

# Decarbonisation of transport- the Finnish case

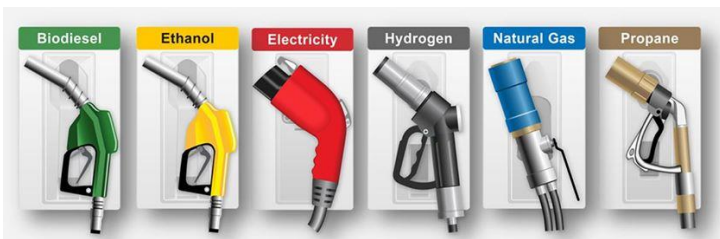
ETIP Bioenergy

8th Stakeholder Plenary Meeting

11-12.4.2018

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# EU level energy and climate targets

## § 2020

§ 20% cut in greenhouse gas emissions

§ 20% of EU energy from renewables

§ 20% improvement in energy efficiency

§ **10 % renewable energy in transport** (with double counting for advanced biofuels and factors for electricity in transport)

## § 2030

§ 40% cut in greenhouse gas emissions compared to 1990 levels

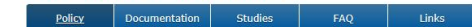
§ at least a 27% share of renewable energy consumption

§ at least 27% energy savings compared with the business-as-usual scenario

§ **no specific renewable target for transport**



### 2020 climate & energy package



The 2020 package is a set of binding legislation to ensure the EU meets its climate and energy targets for the year 2020.

The package sets three key targets:

- 20% cut in **greenhouse gas** emissions (from 1990 levels)
- 20% of EU energy from **renewables**
- 20% improvement in **energy efficiency**

The targets were set by EU leaders in 2007 and enacted in legislation in 2009. They are also headline targets of the [Europe 2020 strategy](#) for smart, sustainable and inclusive growth.



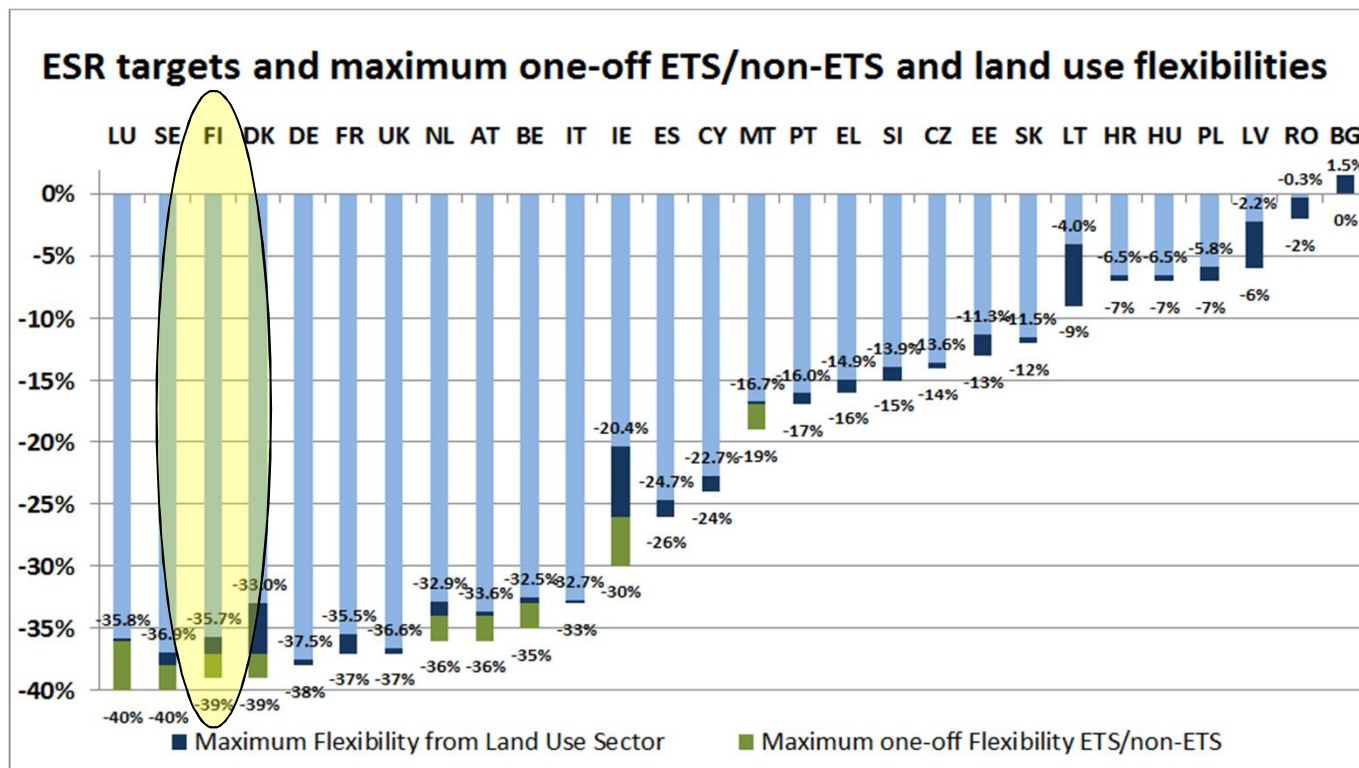
### EU leaders agree 2030 climate and energy goals

24/10/2014

EU Heads of State and Government have agreed the headline targets and the architecture for the EU framework on climate and energy for 2030. The agreed targets include a cut in greenhouse gas emissions by at least 40% by 2030 compared to 1990 levels, an EU-wide binding target for renewable energy of at least 27% and an indicative energy efficiency target of at least 27%. The decision underlines the European Union's position as a world leader in the fight against climate change. The agreed greenhouse gas target will be the EU's contribution to the global climate change agreement due to be concluded in Paris next year. The renewables and energy efficiency targets will increase the security of the EU's energy supplies and help reduce its dependency on imported fossil fuels.

# The July 2016 "Summer package"

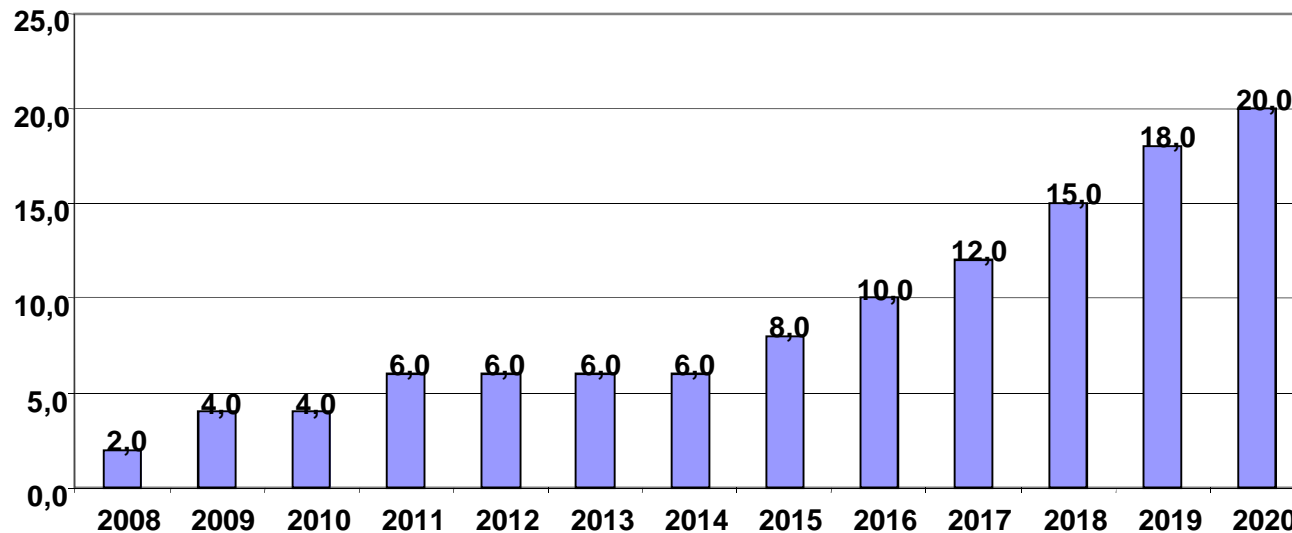
- § A European Strategy for low-emission mobility
- § Land use, land use-change and forestry (LULUCF)
- § Binding greenhouse gas emissions reduction for Member States
  - § transport is the largest contributor to the non-ETS sector!



# The Finnish biofuel obligation

- § Came into force in January 2008 and was revised in 2010
- § Target 20 % in 2020 (with double-counting)

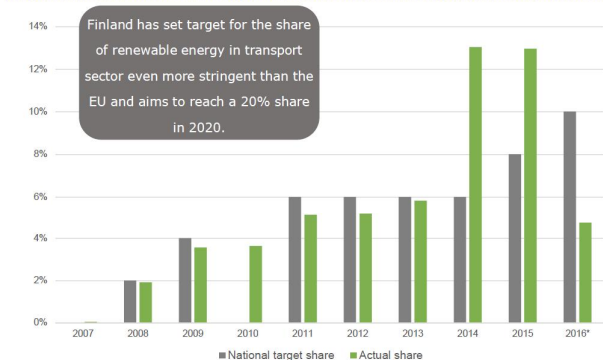
Energy share of biofuels [%] in road transport fuels



The system allows "banking",  
High actual share (green bars) in  
2014 and 2015, low in 2016



Share of renewable energy in transport sector



Finland has set target for the share  
of renewable energy in transport  
sector even more stringent than the  
EU and aims to reach a 20% share  
in 2020.

Source: State Treasury, Petroleum and Biofuels Association Finland



# Finland, a land of solutions

Strategic Programme of  
Prime Minister Juha Sipilä's Government  
29 May 2015

## Ten-year objective:

§ Finland is a pioneer in the bioeconomy, a circular economy and cleantech. By developing, introducing and exporting sustainable solutions we have improved the balance of current accounts, increased our self-sufficiency, created new jobs, and achieved our climate objectives and a good ecological status for the Baltic Sea.

## Transport:

- § The use of imported oil will be cut in half during the 2020s
- § The share of renewable transport fuels will be raised to 40 per cent by 2030 (includes double-counting)

# Strategy outlines energy and climate actions to 2030 and beyond

Ministry of Economic Affairs and Employment © 24.11.2016 13.39 | Published in English on 28.11.2016 at 10.54

PRESS RELEASE



The Government approved the national energy and climate strategy to 2030 on 24 November 2016. The strategy will be submitted as a Government Report to the Parliament, where discussion on it is to be started on 30 November.

The strategy sets out concrete measures and goals for Finland to reach the energy and climate goals for 2030 that have been agreed upon in the Government Programme of Prime Minister Sipilä and the EU.



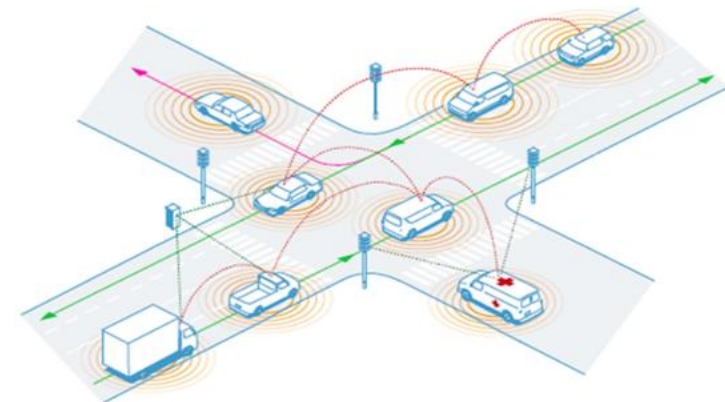
## Finnish energy and climate strategy for 2030

**Overall CO<sub>2</sub> reduction target for transport – 50 %**

- Measures to reduce emissions in transport especially involve road transport, where there is the largest potential for emission reductions.
- The energy efficiency of the transport system will be improved by e.g. developing new transport services, influencing modes of travel and transport and utilising intelligent transport methods.
- The goal is for Finland to have a minimum total of 250,000 electric vehicles and a minimum of 50,000 gas fuelled vehicles in 2030.
- According to the strategy, **the physical share of biofuel energy content of all fuels sold to road transport will be increased to 30 per cent by 2030.**
- In addition, vehicle stock renewal will be accelerated considerably.

# The Finnish approach to CO<sub>2</sub> reductions in transport by 2030 in a nutshell

- § Overall reduction target 50 %
- § 30 % from renewable fuels
  - § The bulk of these fuels as low level blending and drop-in type fuels compatible with legacy vehicles and new vehicles
- § Some 5 % from electric cars (250,000 EVs, some 10 % of the fleet and 30 % of new car sales in 2030)
- § 15 % in total from energy efficiency improvements on the vehicle and system level

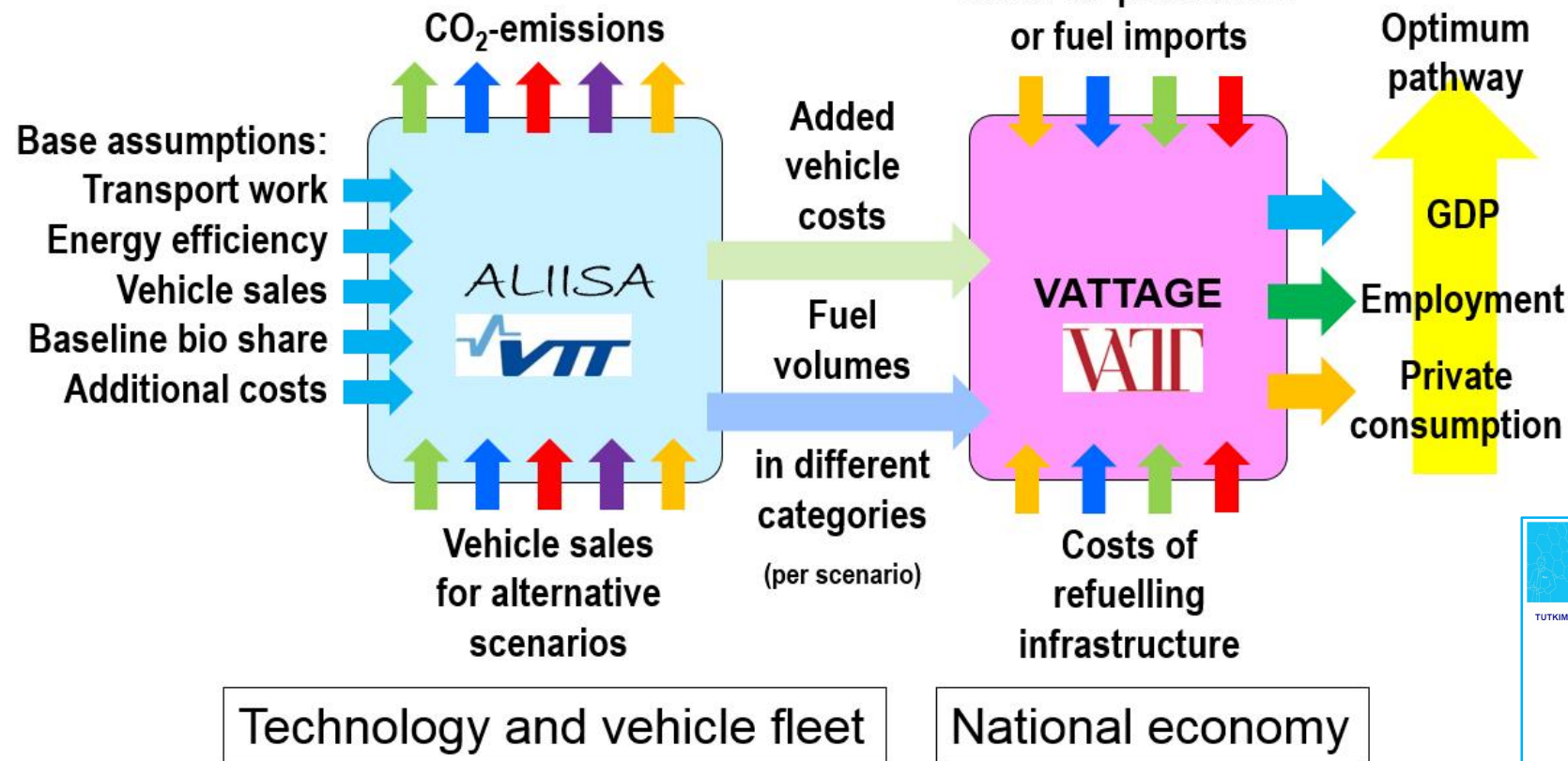


# How to estimate the need of renewable fuels?

- § Current and estimated future fuel use
- § Current and estimated distribution of fuel use/CO2 emissions per vehicle category
- § Size of vehicle fleet and vehicle mileage
- § Vehicle fleet turnover
- § Progress in energy efficiency
- § Estimated penetration of electric vehicles (by vehicle category)
- § Target for CO2 reductions in transport
  - § Renewable fuels and electricity considered to have zero end-use CO2 emissions
- § Costs of alternative pathways for CO2 reduction
  
- § VTT and VATT Institute for Economic Research have made assessments for “Case Finland”



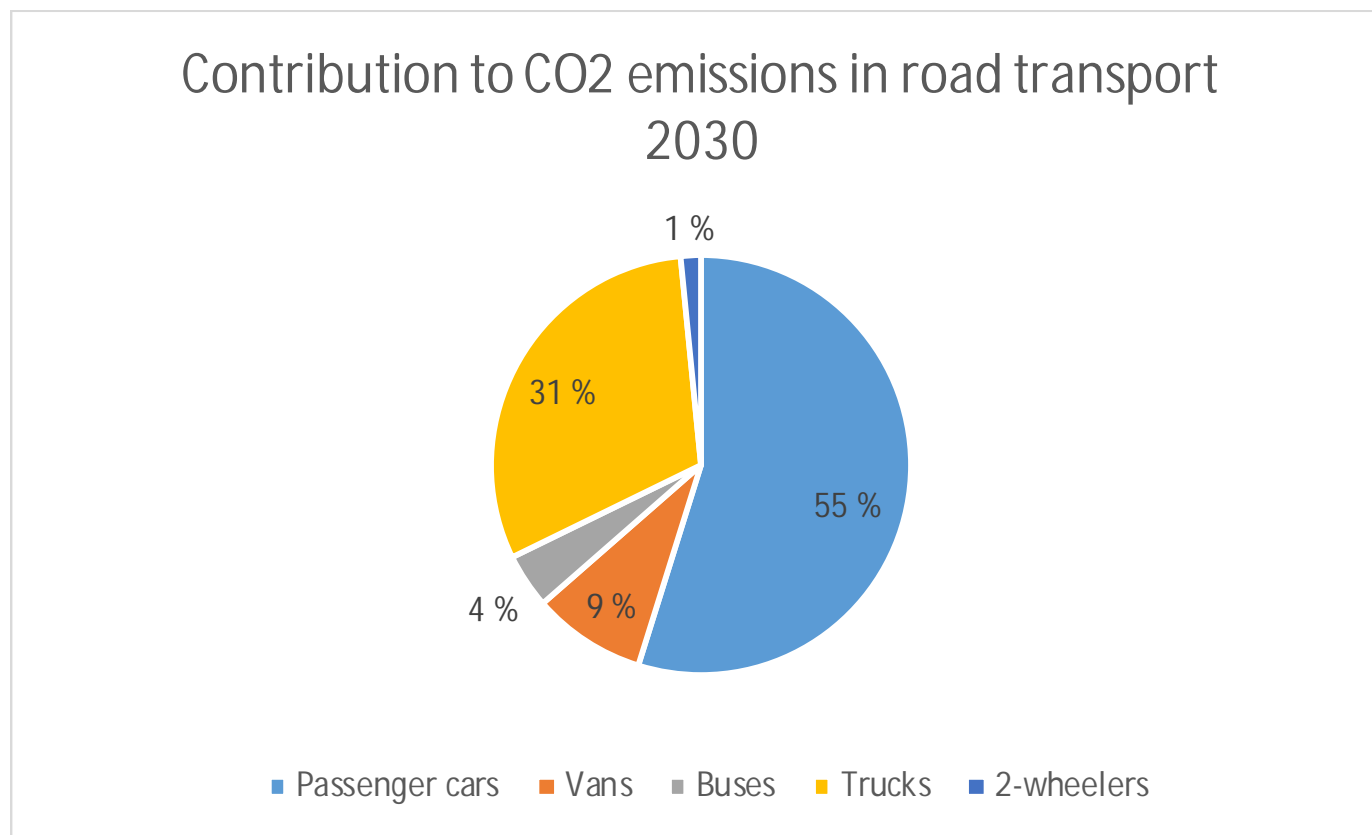
# Methodology



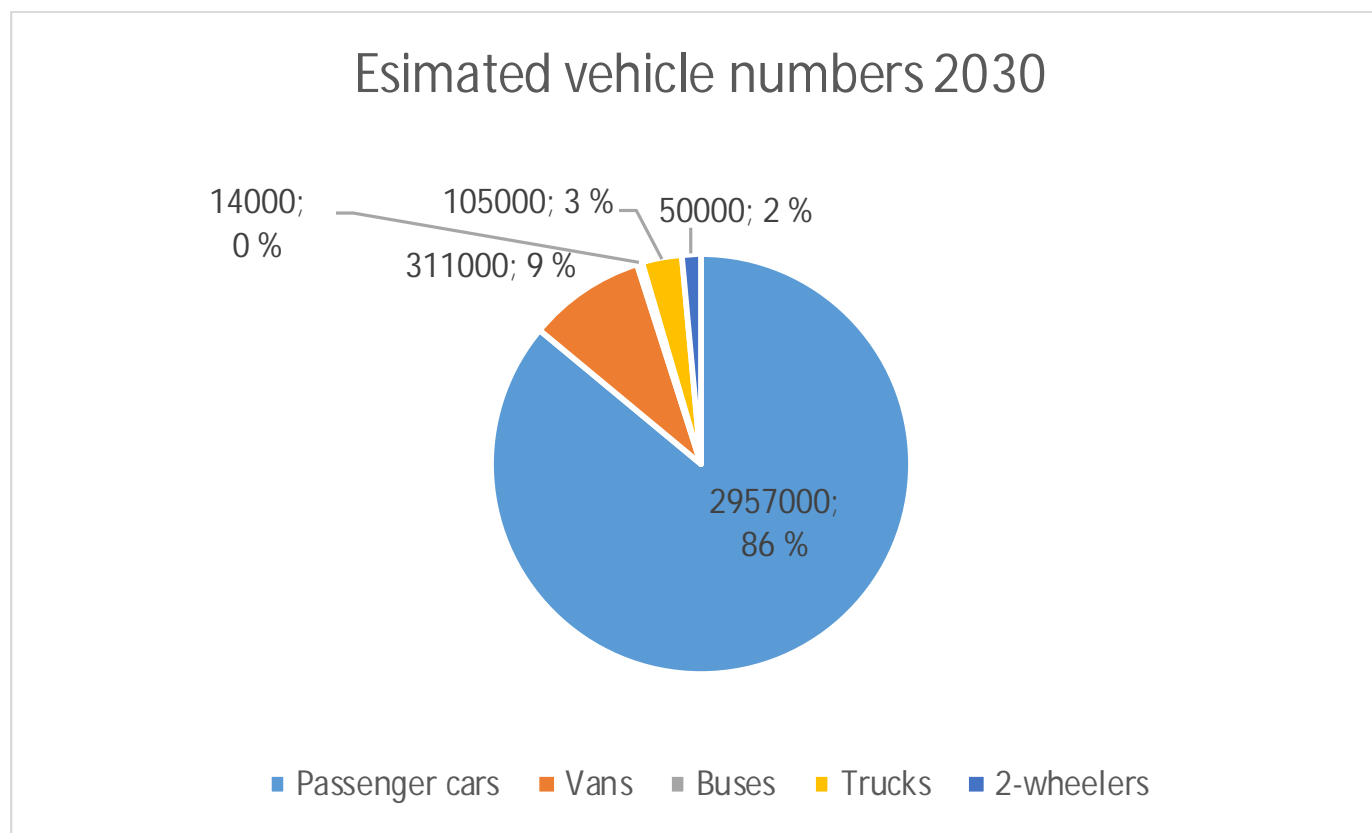
Extended abstract in English at:  
[http://www.transsmart.fi/files/248/Tutkimusraportti\\_VTT-R-00752-15\\_liitteinen.pdf](http://www.transsmart.fi/files/248/Tutkimusraportti_VTT-R-00752-15_liitteinen.pdf)



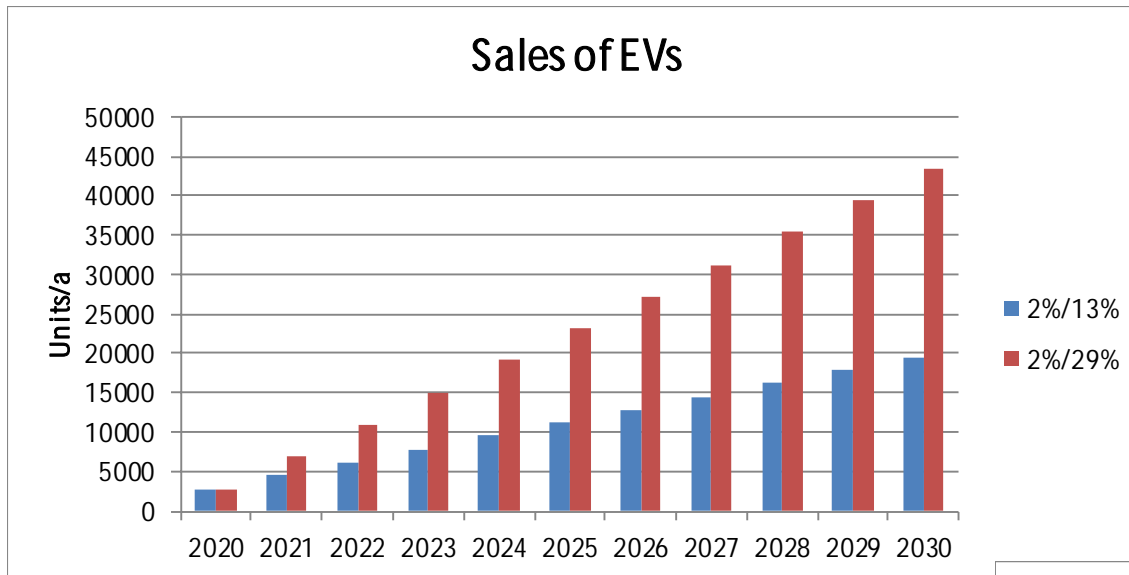
# Contribution to CO2 emissions 2030 – case Finland



# Estimated vehicle fleet 2030



# Sales needed to reach 250,000 EVs in 2030



- Market share starts at some 2 %
- The baseline scenario assumes some 120,000 EVs in 2030
  - requires a 13 % market share in 2030
- Accelerated scenario for 250,000 EVs in 2030
  - Requires a 30 % market share in 2030

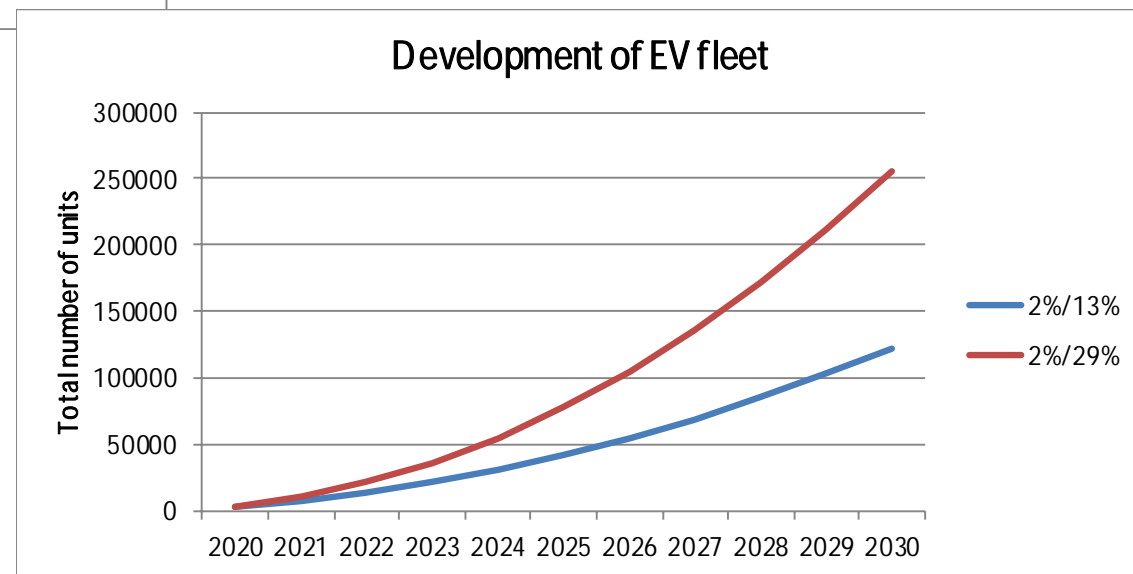
Alternative fuel vehicle registrations: +35.1% in fourth quarter; +39.7% in 2017



01/02/2018 [Tweet](#) [in](#) [LinkedIn](#) [Like](#) [+1](#)

Brussels, 1 February 2018 – In the fourth quarter of 2017, demand for alternative fuel vehicles (AFVs) in the European Union continued to grow – EU results were 35.1% higher than in the same period in 2016. The 227,378 alternatively-powered cars registered during the last quarter of 2017 accounted for 6.7% of total passenger car sales, while electrically-chargeable vehicles (ECVs) made up for 1.9% of all cars sold across the European Union.

Source: ACEA



## Impact of electric vehicles

§ 250,000 electric vehicles (target of the national 2030 energy and climate strategy) means:

§  $250,000/2,950,000 = \sim 8,5\%$  of passenger car fleet

§ 8,5 % zero-emission passenger cars means a total CO<sub>2</sub> reduction of some  $0.085 * 55\% = 4,7\%$

§ Number of EVs needed to reach an overall reduction of 50 %:

§  $50/55 * 2,950,000 = \sim 2,650,000$  EVs

§ Annual vehicle sales  $\sim 120,000$  units

§ If only EVs were sold in years 2018 – 2030 (13 years), the 2030 EV fleet would be  $\sim 1,600,000$  units

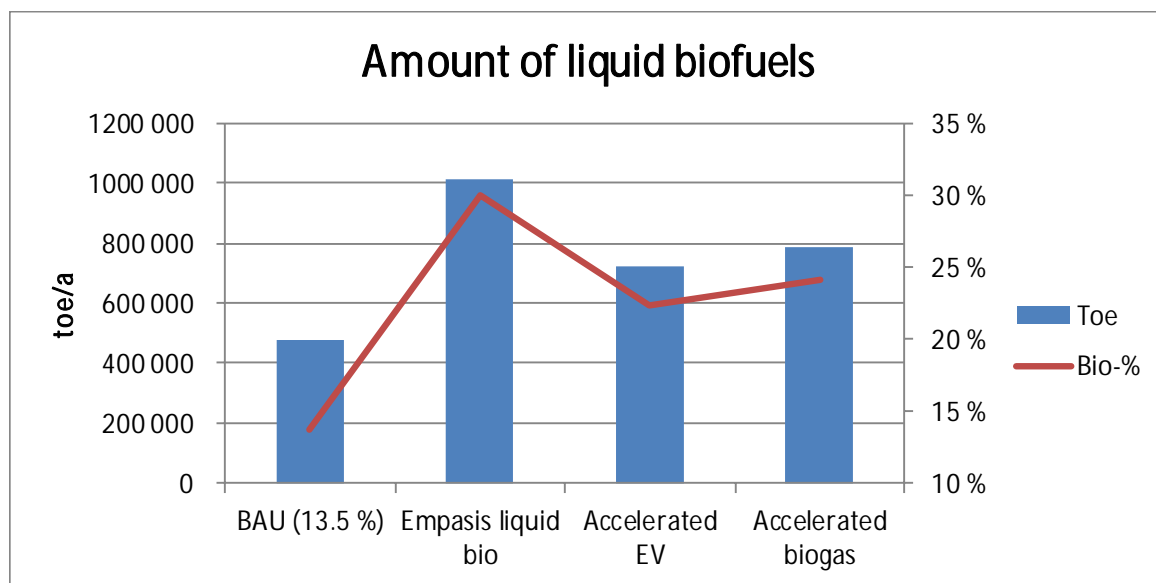
Ø 2030 targets cannot be met by introducing EVs only!

# Calculating fuel volumes

§ 2030 estimated fuel usage 2,800...3,200 ktoe

§ With 250,000 EVs and depending on the success of energy efficiency measures

§ 30 % biofuels in 2030 would mean ~ 850...1,000 ktoe/a



ANNEX TO RESEARCH REPORT VTT-R-00741-17  
EXTENDED ABSTRACT IN ENGLISH

**How to Reach 40% Reduction in Carbon Dioxide Emissions from Road Transport by 2030: 2017 Update**

Authors: Nils-Olof Nylund, Juhani Laurikko, Juha Honkatukia, Kai Sipilä, Ilkka Hannula, Esa Kurkela & Yrjö Solantausta  
Confidentiality: Public

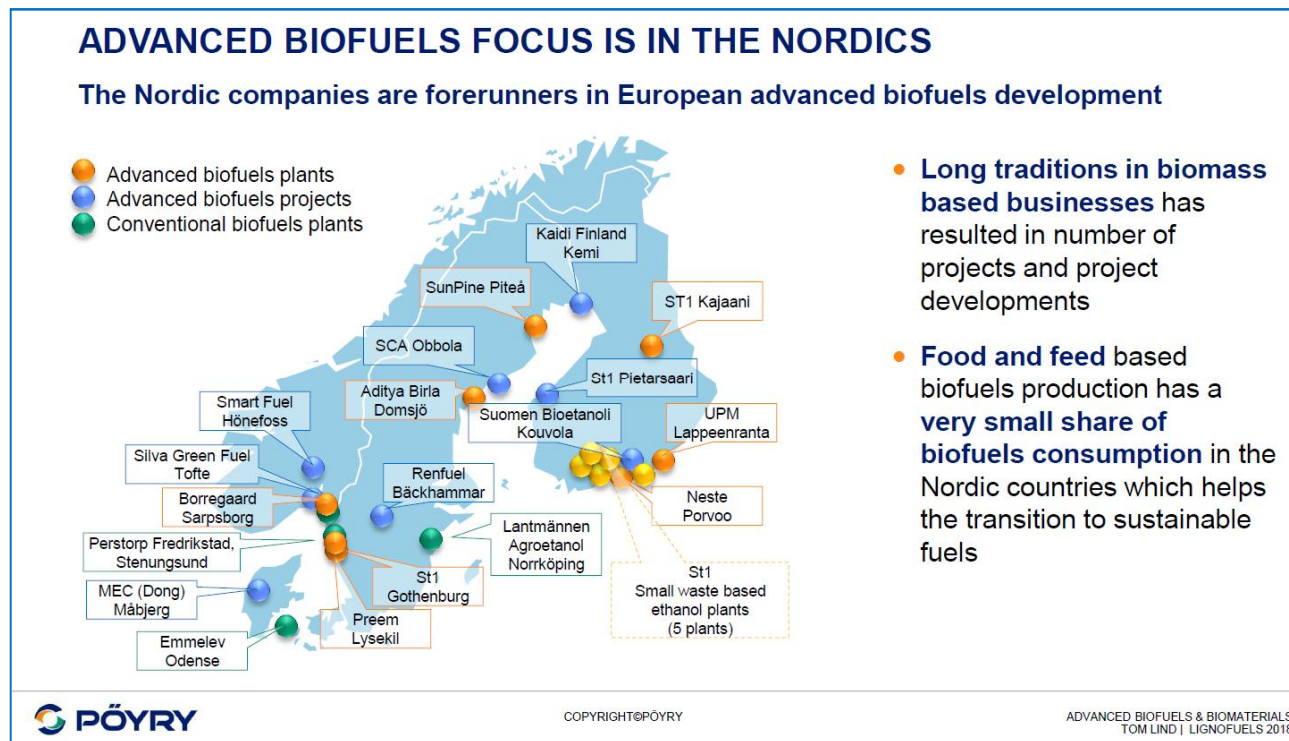


# Pathways to 2030

- § The post 2020 policy for biofuels has not been fixed yet
  - § The outcome of RED II will certainly affect policy
- § Two working groups/projects are currently outlining post 2020 policies
  - § One working group established by the Ministry of Economic Affairs and Employment
    - § Encompasses several ministries and actors in the energy sector
  - § One project initiated by the Prime Minister's Office
    - § A project led by an internationally know consulting company, focusing on techno-economical aspects of alternative biofuel strategies
    - § Shares of biocomponents in road transport fuels and in light heating oil
      - § Base assumption 30 % in road transport fuels and 10 % in light heating oil
    - § Market outlook for biofuels
    - § Scenarios for domestic production and imports
    - § Cost effects for the consumers and the national economy

# Sustainable biofuels are a possibility for Finland

- § Finland is in a good position to increase the use of biofuels in transport
  - § Large biomass resources
  - § A large pulp and paper industry handling huge amounts of biomass
  - § Industrial players with advanced technology

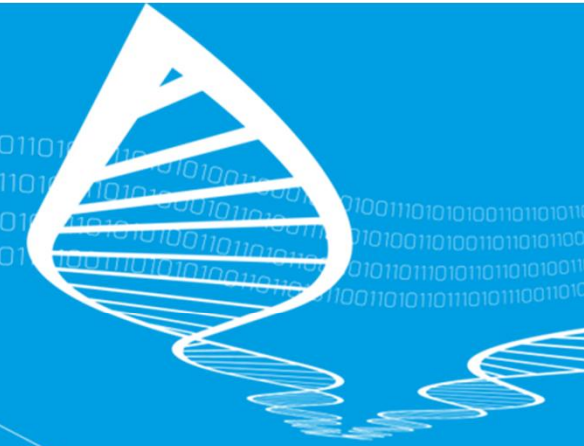


Picture: Tom Lind/Pöyry



## Summary

- § Finland has an ambition to cut CO<sub>2</sub> emissions from transport by 50 % by 2030
- § This target can only be met implementing a combination of energy efficiency, renewable fuels and electrification
- § Electrification alone could contribute some 5 %, maximum 10 %
  - § Market share of EVs and pace of fleet renewal limiting factors
- § The Finnish strategy for CO<sub>2</sub> reductions in transport relies heavily on renewable fuels
- § To reach a 50 % CO<sub>2</sub> reduction by 2030, in addition to energy efficiency measures and electrification, a share of some 30 % renewable fuels will be needed (approximately 0.8...1 Mtoe)
- § Several assessments have shown that in the case of Finland, investment in domestic drop-in biofuels production is a cost effective way to reduce CO<sub>2</sub> emissions from transport



# TECHNOLOGY «» FOR BUSINESS

