

## Port Capacity

### Loading and unloading capacity in Norwegian container terminals

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The project determines which capacities should be used as a basis for capacity-limiting calculations in the Norwegian National Freight Model (NGM), for sea terminals operating container, RoRo and RoPax ships. For container and RoRo ships, the capacity is calculated in two ways, first based on loading/unloading velocity, then based on area limitations related to loading/unloading and container storage. The capacity for terminals operating container ships is mostly restricted by area, while terminals operating RoRo ships are mostly limited by the loading/unloading pace. For RoPax ships, the calculations somewhat differ as the capacity is largely supply-based and depends on the number of sailings per day, the size of the ship and the proportion of a ship not reserved for passengers. Results show that for most sea terminals the calculated capacity limitations are higher than the current traffic volume, which indicates a significant capacity surplus.

#### Purpose

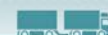
The project aims to map, calculate, and suggest which capacities should be used for each sea terminal when implementing capacity constrained calculations in NGM (The Norwegian National Freight Model). The capacity numbers will also have a value in themselves for analysis outside the NGM model. For NGM capacity in tons/year is the interesting part, but for other use capacities in units per year is also calculated.

#### Delimitations

The analysis is made for ports serving container ships, roro ships and RoPax ships. The RoPax ships are limited to international ferries. The ports included are those with transport statistics in SSB's port and ferry statistics. For container and roro ports, there are calculated capacities based on loading/unloading rates in the ports. In addition, there is developed a model for calculating capacity as a function of available areas for container or roro handling.

#### Capacities

For the lolo container ports, capacity is calculated in tons per year and TEUs per year, using both approaches. For each port, the smallest number is suggested for use in NGM and, also as



the most relevant capacity for each port. For most container ports, the capacity calculated as a function of area are in most cases the bottleneck capacity. For all container ports, the calculated capacities are higher than the present traffic.

For the roro ports, capacity is calculated in tons per year and trailer units per year, using both approaches. For each port, the smallest number is suggested for use in NGM and, also as the most relevant capacity for each port. For most roro ports, the capacity calculated based on loading/unloading rates are in most cases the bottleneck capacity. For all roro ports, the calculated capacities are higher than the present traffic.

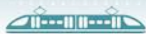
For RoPax, the calculations are based on a supply restricted capacity, linked to available lane meters per year, and what share of that is expected to be allocated to passenger traffic (passenger cars and busses). Estimated allocated passenger car capacity varies a lot between different ports.

The capacity offered is calculated as a function of daily frequency for the ships. The tables below show the recommended capacities in NGM.

Tabell 1.3. Recommended capacities, container ships (LoLo and RoRo) in mill. tons per year.

Port	LoLo	RoRo
Oslo*	2,72	1,1
Fredrikstad	0,85	1,2
Larvik	0,79	-
Brevik	0,72	1,2
Kristiansand	0,55	-
Orkanger	0,52	0,2
Helgeland Havnevesen	0,52	-
Husøy - Karmøy	0,34	0,9
Moss	0,32	-
Ålesund	0,29	0,03
Risavika	0,29	0,3
Bergen	0,28	1,4
Mo i Rana	0,28	-
Måløy	0,27	-
Bremanger Hamn og Næring KF	0,25	-
Drammen*	0,24	0,5
Flora Hamn KF	0,15	-
Averøy	0,15	-
Sunnalsøra	0,14	-
Kvinesdal	0,12	-
Tromsø	0,11	-
Trondheim - Pir1	0,11	0,5
Håvik	0,09	0,9
Alvika	0,07	0,03
Sandstad	0,05	1
Egersund	0,04	-
Tananger	0,03	0,2
Høyanger	0,03	-
Harstad	0,03	-
Haugesund	0,02	0,7
Storesund	0,02	-
Molde	0,02	0,1
Hammerfest Havn KF	0,02	-

\* For RoRo sum capacity for ships carrying cars and roro ships with mixed cargo.



Tabell 1.4. Recommended capacities, international ferries (Ropax skip).

Port	Relation	Capacity in thousand tons per year
Oslo	Oslo-Danmark	113
	Oslo - Tyskland	248
Sandefjord	Sandefjord-Sverige	129
Larvik	Larvik-Danmark	764
Grenland	Grenland-Danmark	215
Kristiansand	Kristiansand-Danmark	13
Stavanger	Stavanger-Danmark	332
Bergen	Bergen-Danmark	222