The Contribution of Advanced Renewable Transport Fuels to Transport Decarbonisation in 2030 and beyond

Case Finland
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Outline

- Finland in a nutshell
- Data on energy use and vehicles
- Policies for emission reductions in transport
- The Finnish biofuels obligation
- Summary
Finland in a nutshell

- Finland is a large, sparsely populated country
  - 338,000 km², some 1400 km from North to South
  - Population appr. 5 million, 15 people/km²
  - Transport work per capita is high
- Finland has large biomass resources but no oil or gas
  - 73 % of the land area is forest
  - The forest industry is important from the viewpoint of national economy
- Finland has quite ambitions goals for decarbonizing the whole society
  - Target to be carbon neutral by 2035
Final energy consumption by sector

Final energy consumption by sector 2017

- Industry: 12%
- Transport: 26%
- Space heating: 46%
- Others: 16%
Road transport fuels (liquid and gaseous) in 2017

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Type</th>
<th>ktoe</th>
<th>% of total</th>
<th>% renewable</th>
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<tbody>
<tr>
<td>Petrol, E85</td>
<td>Total</td>
<td>1349</td>
<td>35%</td>
<td>6%</td>
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<tr>
<td></td>
<td>E5</td>
<td>444</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E10</td>
<td>899</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E85</td>
<td>6</td>
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<tr>
<td></td>
<td>Renewable</td>
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<tr>
<td>Methane</td>
<td>Total</td>
<td>5</td>
<td>0.1%</td>
<td>54%</td>
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<tr>
<td></td>
<td>Natural gas</td>
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<td>Biogas</td>
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<tr>
<td>Diesel</td>
<td>Total</td>
<td>2547</td>
<td>57%</td>
<td>14%</td>
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<td>Fossil</td>
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<td>Renewable</td>
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<tr>
<td>Total</td>
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<td>3901</td>
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<td></td>
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<tr>
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<td>Fossil</td>
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</tr>
<tr>
<td></td>
<td>Renewable</td>
<td>398</td>
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<td>10.2%</td>
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</table>
Liquid biofuels in road transport

Year-to-year variations due to a flexible biofuels obligation
New passenger car registrations 2018

Total new registrations 2018 120,000
Current passenger car fleet ~ 2.7 Mio
According to the EU effort sharing rules, Finland has to reduce its CO2 emissions in the non-ETS sector by 39% by 2030 (reference 2005).
Targets for emission reductions in road transport

- Recent guidelines for emission reductions in transport can be found, e.g., in:
  - The 2015 Government Programme of Prime Minister Juha Sipilä
  - The 2016 national energy and climate strategy
  - The 2019 Government Programme of Prime Minister Antti Rinne

2016 national energy and climate strategy

- The strategy for 2030, presented in November 2016, calls for a 50 % reduction of CO$_2$ emissions from transport by 2030, the reference year being 2005. Three key measures to reduce emissions are listed:
  - Improving the energy efficiency of the transport system
  - Improving the energy-efficiency of vehicles
  - Replacing oil-based fossil fuels with renewable and/or low emission alternatives
Within the three key measures, several detailed measures or sub-targets are mentioned. For renewable and low-emission energy carriers the following measures and targets are listed:

- **Increasing the physical share of biofuels (energy content) in road transport fuels to 30%**
- Expanding the refuelling infrastructure for alternative energies in transport (recharging of electric vehicles, gaseous fuels including hydrogen)
- Encouraging the uptake of alternative vehicles, the minimum targets set for 2030 being:
  - 250,000 electric vehicles (battery electric vehicles, plug-in hybrids, fuel cell vehicles)
  - 50,000 gas fuelled vehicles
The 2019 Government Programme of Prime Minister Antti Rinne

- For the upper level, states, among other things:
  - Finland will achieve carbon neutrality by 2035
  - Finland aims to be the world’s first fossil-free welfare society
  - The transition to a low-carbon economy will require additional investments, particularly in bioeconomy, circular economy, clean energy solutions, energy efficiency, emissions-free forms of energy production, energy storage solutions, carbon recovery and energy utilisation, along with research, development and innovation activities and measures to bring these solutions to the market
Specifically on transport, among other things:

- Finland will reduce transport emissions by at least 50 per cent compared to the 2005 level (reduced transport work, promoting the transition towards more sustainable mobility and phasing out fossil fuels).
  - In principle repetition of the 2016 national energy and climate strategy
- The transition to sustainable biofuels in heavy goods vehicles and air transport will be promoted
- Sustainably produced biogas will be included in the scope of the biofuels distribution obligation
  - An obligation will be set for petrol station chains to provide a certain number of charging points for electric cars
- Piloting of carbon neutral synthetic fuels and launching of their production in Finland will be promoted
The Finnish biofuels obligation 2008 – 2020
"Double counting" allowed

Energy share of biofuels [%] in road transport fuels

2008: 2.0
2009: 4.0
2010: 4.0
2011: 6.0
2012: 6.0
2013: 6.0
2014: 6.0
2015: 8.0
2016: 10.0
2017: 12.0
2018: 15.0
2019: 18.0
2020: 20.0

Jukka Saarinen, Ministry of Economic Affairs and Employment
Drafting the biofuels obligation for 2030

- In 2018, in preparation for the update of the biofuels mandate for 2021 to 2030, the Prime Minister’s Office (PM Juha Sipilä) launched a tender for a study with the title “Cost effective pathways of biofuels until 2030”. A consortium led by Pöyry Management Consulting Ltd won the tender.

- The final report of the study was published in early October 2018 (“Biofuels 2030”). The study confirmed the definition of policy set in the 2016 national energy and climate strategy, **Finland will need some 30 % liquid biofuels in 2030 to meet a 50 % emission reduction target in road transport.**

- The study resulted in a proposition by the Government to the Parliament on the update of the biofuels mandate already within the month of October. **The new biofuels obligation law was approved in March 2019.**
Key points in the new biofuels mandate 2021 - 2030

- Total 30 % share (energy) of biofuels in road transport in 2030
  - increasing linearly from 18 % (physical) in 2021 to 30 % in 2030

- Sub target of 10 % advanced biofuels in road transport in 2030
  - starting at 2 % in 2021 - 2023
  - feedstocks according to Annex IX A of the RED II Directive

- A new 10 % biocomponent obligation for light fuel oil is written in a separate law.

The biofuels 2030 study

STRUCTURE OF THE WORK

The objective of the study was to assess the impact of increasing the share of transport biofuels in Finland to some 30 % by the year 2030, thus reaching a 50 % reduction in road transport CO₂ emissions.

Stage I
- Current status of indigenous biofuels and -liquids
- The amounts of biofuels needed in road transport, mobile machinery and heating to meet the emission reduction targets in the non-ETS sector
- The need and cost for new capacity and competing supply and demand

Stage II
- Implementation in 2021-2030 taking into account the stipulations of the RED II Directive

Stage III
- Cost impacts on end users
- Cost impacts on national and state economy
- Additional measures needed for implementation and timing of these measures

Source: Pöyry Consulting
The biofuels 2030 study

AMOUNT OF BIOFUELS NEEDED IN THE NON-ETS SECTOR

250,000 EVs:
- 1/3 of registrations in 2030

600,000 EVs:
- >2/3 of registrations in 2030

Source: Pöyry Consulting
Need for liquid biofuels in 2030

Corresponds to 30%

Source: Pöyry Consulting
Split of energies towards 2050

Energy use in Road Transportation - Finland

CO2 reductions in 2030:
- 2005 reference 11.7 Mt
- Energy efficiency & traffic management -2.6 Mt
- EVs -0.7 Mt (250,000 EVs)
- Biofuels -2.6 Mt (30 % share)
- Target 5.8 Mt

Contribition to CO2 reductions
- Efficiency & transport management: 44 %
- Biofuels: 44 %
- EVs: 12 %
Finnish biofuel actors

BIOFUEL PRODUCTION BY FINNISH COMPANIES

Source: Pöyry Consulting
Summary

- Finland has very ambitious climate targets
  - Carbon neutrality by 2035
  - 50 % CO2 emission reduction in transport by 2030
    - Energy efficiency, low-carbon fuels, electrification
- Finland has already set an ambitious biofuels obligation for 2030
  - 30 % biofuels (true energy share)
  - 10 % (1/3) sub-target for advanced biofuels
- The future of biofuels is seen in heavy-duty vehicles, ships and airplanes
- Finnish energy companies are very active in biofuels
- Carbon neutral synthetic fuels have made their way into the most recent Government Programme
The Contribution of Advanced Renewable Transport Fuels to Transport Decarbonisation in 2030 and beyond

More information: https://iea-amf.org/content/news/TD-WS
Contact: dina.bacovsky@best-research.eu