



Nurminen Logistics

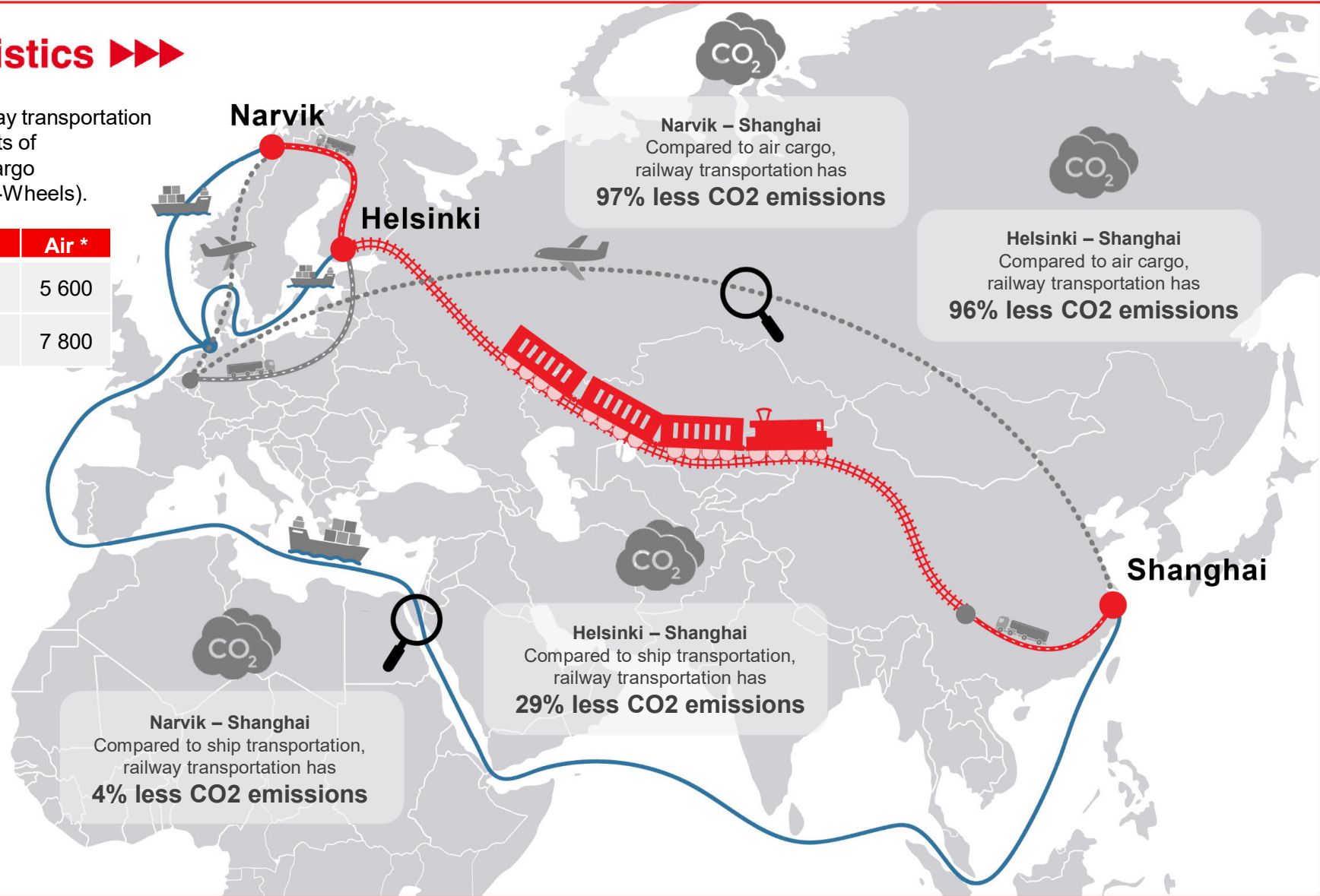
CARBON FOOTPRINT OF RAIL TRANSPORTATION

Gaia Consulting
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Nurminen Logistics ▶▶▶

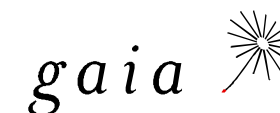
The carbon footprint of railway transportation compared to carbon footprints of ship transportation and air cargo for the same routes (Tank-to-Wheels).

kgCO ₂ e/t	Railway	Ship	Air *
Helsinki – Shanghai	200	280	5 600
Narvik – Shanghai	270	280	7 800



The calculation is done according to the SFS-EN 16258 standard.
* Air cargo calculated without radiative forcing.

Carbon footprint of railway transportation of one ton of goods



- The carbon footprint of the railway transportation between Helsinki / Narvik and Shanghai was calculated for Nurminen Logistics by Gaia Consulting.
- The calculation is done according to the *SFS-EN 16258 Methodology for calculation and declaration of energy consumption and GHG emissions of transport services (freight and passengers)*. Both Tank-to-Wheels (TTW) and Well-to-Wheels (WTW) emissions are calculated according to the used standard.
 - Electricity consumption for electric trains was estimated based on VTT Lipasto database¹. In Finland, only green electricity is used in railway transportation. For other countries, emission factors are taken from the IEA database². Upstream emissions of electricity production as well as transmission and distribution losses (TTW) are calculated based on UK Government GHG Conversion Factors for Company Reporting (2020)³.
 - For the diesel train the emission and consumption factors were from the standard SFS-EN 16258.
- The railway transportation was compared to ship transportation⁴ and air cargo⁵ for the same routes.
 - The ship transportation has 29% larger emissions for the route from Helsinki to Shanghai and 4% larger for the route from Narvik to Shanghai.
 - The air cargo has 96% larger emissions for the route from Helsinki to Shanghai and 97% larger for the route from Narvik to Shanghai.

1) <http://lipasto.vtt.fi/yksikkopaastot/indexe.htm>

2) IEA, CO2 Emissions from Fuel Combustion

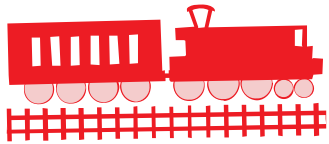
3) <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020>

4) Container ship 8000+ TEU as an assumption

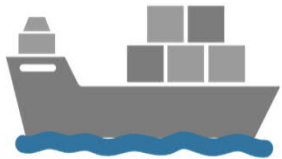
5) Without radiative forcing – real avoided emissions are thus higher than calculated

Results	TTW	WTW	
Helsinki – Shanghai	197	265	kgCO2e/t
Narvik – Shanghai	268	367	kgCO2e/t

Comparison of different transportation modes per one ton of goods



- The carbon footprint of the **railway transportation** from Helsinki to Shanghai equals to
- Flying from Helsinki to Prague (return flight, economy class), approx. 2700 km, or
 - Driving a car from Helsinki to Tromsø (passenger car, average fuel), approx. 1320 km



- The carbon footprint of the **ship transportation** from Helsinki to Shanghai equals to
- Flying from Helsinki to Geneva (return flight, economy class), approx. 3800 km, or
 - Driving a car from Helsinki to Rovaniemi and back (passenger car, average fuel), approx. 1840 km



- The carbon footprint of the **air cargo** from Helsinki to Shanghai equals to
- Flying from Helsinki to Shanghai and back five times (five return flights, economy class), approx. 76 000 km, or
 - Driving a car from Helsinki to Vladivostok and back twice (passenger car, average fuel), approx. 37 000 km

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