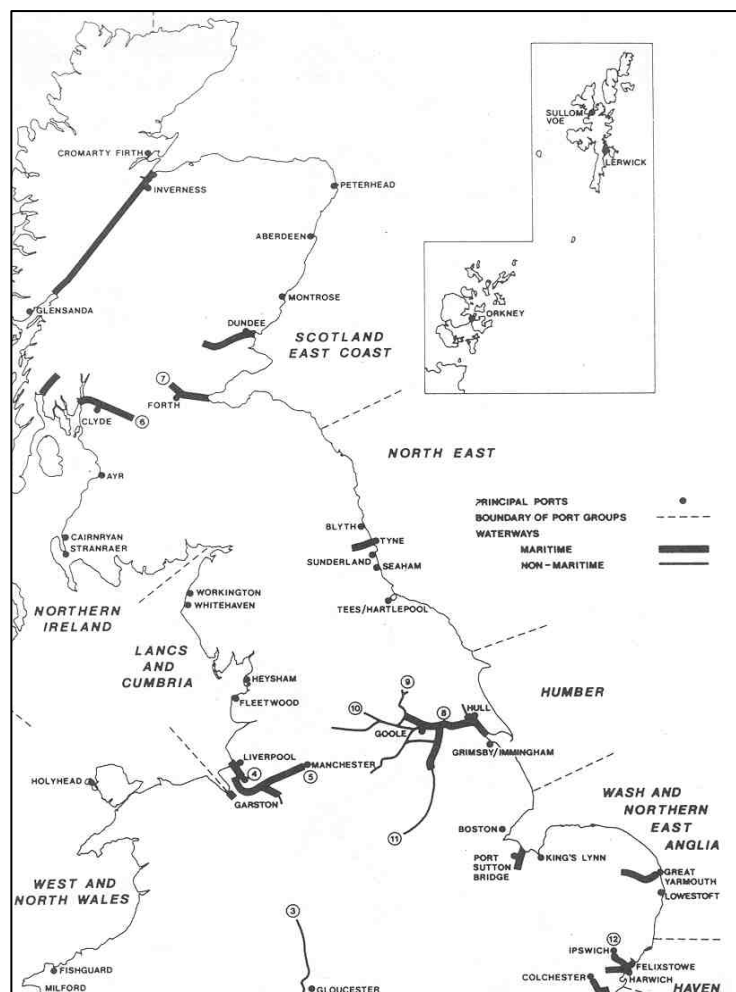
- Grimsby/Immingham;
- Hull;

### *North East:*

- Tees/Hartlepool;
- Beaham;
- Sunderland;
- Tyne;
- Blyth;

### *Scotland East Coast:*

- Forth;
- Dundee;
- Montrose;
- Aberdeen;
- Peterhead;
- Inverness;
- Cromary Firth;
- Orkney;
- Lerwick (Shetland).



## North Sea Ports in Belgium, the Netherlands and Northern Germany

The southern seaboard of the NSR contains several large ports that serve intercontinental connections. A distinction could be made between mega ports and other larger ports as part of the NSR transport networks. The mega ports are Antwerp, Rotterdam and Hamburg; these ports each





achieve more than 100 million tonnes throughput annually and have an important position in intercontinental transport networks. Other ports that could be important for the NSR transport network are those that have a throughput of more than 1.5 million tonnes per year (Similar to the TEN-T category A ports). Fifteen (15) ports on the North Sea coast of the Netherlands, Belgium and Germany qualify for this category. The port of Kiel is included due its connection to the North Sea via the Kiel Canal. The location of the ports is indicated on the overview map.

### *Mega-ports:*

- Rotterdam;
- Antwerp;
- Hamburg.

### *Other larger ports:*

- Amsterdam;
- Flushing / Terneuzen;
- Moerdijk;
- Delfzijl / Eemshaven;
- Zeebrugge;
- Ghent;
- Oostende;
- Bremen / Bremerhaven;
- Wilhelmshaven;
- Brake;
- Nordenham;
- Emden;
- Kiel;
- Cuxhaven.



\* Brake and Nordenham are close to Bremerhaven and are not indicated separately on the map

(Sources: Dutch National Port Council, Hafen Hamburg, Niedersächsischen Seehäfen, Statistisches Amt für Hamburg und Schleswig-Holstein)

## Overview of Seaports in the NSR

The following map is copied from the 'NorVision' report (see the SUTRANET paper on regional development perspectives and concepts) and does not include all of the A-ports mentioned above. However, the map provides a picture of the geographical scope and connectivity of the NSR transport networks. It also gives an idea about the diversity of land-based transport networks and modes, i.e. inland waterways, roads and railways, which connect with the NSR seaports.



Strategic Vision for the North Sea Region  
reg IIc

### Intermodal Terminals

- inland waterway
- rail/road
- sea

- main railway axes
- roads
- ferry lines
- ports

(Source: NorVision report, 2000/01)



## 4. Criteria for the Selection of NSR Seaports

The seaports should have potentials for contributing to regional development and impact on functional relations in the NSR. Ports that mainly handle dry and liquid bulk could be excluded, as the spatial impact of these ports is mostly concentrated within a local distribution and feeder area. However, large bulk ports could be a concern in terms of environmental safety and sustainability for the North Sea as a whole.

Categories of ports:

- Mega-port;
- Larger ports;
- Ports with special function;
- Other ports (medium-sized ports, and smaller ports with an important NSR network function).

The NSR seaports need to be described and categorised according to the types of passenger and freight services offered. Thus a distinction could be made between functional and capacity/performance criteria.

Some optional criteria for the selection of NSR seaports are:

- Significant existing or potential node in the NSR transport networks;
- Annual throughput in terms of tonnes (excluding dry and liquid bulk);
- Annual throughput in terms of number of TEUs, and/or equivalent number of trailers;
- Annual throughput in value terms;
- Annual throughput of trade flows with origin and/or destination in the NSR (volume/weight and value);
- Structural criteria, e.g. multimodal land-based (hinterland) infrastructure connection to the TEN-T, intermodal port facilities etc.;
- Functional criteria, e.g. ferry services, container, Ropax, RoRo and LoLo handling.

The WP 2, Task 1 activity includes the identification of the major NSR ports, intermodal shipping services, and hinterland connections (modal split by port). It further suggests a focus on unitised (unit load) ports in the NSR with a throughput of above 50,000 or 100,000 TEUs/year.

The criteria to be selected have to consider the current and potential functional integration of the ports in the NSR transport networks, and the specific scope of SUTRANET research activities and case studies.



## References

Department of Development and Planning, Aalborg University, 2000: *Freight Transport Statistics – Statistical sources and requirements for freight transport modelling* (ISP Series No. 264, December 2000).

European Commission, 1997: COM(97) 243 final.

European Commission, 2002: *Maritime Policy. European Union legislation and objectives for sea transport* (European Commission Directorate-General for Transport and Energy, Brussels 2002).

European Commission, 2004: *Trans-European Transport Network. Revised proposals on guidelines and financial rules* (Directorate-General for Energy and Transport, 2004).

Interreg North Sea Programme Secretariat, 2005: *News Letter 9* (Viborg, April 2005).

Ministry of Environment, 2002 (in Danish): *Transport i det kompetente og innovative Danmark* (Copenhagen, December 2002).

Ministry of Transport and Danish Maritime Authority (in Danish), 2002: *Den Blå Landevej. Havneudvikling – strategiske valg* (Trafikministeriet og Søfartsstyrelsen. Copenhagen, February 2002).

Nordic Road Association (NVF), 2002: *NVF Dictionary, version 2* (Nordic Road Association, Technical Committee No. 53, September 2002).

Nordic Transport political Network (NTN), 2003: *Transport Corridors. Facts and development trends* (NTN II, November 2003)

SUTRANET WP 1, 2005: *Regional Development Perspectives and Concepts in the North Sea Region* (Working Paper, June 2005).

SUTRANET WP 3, 2005: *Analysis of Institutional and Organisational Solutions in the Development of Transport & Logistics Centres* (draft report, March 2005).