M4Traffic

CBA Saimaa

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Henrik Carlsson

Background

- Cost Benefit Analysis (CBA) of a typical freight transport between Joensuu and Dusseldorf.

- Calculate socio-economic costs for different transport-options in order to compare them and see which is best from a socio-economic point of view.
  - Covers the costs that society values

Methodology

- Basic values and assumptions that are used for the calculations, are based on the guidelines issued by the Swedish transport administration but complemented with Finnish values if they have been found.

- The analysis is based on the total annual transport volumes of pulp, transported from Joensuu to Dusseldorf

- Six different transport alternatives and one sub-alternative are being investigated.
  - Train, ship, truck and combinations of the different modes

- Result presented as socio-economic cost for the different transport alternatives and non-valued effects

Studied costs

- **Calculated costs are the same as those recommended for socio-economic calculations by the Swedish Transport Administration, these are:**
  - Transport costs
    - Distance based (fuel costs, maintenance etc)
    - Time based (wages, insurance, capital costs etc)
  - Loading and unloading costs
  - Fairway dues
  - Emissions
  - Infrastructure costs (“wear and tear”)
  - Accident costs

Parameters

- Basic values and assumptions that are used for the calculations, are based on the guidelines issued by the Swedish transport administration but complemented with Finnish values where these have been found.

- “Analysmetod och samhällsekonomiska kalkylvärden för transportsektorn” (ASEK) – “analysis method and socio-economic estimates for the transport sector”

- Mutual parameters – applies on all alternatives

- Specific parameters for different transport modes
  - Truck
  - Train
  - Ship

Mutual parameters

- Calculation period
  - Effects are calculated for 42 years
- Valuation of emissions
  - Finnish values used
  - Price per kilo of emission (CO2, SO2, NOx, etc.)
- Diesel price, exchange rate, etc.

Specific parameters

- Operational costs
  - Time based (salary, capital costs, etc)
  - Distance based (fuel, service, etc)
- Costs and time for Loading and unloading
  - Cost per ton
- Emission factors
  - Emissions per km.
- Fairway dues
  - Saimaa canal, Kiel canal
  - Truck tolls Germany
  - Track fees

Transport demand

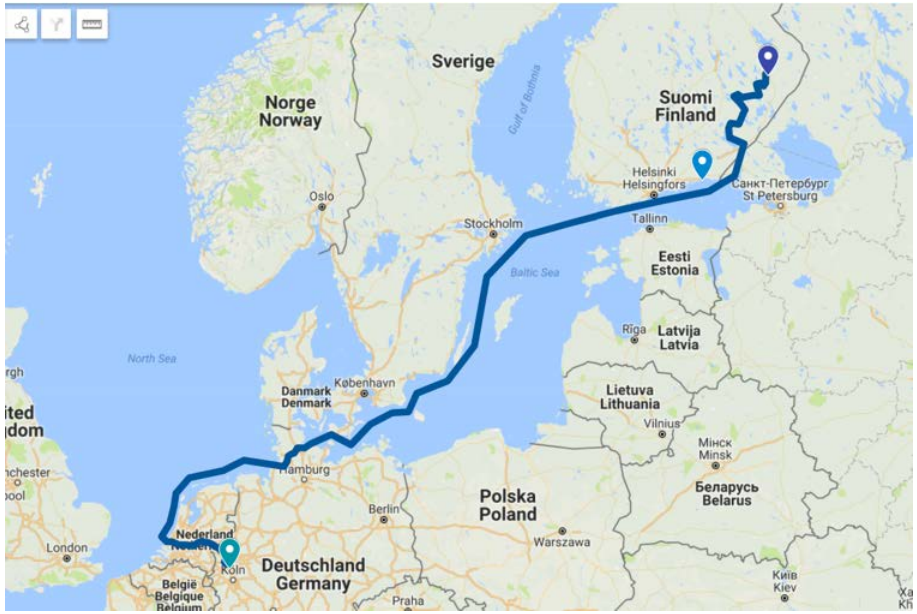
- Calculations are based on actual transport volumes of pulp between Joensuu and Dusseldorf
  - 200 000 tonnes during the first year
  - Thereafter an annual increase of 0,6 %
  - Based on historic data of pulp shipments in Europe the last 30 years

Alternatives

- Six alternatives and one sub alternative
- Calculations are made for the number of fully loaded transport units required to transport the annual transport volumes.
  - This means, for example, that the number of trucks needed per year is calculated by taking the annual transport requirement and dividing it with the load capacity of each truck.
  - Simplification as in reality, transports will not always be fully loaded and co-load with other products may occur.
  - Simplifications are required to make the calculations not too extensive and they apply to all transport modes which means that the comparability of the various options remain

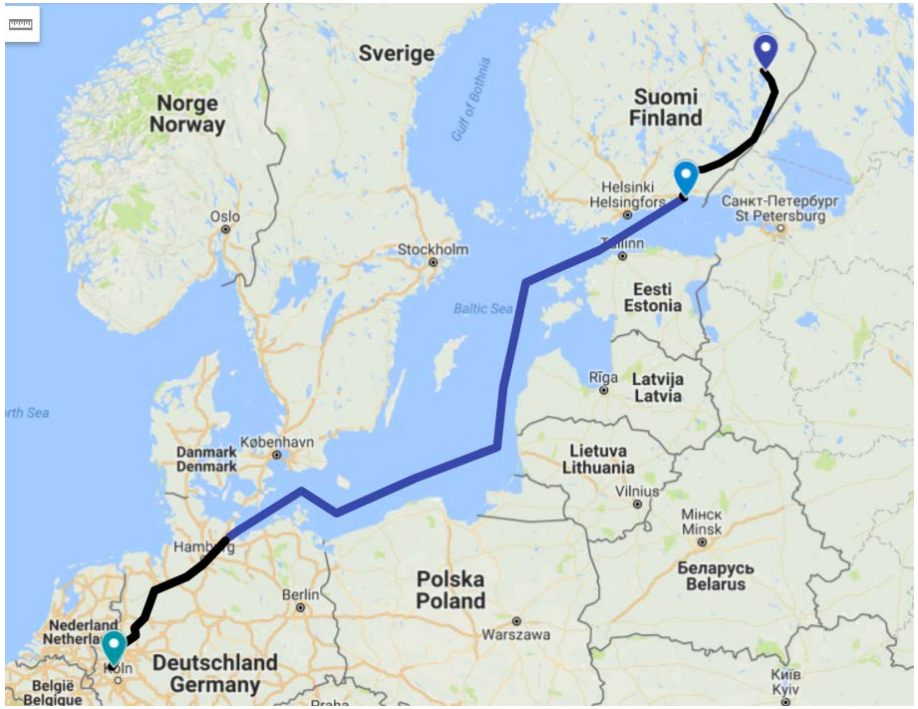
Alternative 1 - Direct vessel delivery

- Total traveltime 114 h, total distance 2 600 km.
- *2020-2025 Current* limitation of ship size 2 500 tones
- *2026-2062 Future* limitation of ship size 3 200 tones
- In total, there will be 103 ships (2 500 dwt) year 2020
- 80 ships (3 200 dwt) year 2026 (annual increase 0,6 %)



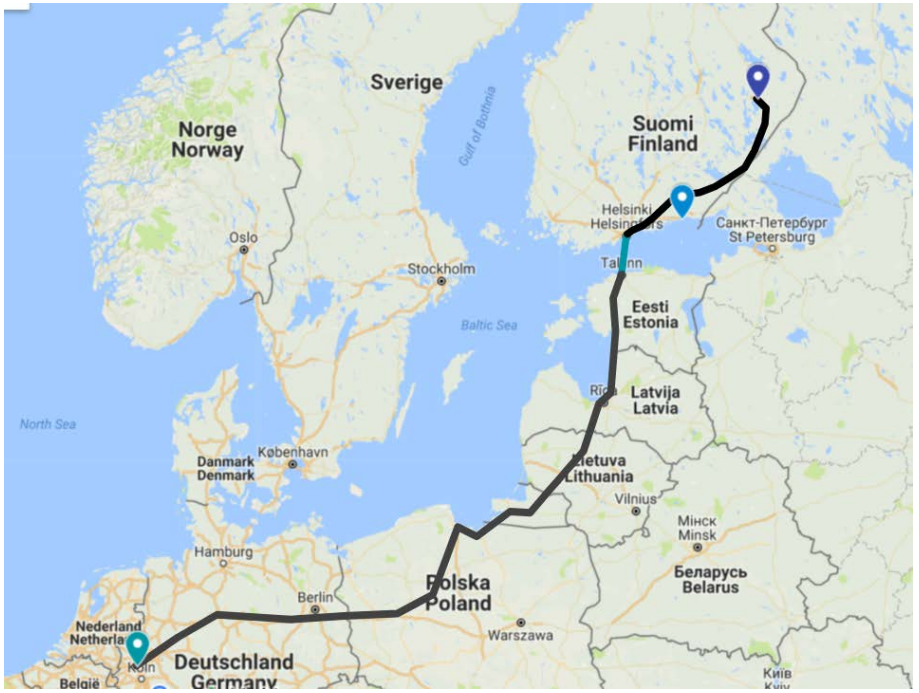
Alternative 2a - Truck transport from Joensuu to Düsseldorf

- Approximate 800 km /14 h with truck and 1 300 km/44 h with RoRo-ship.
- In total, 9 091 trucks and 27 ships (9 500 dwt) the opening year



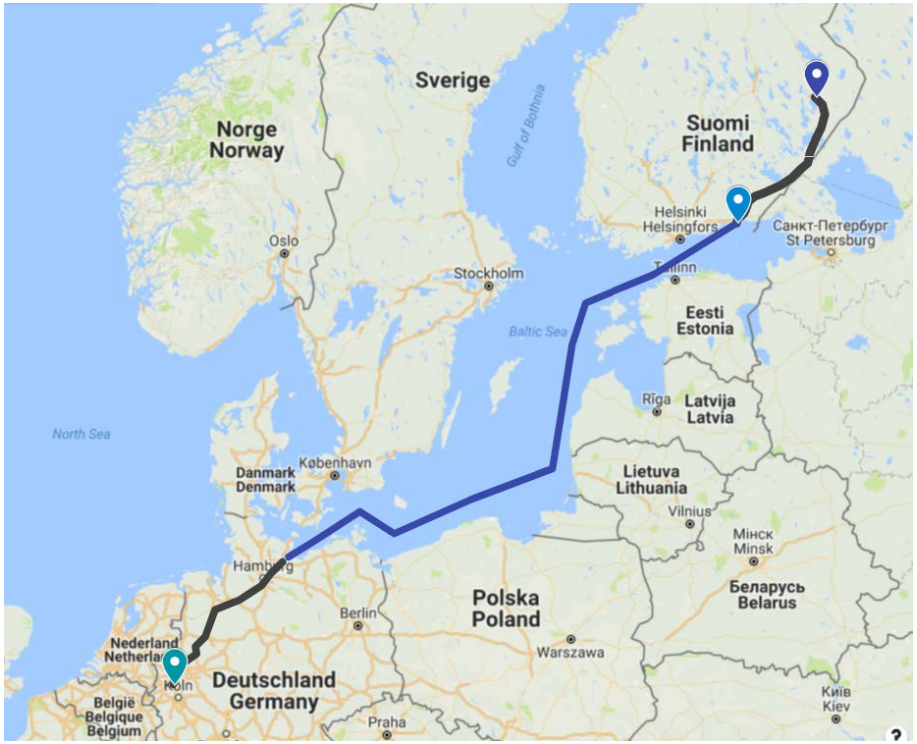
Alternative 2b - Truck transport via the Baltic countries

- Approximately 2 500 km/38 h with truck and 90 km/2 h with ferry.
- In total, there will be 9 091 trucks and 96 ships (road ferry) the opening year.



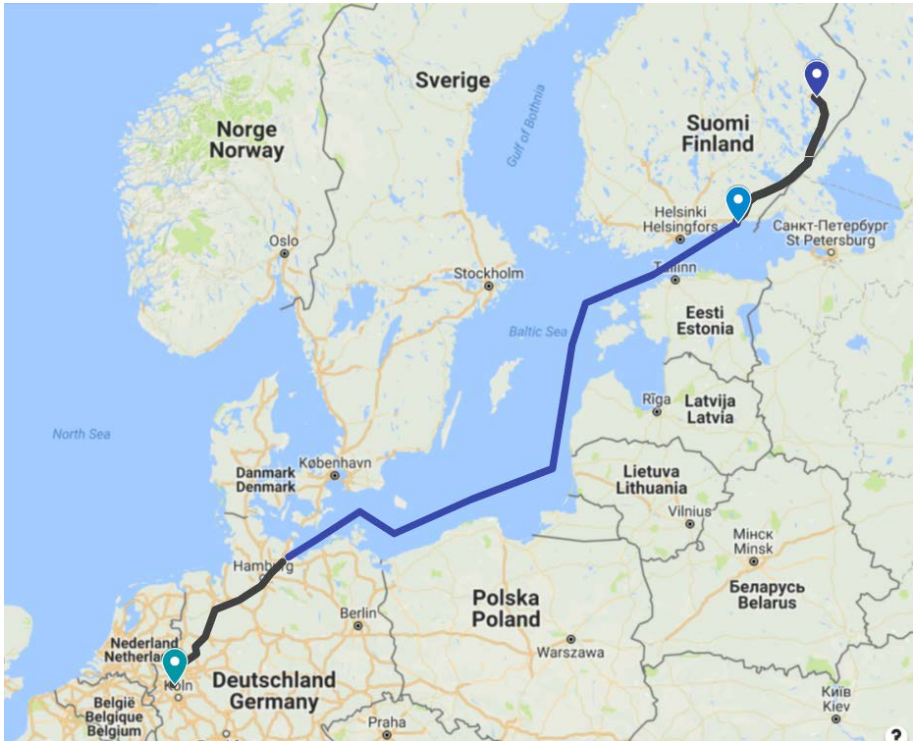
Alternative 3 - *Truck (Carelian route) and ship transport*

- Approximately 800 km/14 h with truck and 1 300 km/68 h by general cargo ship
- In total, there will be 9 091 trucks and 57 ships (4 500 dwt)



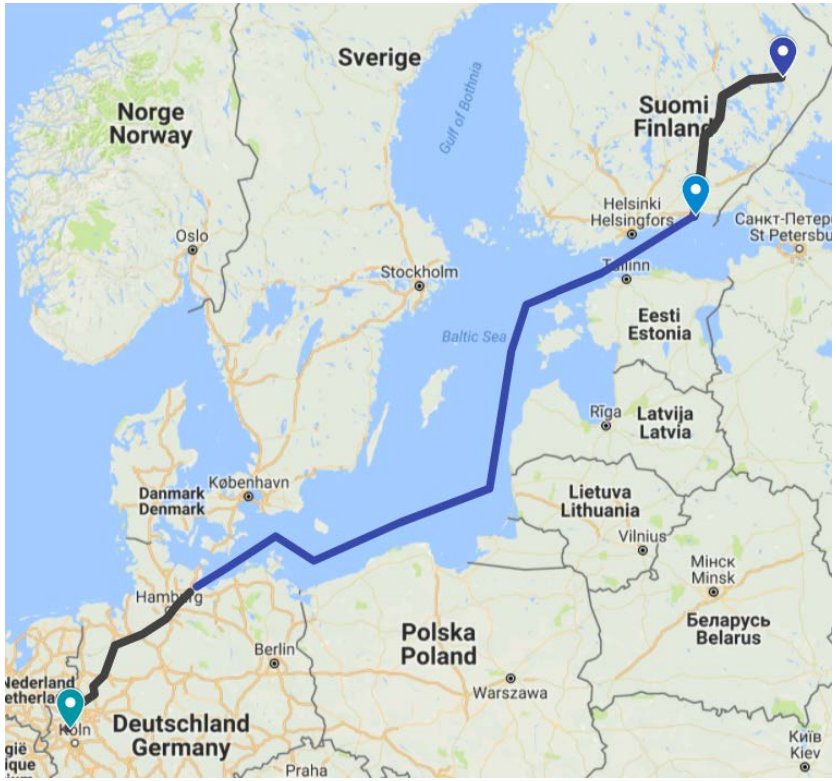
Alternative 4 - *Train (Carelian route) and ship transport*

- Approximately 770 km/12 h with electrified train and 1300 km/68 h by general cargo ship.
- In total, there will be 142 trains with 3125 wagons and 57 ships (4 500 dwt)



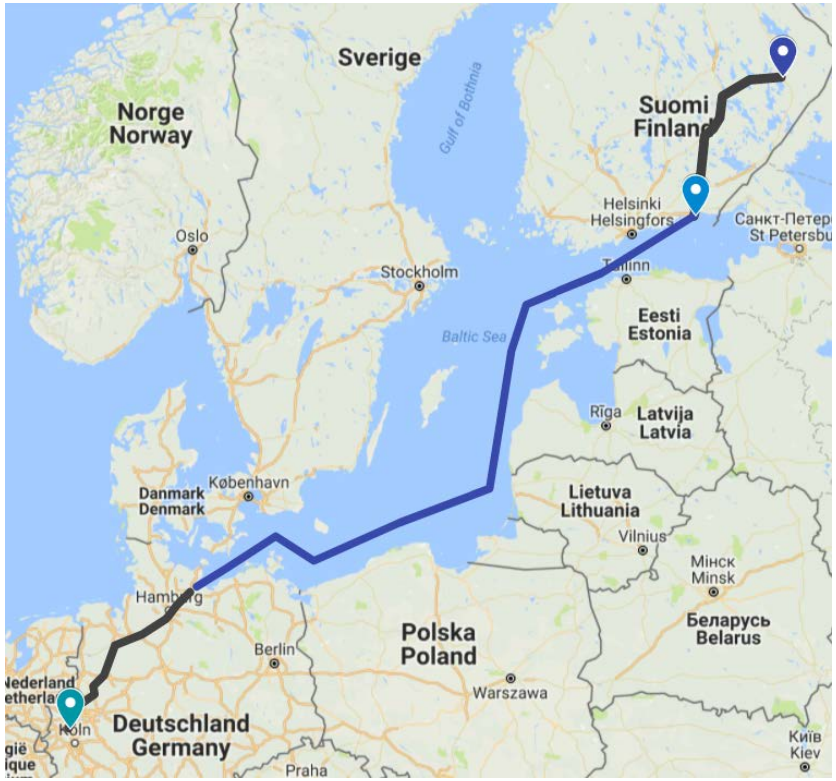
Alternative 5 - *Truck (Savo route) and ship transport*

- Approximately 830 km/14 hours by truck and 1300 km/68 h by general cargo ship.
- In total, there will be 9091 trucks and 57 ships (4 500 dwt)



Alternative 6 - *Train (Savo route) and ship transport*

- Approximately 635 km/10 h with electrified operation and 182 km/3 h with diesel operation. 1300 km/68 h by general cargo ship.
- In total, there will be 142 trains with 3 125 wagons and 57 ships (4 500 dwt)



Results – Calculated socio-economic costs

Alternative:	A1	A2a	A2b	A3	A4	A5	A6
Distance cost [MEUR]	27,3	240,7	711,2	235,7	78,2	242,1	84,3
Time-based cost [MEUR]	60,7	198,8	499,8	205,3	73,8	209,7	77,2
Loading and unloading [MEUR]	138,9	230,1	51,9	234,7	247,8	234,7	247,8
Emissions [MEUR]	14,9	29,7	71,3	27,0	5,0	27,6	8,6
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]	43,4	28,6	39,6	28,6	-	28,6	-
Total cost [MEUR]	**285,2**	**746,1**	**1 430,4**	**749,4**	**421,8**	**761,5**	**436,2**

Results – Non-valued effects

- **Saimaa canal closed due to ice**
  - Approximately one month per year
  - Affects alternative 1 negatively
    - Alternative transport solution or storage of pulp during this month
- **Accident cost for train and ship**
  - Calculated for trucks
  - No available values due to lack of relevant data
- **Round trips**
  - If any of the transport alternatives is better at attracting transport volumes for the return trip, this will affect the total costs.
- **Regulations on the Rhine**
  - specific equipment as radar and AIS (Automatic Identification System).

Results – Summary/conclusion

- The results from the socio-economic calculation show that Alternative 1, with direct vessels from Joensuu to Dusseldorf, is the most advantageous.
  - Applies to total costs as well as the costs that affects the society
  - Beneficial for the society to try to influence carriers to choose this transport mode.

- Non-valued effects
  - Saimaa canal closed for 1 month/year
  - Affects the attractiveness of this alternative

- Train/ship-transports are preferable to truck/ship
  - Electrified rail

Thank you

Henrik Carlsson

Henrik.carlsson@m4traffic.se