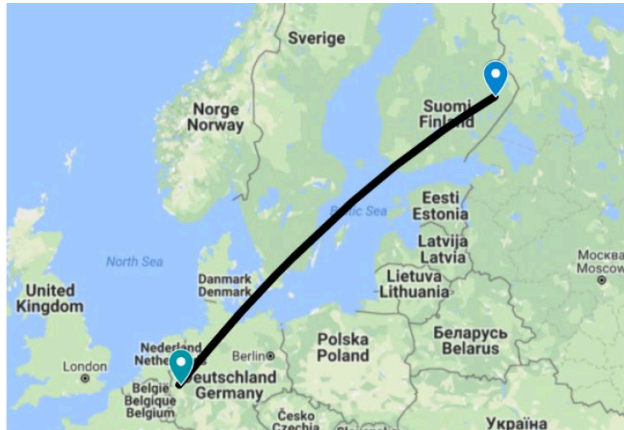




WATERWAY TRANSPORT HAS THE LOWEST SOCIO-ECONOMIC IMPACT



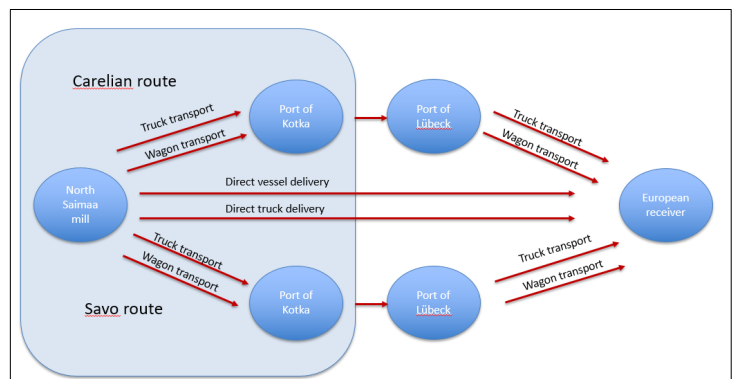
Cost Benefit Analysis at Saimaa Lake

Six + one different transport alternatives were studied and compared in order to understand which of the transport alternatives is preferable from a socio-economic point of view when the goods are transported from Joensuu, Finland to Düsseldorf, Germany. The calculation was completed based on a typical freight transport of 200 000 tons of pulp.

This socio-economic analysis covered the costs related to the different transport scenarios that society values and can put a price on. All alternatives were calculated one-way direction from Joensuu to Düsseldorf and on a condition of fully loaded vessel, truck or train.

one-way direction from Joensuu to Düsseldorf and on a condition of fully loaded vessel, truck or train.

- **Alternative 1** Direct vessel – General cargo ship 2 500 dwt and 3 200 dwt
- **Alternative 2a** Truck (Carelain route) - RoRo ship 9 500 dwt-Truck
- **Alternative 2b** Truck (Carelain route) - Road ferry ship-Truck
- **Alternative 3** Truck (Carelain route) - General cargo ship 4 500 dwt -Truck
- **Alternative 4** Train (Carelain route) - General cargo ship 4 500 dwt -Train
- **Alternative 5** Truck (Savo route) - General cargo ship 4 500 dwt -Truck
- **Alternative 6** Train (Savo route) - General cargo ship 4 500 dwt -Train



Different Alternatives and Total Costs + Emission Results

	A1 Direct Vessel	A2a Truck + RoRo	A2b Truck + Road Ferry	A3 Truck + GC Ship	A4 Train + GC Ship	A5 Truck + GC Ship	A6 Train + GC Ship
Distance cost [MEUR]	72,2	257,2	727,4	247,9	90,5	254,4	96,5
Time-based cost [MEUR]	60,7	198,8	499,8	205,3	73,8	209,7	77,2
Loading and unloading [MEUR]	191,6	175,5	51,9	229,2	242,3	229,2	242,3
Emissions [MEUR]	22,4	38,8	80,3	33,6	11,7	34,3	15,3
Infrastructure cost [MEUR]	-	6,9	21,4	6,9	16,9	7,1	18,3
Accident cost [MEUR]	-	11,3	35,3	11,3	-	11,6	-
Fairway dues [MEUR]	4,1	29,7	40,3	32,4	3,7	32,4	3,7
Total cost [MEUR]	351,7	718,2	1 456,3	766,6	438,9	778,6	453,3

Outcome: Direct vessel, has the lowest summarized socio-economic costs and therefore can be considered the best of the alternatives studied.



Different Alternatives and Emissions only

	A1 Direct Vessel	A2a Truck + RoRo	A2b Truck + Road Ferry	A3 Truck + GC Ship	A4 Train + GC Ship	A5 Truck + GC Ship	A6 Train + GC Ship
CO ₂ [tonnes]	278 024	548 787	1 213 574	486 153	143 530	495 967	200 122
NO _x [tonnes]	6 298	7 276	11 426	5 857	3 251	5 931	3 582
VOC [tonnes]	180	208	328	168	93	170	129
SO ₂ [tonnes]	180	134	96	93	93	93	93

Outcome: Electrified train + General Cargo Ship has the lowest emissions.



Carriers to Choose Waterways

The results from the socio-economic calculation show that Alternative with direct vessels from Joensuu to Dusseldorf is the most advantageous.

This applies both to the total costs as well as the costs that affects society in terms of wear and tear, accident costs and emissions. The fact that the total socio-economic costs are lowest for this option indicates that it may be beneficial for the society to try to influence carriers to choose this transport mode.

Even when studying the costs incurred for carriers in terms of transport costs, fairway dues and loading and unloading costs, Alternative 1 (direct vessel) is best and should therefore be the most attractive transport mode for the carriers.

However, there are also non-valued effects related to Alternative 1, which might affect to it's attractiveness. The one with the greatest impact is the fact that the Saimaa canal is closed for a month due to ice conditions. This means that one will need to choose a different transport mode during this month or to store the cargo while the canal is closed. It is hard to value this effect, but it is considered significant and will add a "cost" to Alternative 1.



The Finnish Waterway Association (www.vesitiet.org) and Finnish Transport Agency (www.liikennevirasto.fi) assigned M4Traffic Ab, Sweden (www.m4traffic.se) to conduct the Cost Benefit Analysis (CBA) at the Saimaa Lake. This work was accomplished under international EMMA project. EMMA - "Enhancing freight Mobility and logistics in the BSR by strengthening inland waterway and river sea transport and proMoting new internAtional shipping services". EMMA, 3-year project (1.3.2016-28.2.2019), co-financed by the Baltic Sea Region Programme using available funding from the EU's European Regional Development Fund (ERDF).

