



Nykänen Lasse

NORFREN - NORDIC COMPARISON ON THE FUTURE OF ROAD FREIGHT ENERGY EFFICIENCY AND CO₂ EMISSIONS

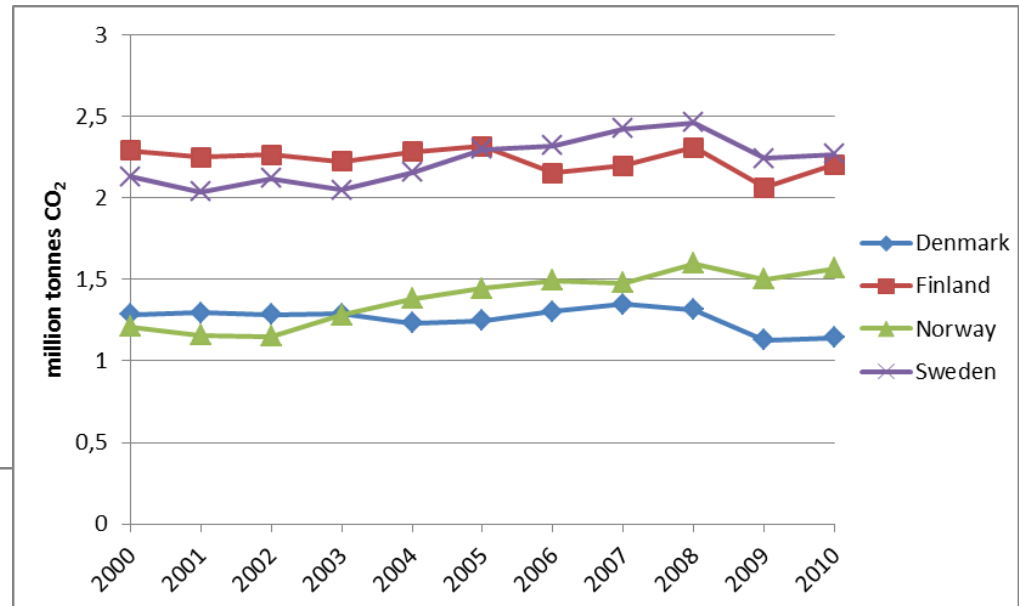
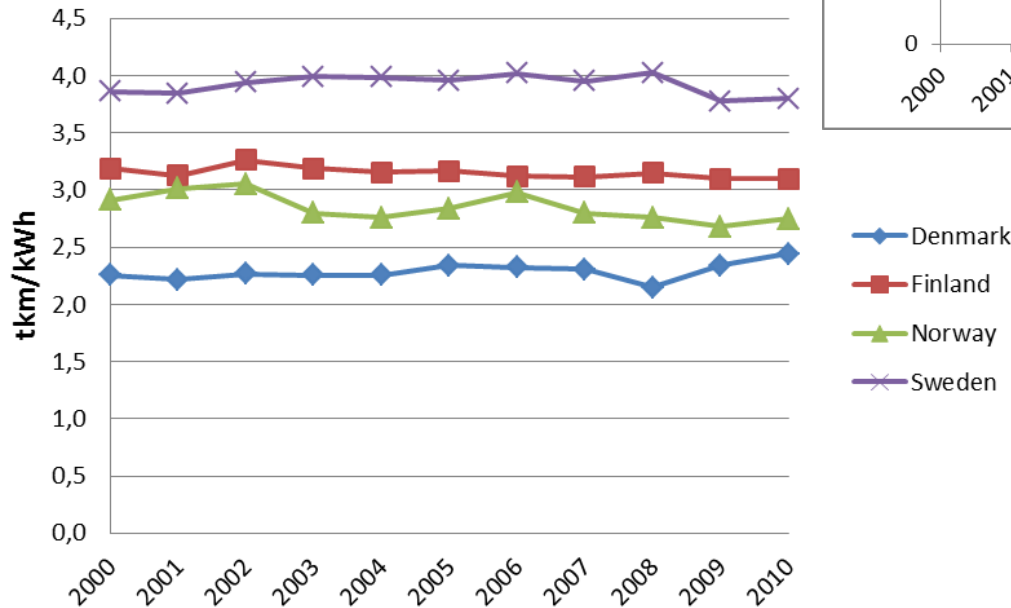
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NORFREN

- **Project participants:** Transport Research Centre Verne, Tampere University of Technology, Finland; Department of Transport, Technical University of Denmark, Denmark; Institute of Transport Economics, Norway; Department of Business Administration, University of Gothenburg, Sweden
- **Schedule:** May 2012 – May 2013
- **The purpose:** To compare and to forecast the development of energy efficiency and CO₂ emissions of road freight transport in Denmark, Finland, Norway and Sweden.
- **The Data:** The national goods transport by road statistics (GTRS) and fuel consumption data from LIPASTO (2010) and NTM (2008).
- **Methods:** literature review, trend analysis, online haulier survey, Delphi survey and workshops

Trend analysis

Energy efficiency



CO2 emissions



Online haulier survey

Energy efficiency index (EEI)

- **The EEI consists of three aspects related to the energy efficiency of hauliers: monitoring, energy efficiency actions and future prospects.**
- **The two best hauliers achieved 81 points out of the maximum 100 points.**
- **The more lorries the company operates, the higher the average EEI is.**
- **EEI is also affected by the customer interest and the type of cargo the company primarily transports.**

Monitoring

- **Typical monitoring is done manually when filling the tank and data is then kept on a computer.**
- **In terms of target setting there are significant differences between countries**
 - 89% of Norwegian hauliers have set targets for reducing fuel consumption, but only 55% of Danish hauliers have done the same.

Energy efficiency actions

- **The total average is dominated by Finland, but Finland has fairly low levels of utilization in many actions.**
- **Norway has high levels of utilization in many actions.**
 - e.g. ecodriving training and monitoring and low consumption lorries.

Future

- **Hauliers have similar opinions on ecodriving monitoring and bonus schemes.**
- **Swedish hauliers see energy efficiency reporting more likely than others.**
- **In terms of the use of hybrid vehicles there are big difference between countries.**
 - In Finland 4% consider it likely, while in Sweden 31% consider it very likely and 7% likely.

Delphi survey

| | Finland | | Norway | | Sweden | |
|---|---------|-------------|--------|-------------|--------|-------------|
| | 2010 | 2030 | 2010 | 2030 | 2010 | 2030 |
| GDP [billion €] | 142 | 200 | 179 | 259 | 283 | 330 |
| Value density [€/t] | 323 | 480 | 563 | 897 | 767 | 900 |
| Total goods moved [million t] | 441 | 417 | 318 | 289 | 369 | 367 |
| Road's share of goods moved [% of total] | 90% | 88% | 88% | 92% | 86% | 80% |
| Goods moved by road [million t] | 397 | 367 | 261 | 266 | 316 | 293 |
| Average length of haul [km] | 59 | 62 | 62 | 96 | 82 | 85 |
| Total haulage [billion tkm] | 26.0 | 25.2 | 17.2 | 25.6 | 32.7 | 27.7 |
| Average load on laden trips [t] | 13.9 | 14.5 | 12.8 | 13.7 | 12.9 | 15.0 |
| Mileage on laden trips [billion km] | 1.69 | 1.57 | 1.37 | 1.87 | 2.01 | 1.66 |
| Empty running [% of total mileage] | 27% | 21% | 27% | 27% | 19% | 17% |
| Total mileage [billion km] | 2.32 | 1.97 | 1.76 | 2.57 | 2.48 | 1.98 |
| Average fuel consumption [l/100km] | 35.7 | 32.1 | 32.3 | 30.1 | 34.4 | 30.0 |
| Total energy consumption [GWh] | 8378 | 6380 | 5732 | 7807 | 8614 | 6013 |
| Fuel CO ₂ content [kg/l] | 2.66 | 2.48 | 2.62 | 2.56 | 2.66 | 2.53 |
| Total CO ₂ emissions [million t] | 2.21 | 1.57 | 1.57 | 1.98 | 2.27 | 1.51 |

| | Finland | | Norway | | Sweden | |
|---------------------------------|---------|-------------|--------|-------------|--------|-------------|
| | 2010 | 2030 | 2010 | 2030 | 2010 | 2030 |
| CO ₂ intensity [g/€] | 15.5 | 6.8 | 8.7 | 7.6 | 8.0 | 4.6 |
| Transport intensity [tkm/€] | 0.18 | 0.12 | 0.09 | 0.10 | 0.12 | 0.08 |
| Energy efficiency [tkm/kWh] | 3.10 | 3.96 | 3.00 | 3.28 | 3.80 | 4.60 |

1st round

- Forecast for 8 indicators

2nd round

- List of statements
- 3 supplementary questions for indicators

Participants:

Fin: 24/20 experts (2011)

Nor: 11/7 experts (2013)

Swe: 11/11 experts (2013)

Den: only 1 expert

Workshops (FIN, NOR, SWE)

- **Identified the low carbon road freight transport obstacles.**
 - Lack of knowledge and best practices of energy efficiency within logistics service providers.
 - Inadequate environmental consideration by industry and trade in purchasing logistics services.
 - Lack of coordination of urban logistics.
 - There is generally little willingness to pay for environmentally friendly practices.
 - Lack of incentives to use more biofuels than the statutory 7% blend in diesel.
 - Lack of communication between shipper and haulier.
 - Weak profitability of hauliers.
 - Lack of optimization.
 - Low knowledge in public decision-making.
- **Identified measures to improve the low carbon road freight transport**
 - Marketing of energy efficiency agreement for freight transport and logistics and related communication and education activities.
 - Producing and communicating benchmarking information.
 - Investment grant for hauliers.
 - Including energy efficiency criteria in the transport service purchases by state and municipalities.
 - Including energy efficiency information into the sectoral energy efficiency agreements.
 - Improving the communication between shippers and hauliers.
 - Improving the city logistics.
 - Facilitating the wider distribution of biofuels.
 - Economic stimulus.
 - Focus on other alternative energy sources in addition to electricity.
 - Increased understanding for the function and drivers of the transport system amongst decision makers.
 - CO₂ tax or road tax.
 - Regulations to promote transport with the right performance.

Online tool

Haulier's energy efficiency index (EEI)

- Energy efficiency index was developed to provide a simple metric for international comparison.
- The EEI covers various aspects of energy efficiency to provide a comprehensive outlook into the issue.
- The energy efficiency index of the respondents is currently:
 - on average 38.5 points
 - with 25% of hauliers having less than 24 points and
 - 25% having more than 51.5 points.

<http://www.tut.fi/verne/norfren/energy-efficiency-index/>