

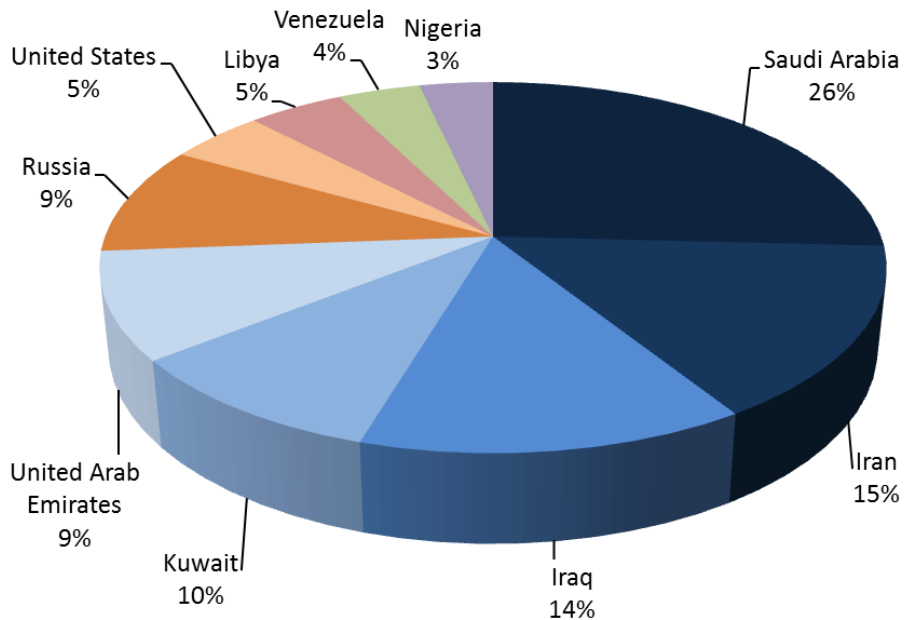
Renewable Energy in the Transport Sector

Amela Ajanovic
Energy Economics Group
Vienna University of Technology

Prague, 25.11.2019

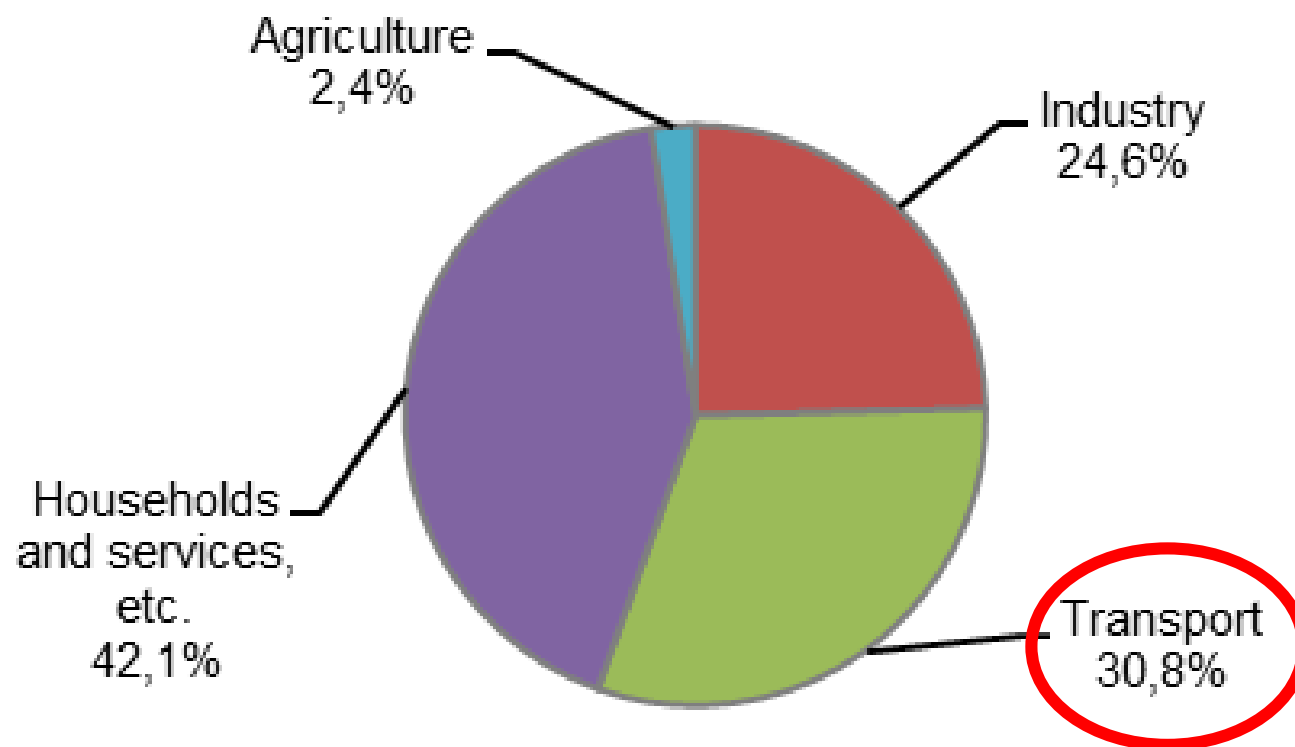
- Introduction
- Policy framework
- Biofuels
- Electric vehicles
- Conclusion

- least-diversified sector

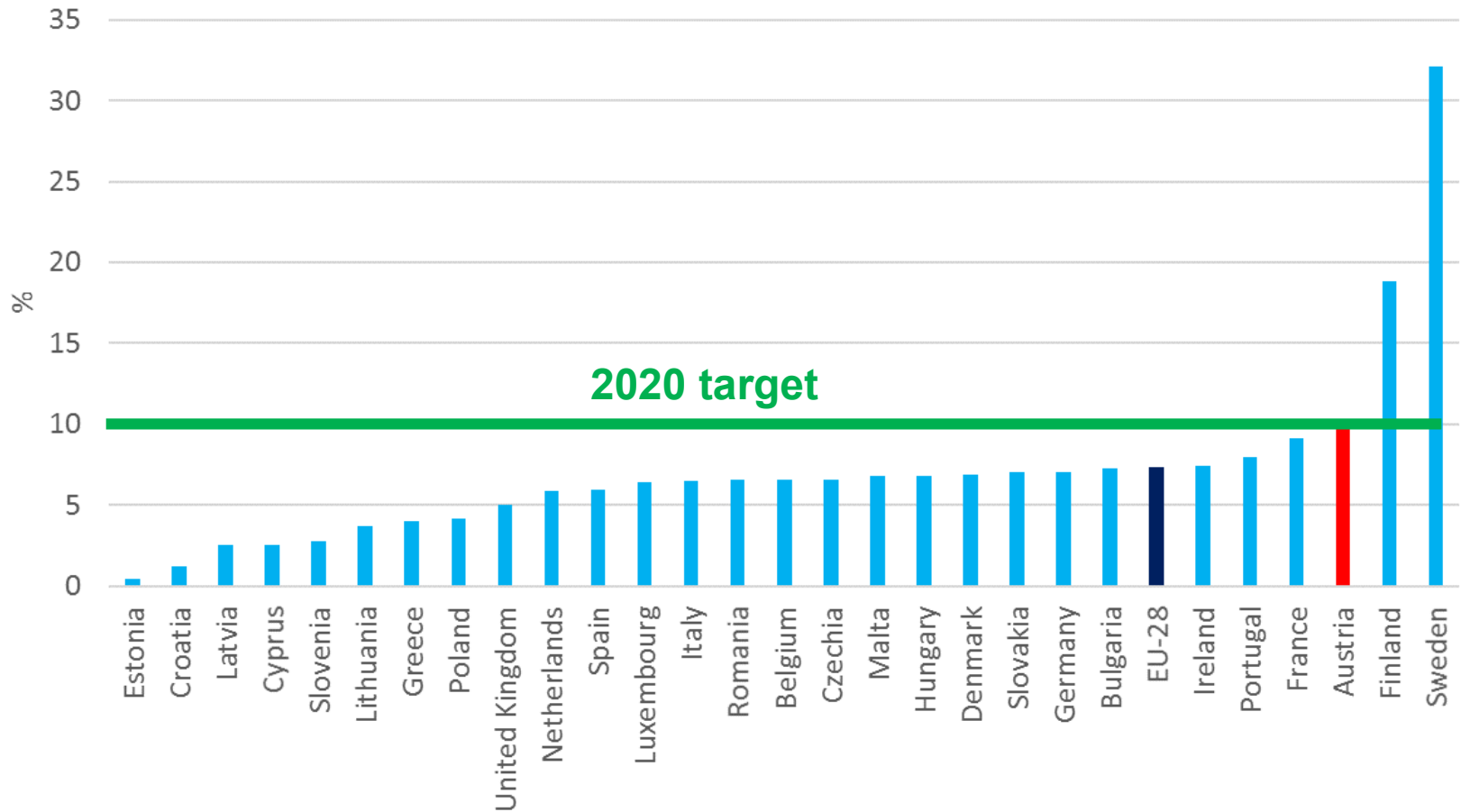


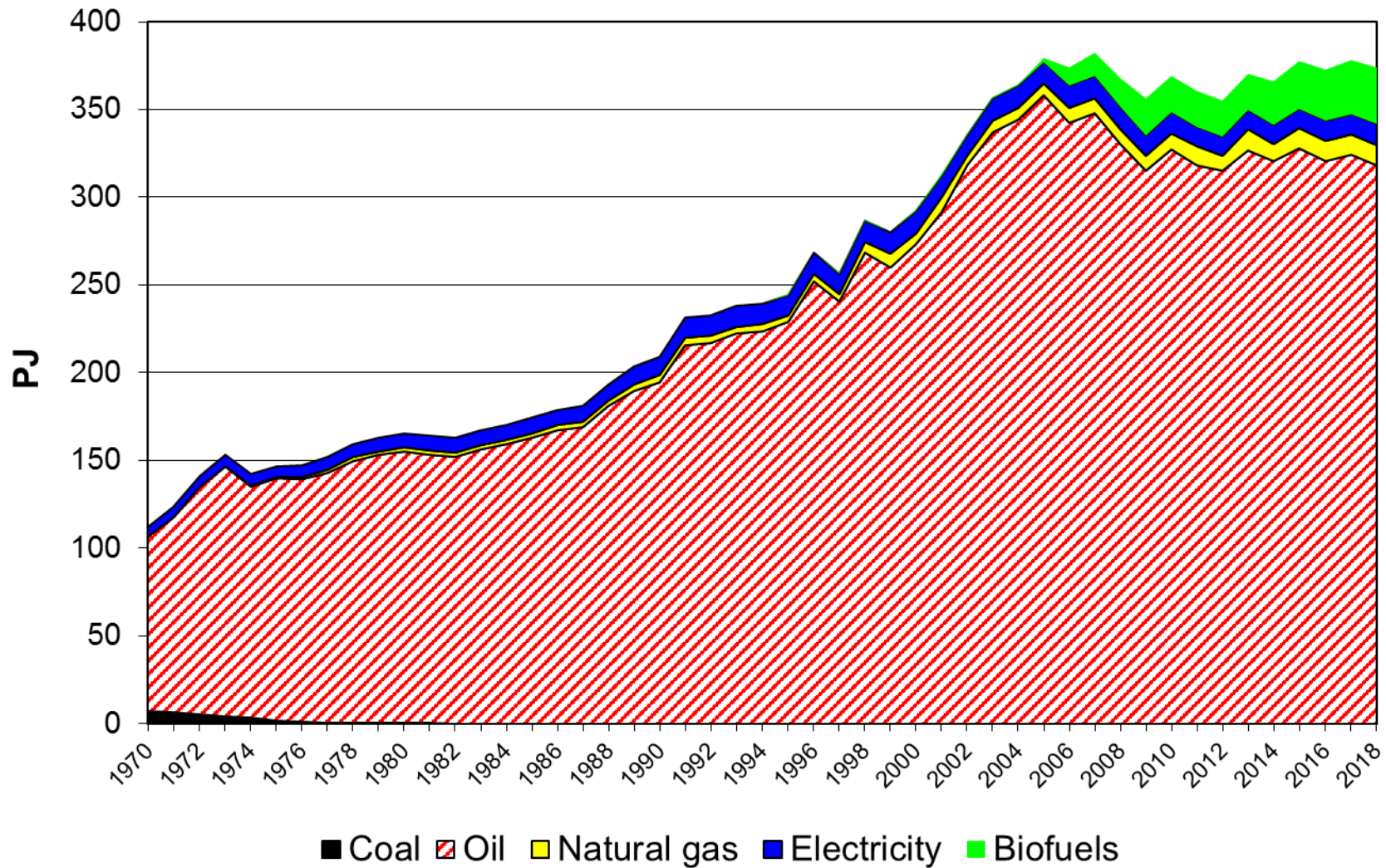
Countries with largest
conventional oil
reserves

Year 2017

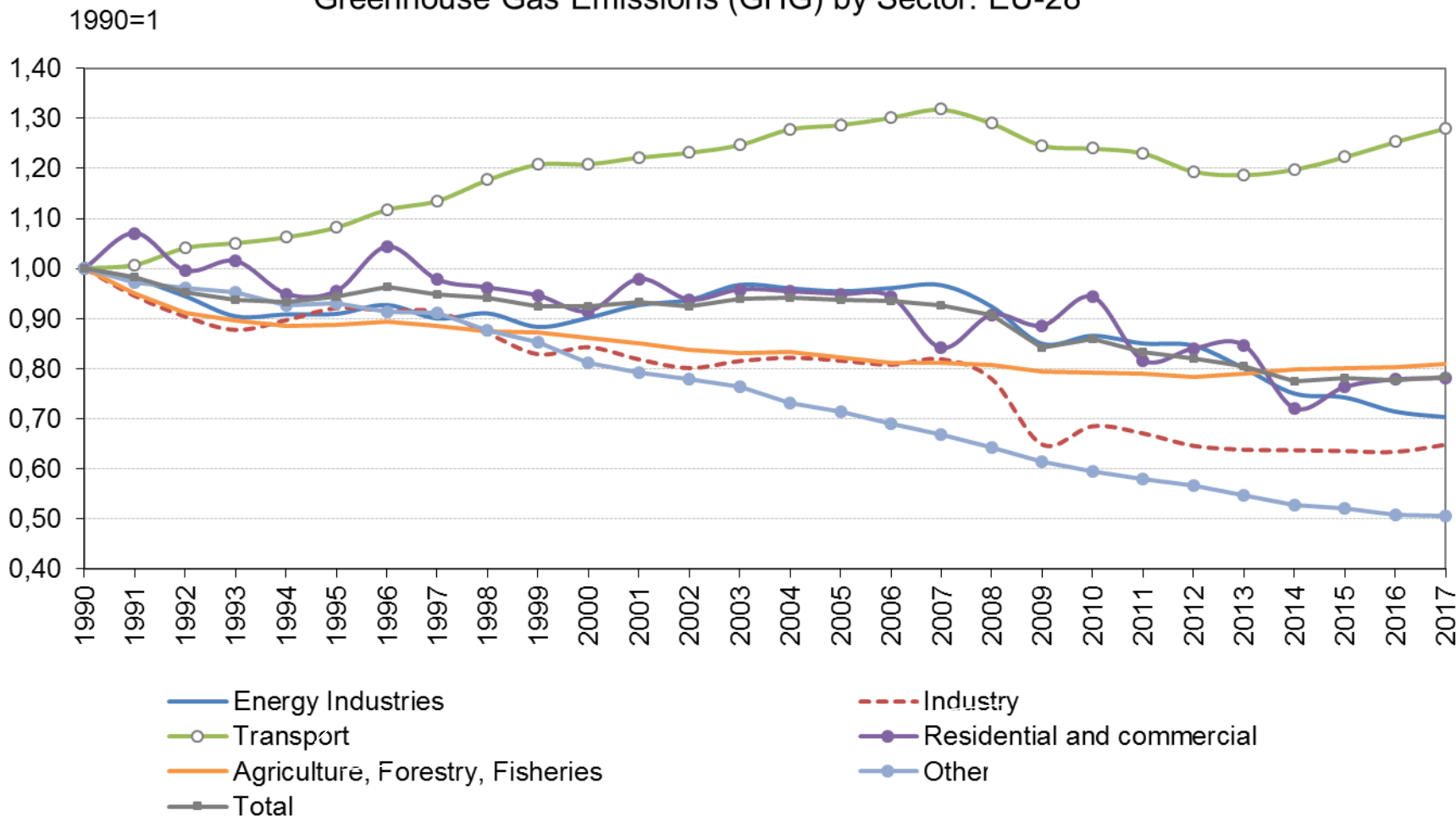


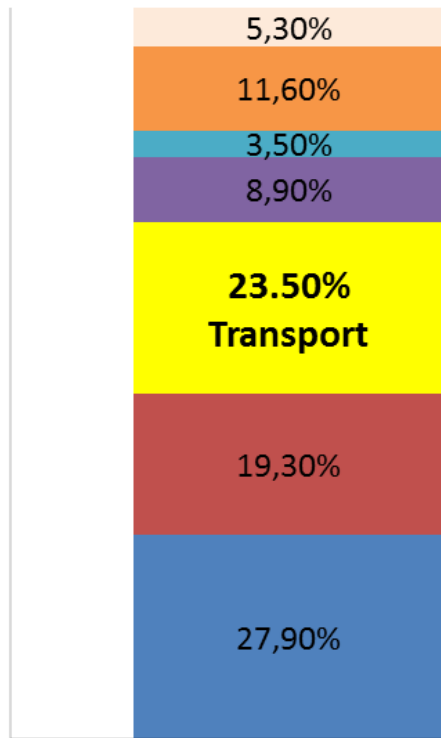
- RES in transport: 7.6%





Greenhouse Gas Emissions (GHG) by Sector: EU-28

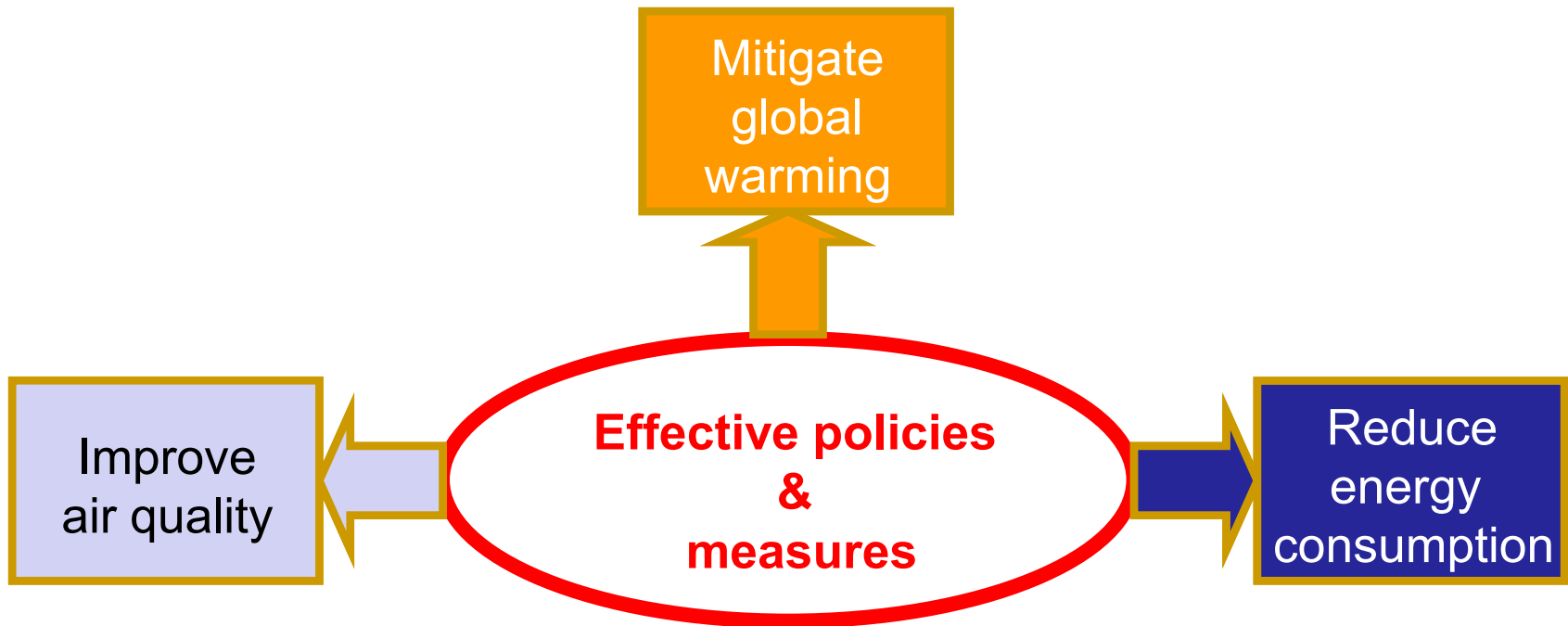




ALL SECTORS

- Energy industries
- Industry
- Transport
- Residential
- Commercial/institutional
- Agriculture, forest, fisheries
- Other sectors
- Road transportation
- Other transport modes
- Cars
- Other transport means

The challenges for EU climate and energy policies



Climate & energy package

20-20-20

40-32-32.5

BF: 5.75%

10%

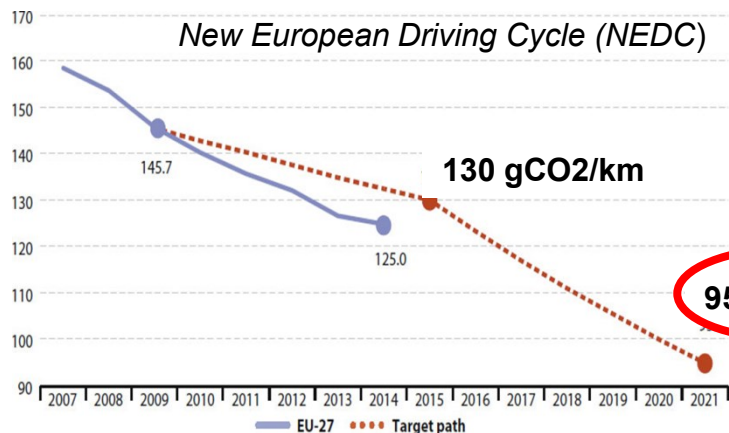
14%

the share of advanced biofuels and biogas must be at least 1% in 2025 and at least 3,5% in 2030.

New legislation approved by European Parliament on 28 April 2015

- Cap of 7% on the contribution (to 2020 targets) of biofuels produced from 'food crops' to mitigate ILUC emissions
- No public support for food crop based biofuels post 2020

2009 2010 2015 2020 2025 2030 2050



ICE -50% in city

20% GHG (2008)

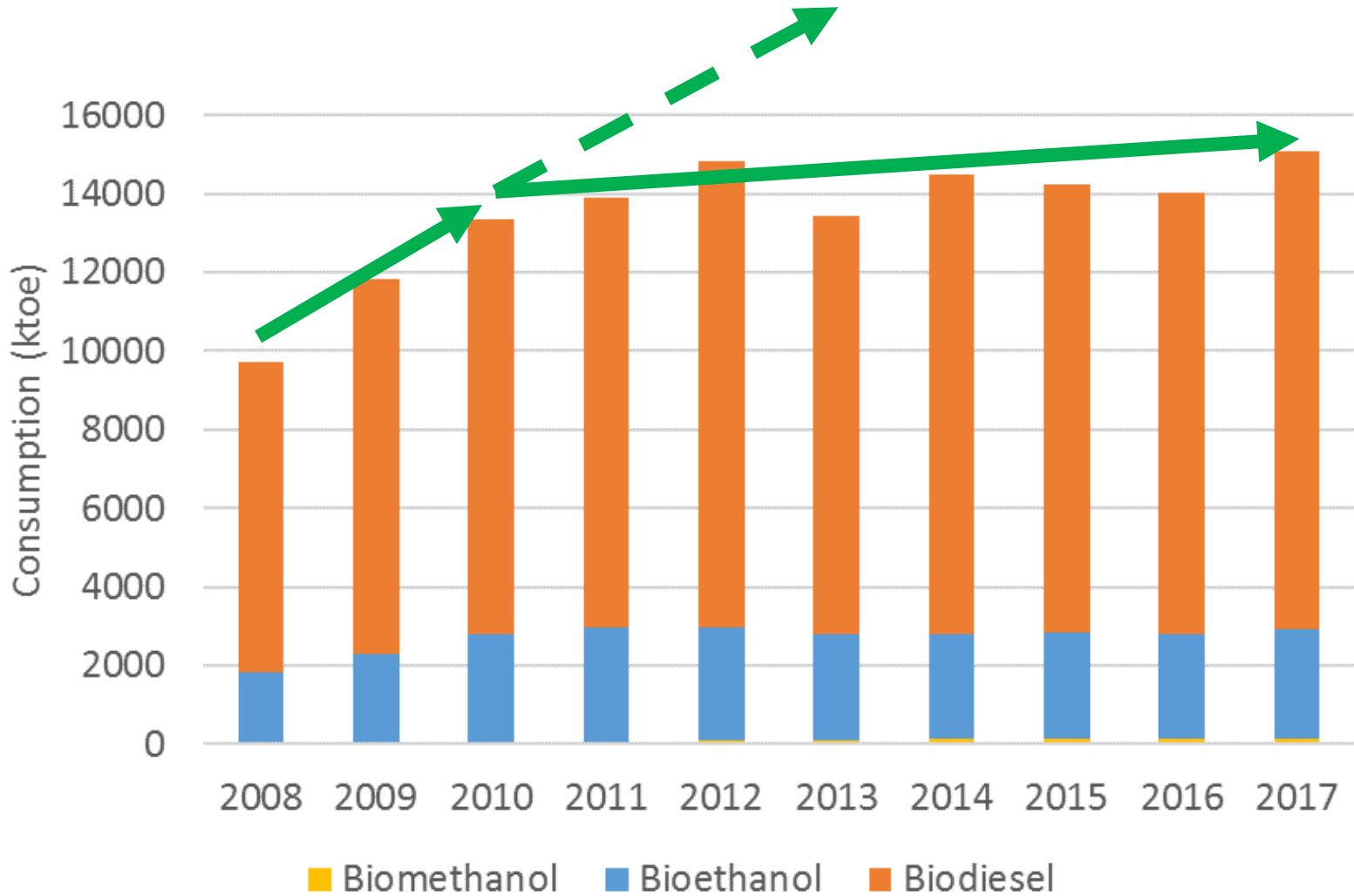
No ICE in city

60% GHG (1990)

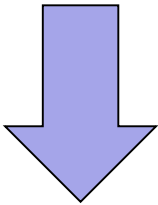
Transport White Paper

-15%
-37,5%

Targets and average CO₂ emissions from new passenger cars in EU countries *World harmonized light-duty vehicles test procedure (WLTP)*

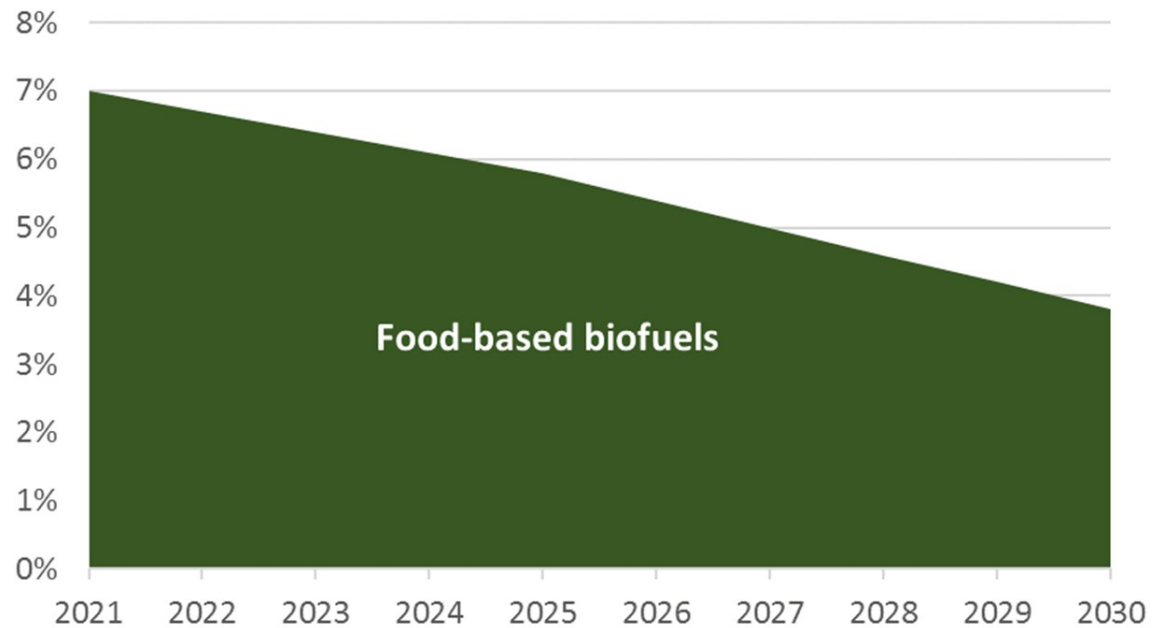


1st generation biofuels



2nd generation biofuels

Gradual phase out of conventional crop based biofuels



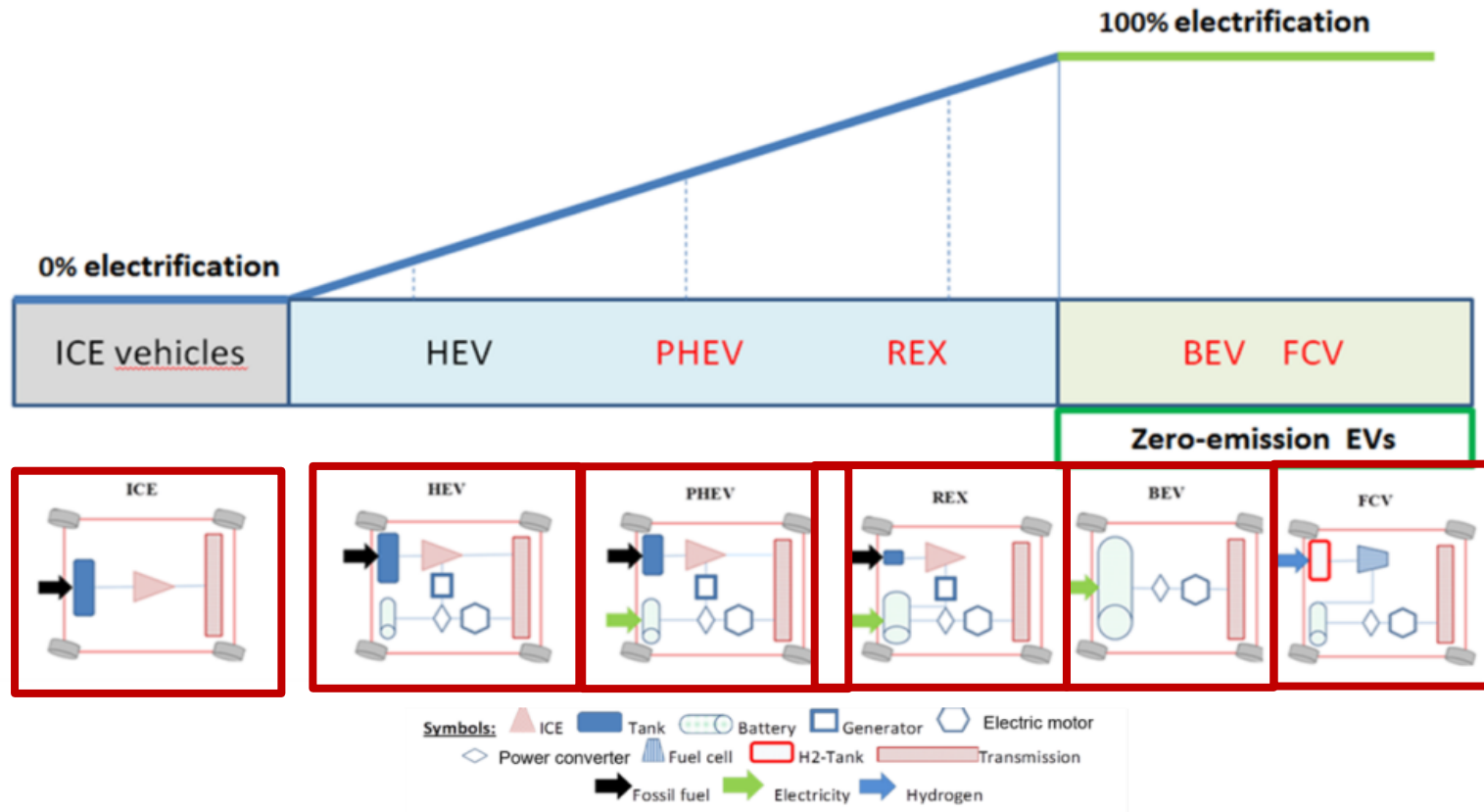
Other alternatives

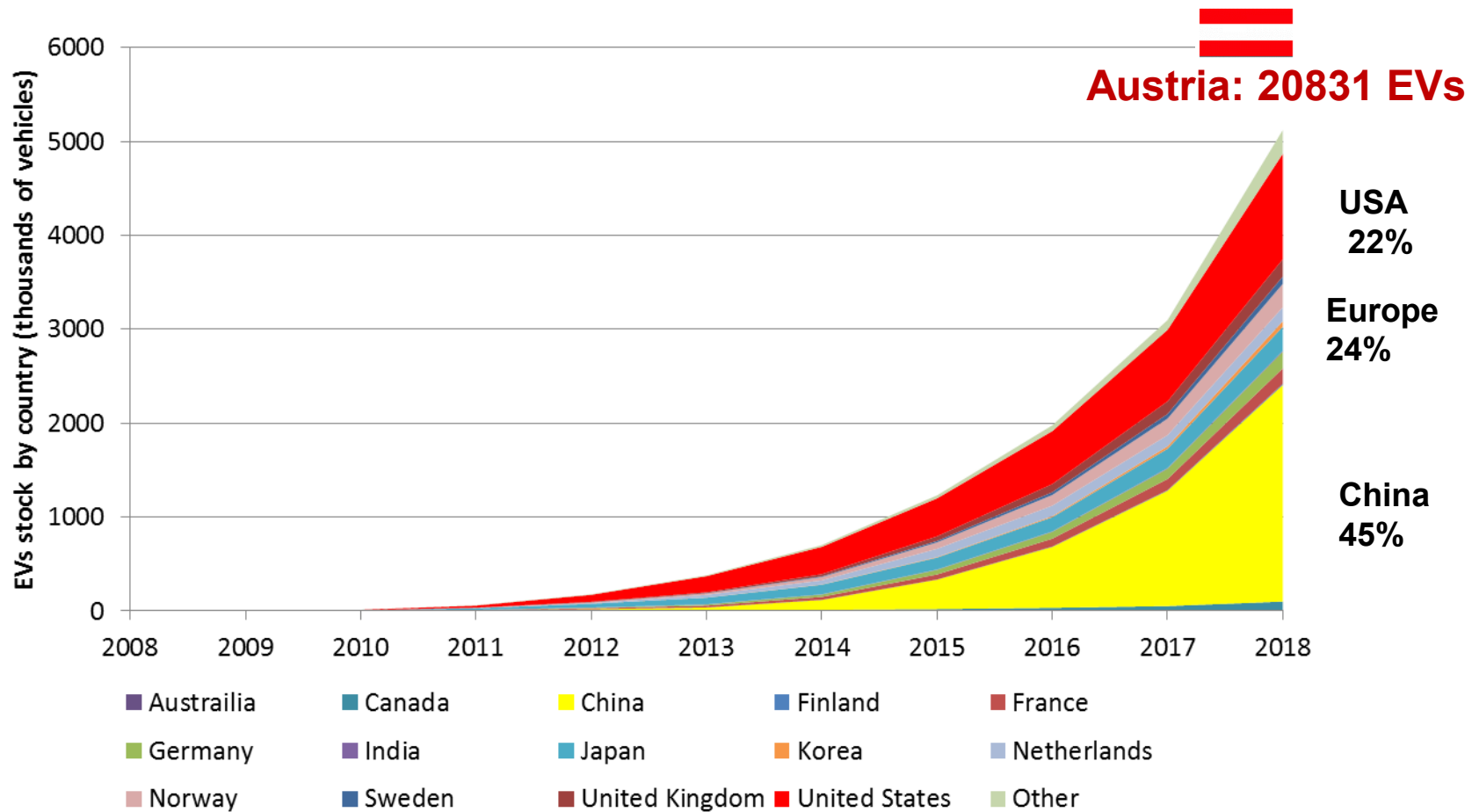
- Hydrogen from RES
- Electricity from RES

Paris Declaration on Electro-Mobility and Climate Change & Call to Action:

- more than 100 million EVs
- 400 million two and three-wheelers

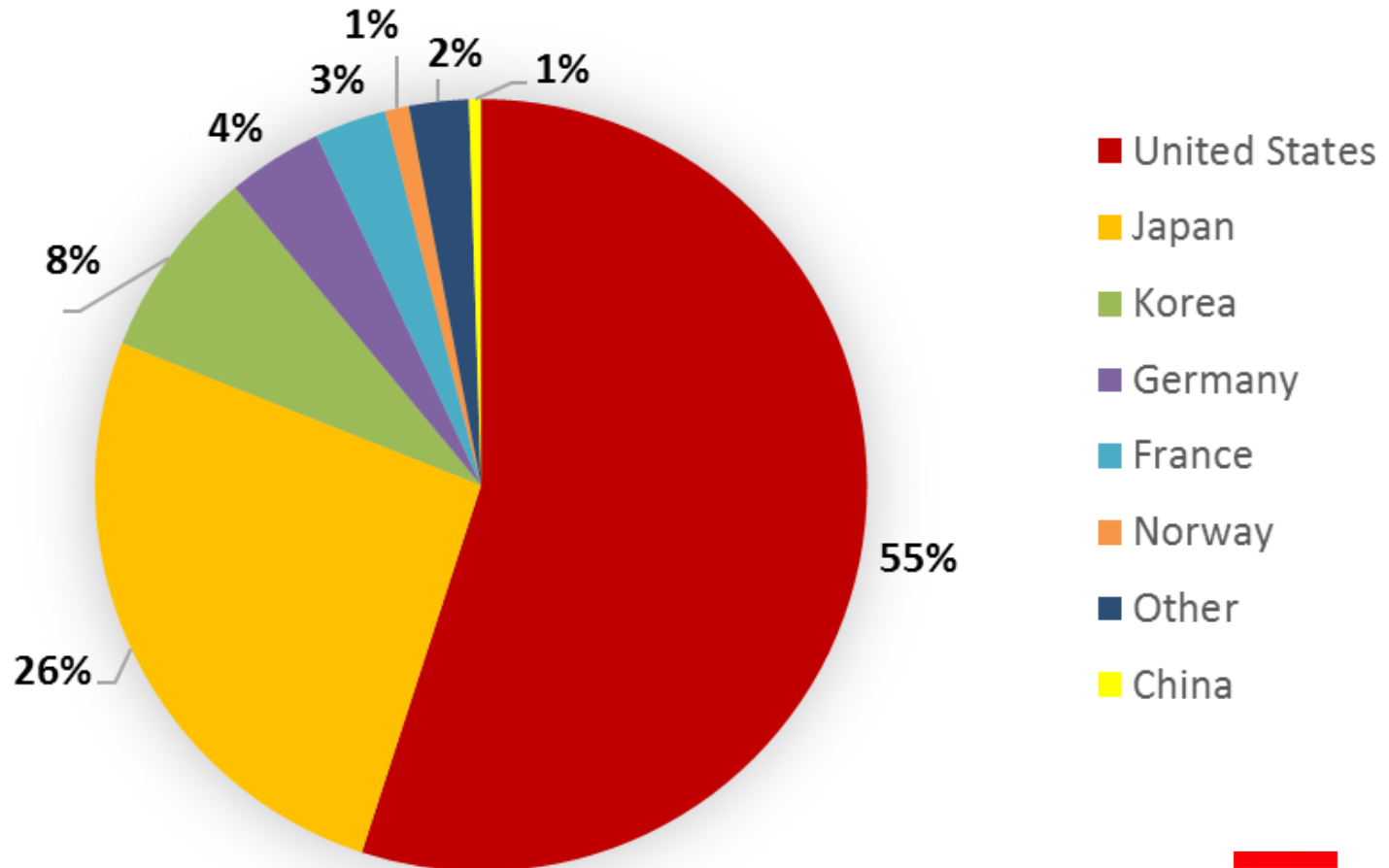
Electric vehicles





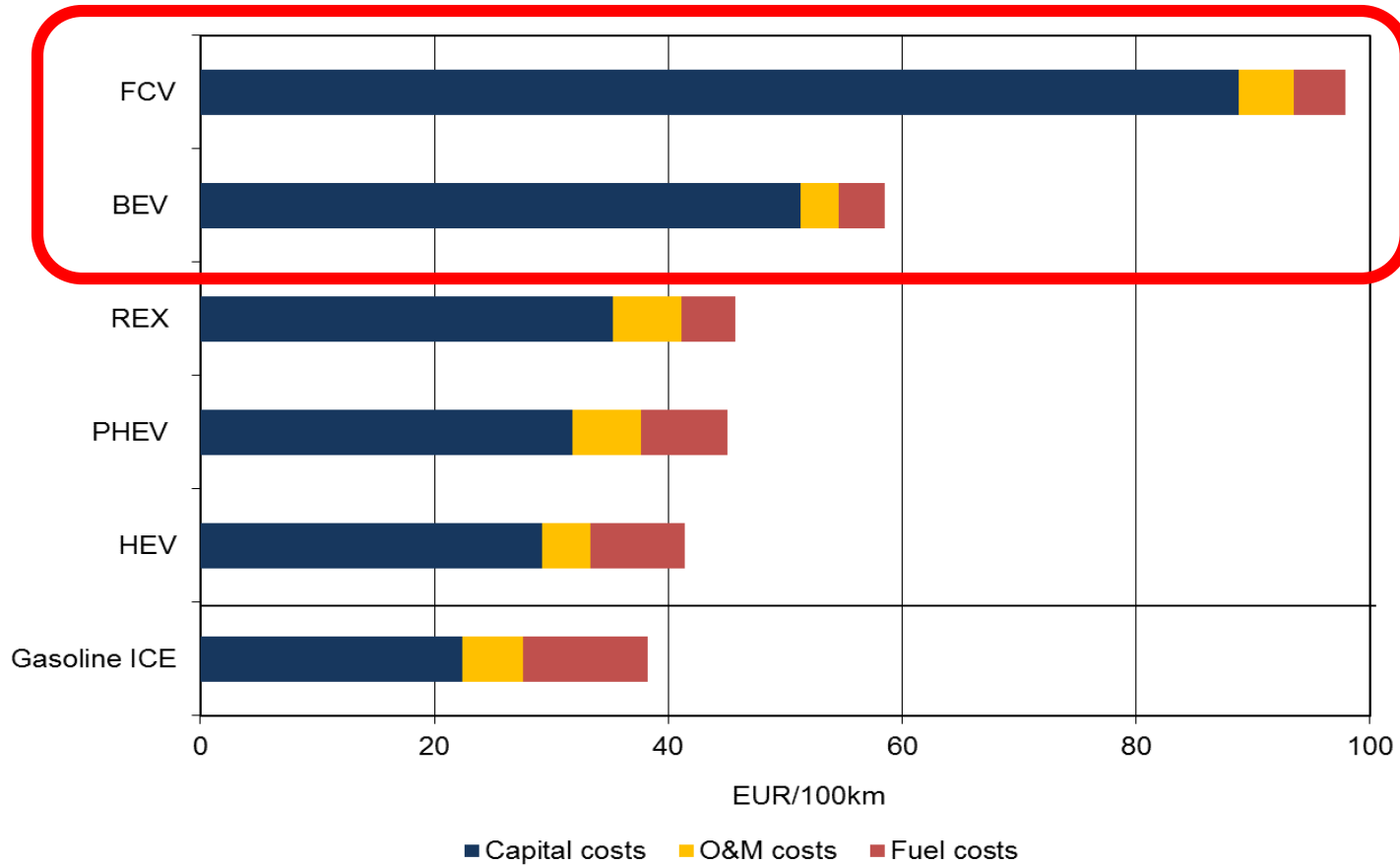
Development of the global stock of rechargeable EVs

Electric vehicles



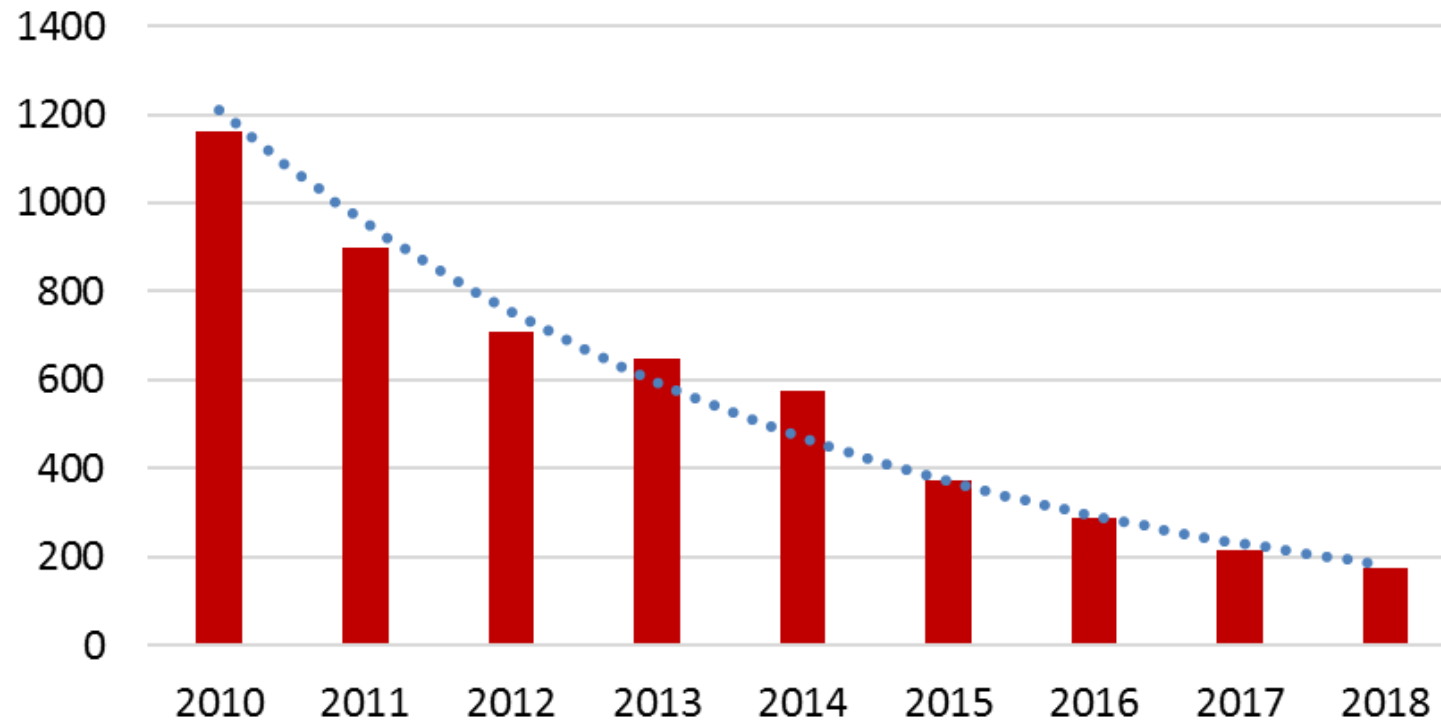
Fuel cell electric passenger car stock: 11.200

Austria: 23 FCV

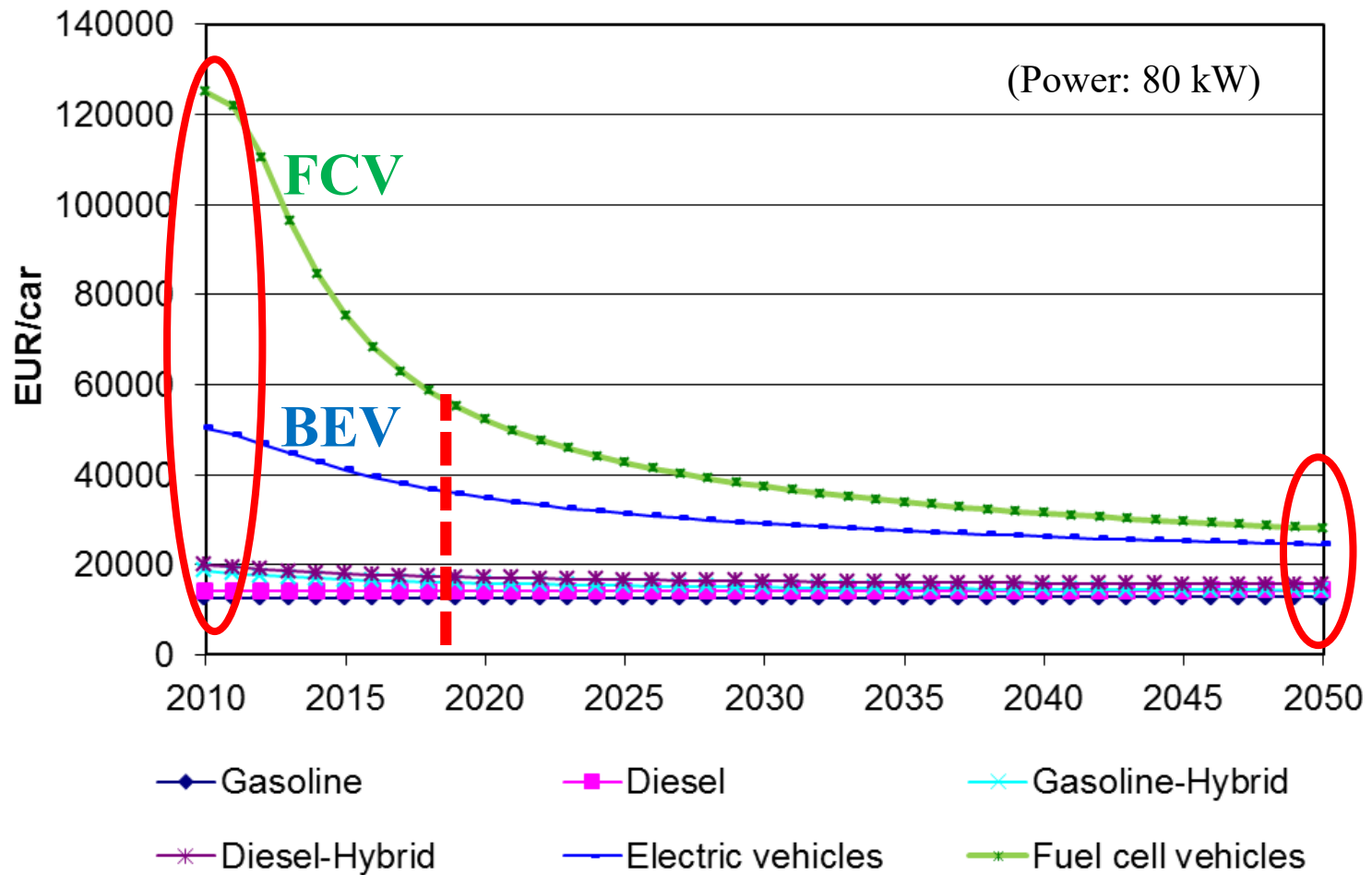


Total costs of service mobility of various types of EV in comparison to ICE cars

Battery pack price (\$/kWh)



Scenario for development of investment costs



Electric vehicles

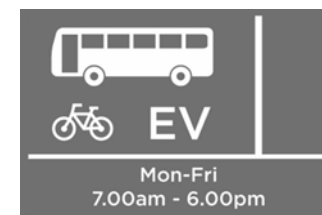
Monetary measures

- road taxes
- annual circulation tax
- company car tax
- registration tax
- fuel consumption tax
- congestion charges



Non-monetary measures

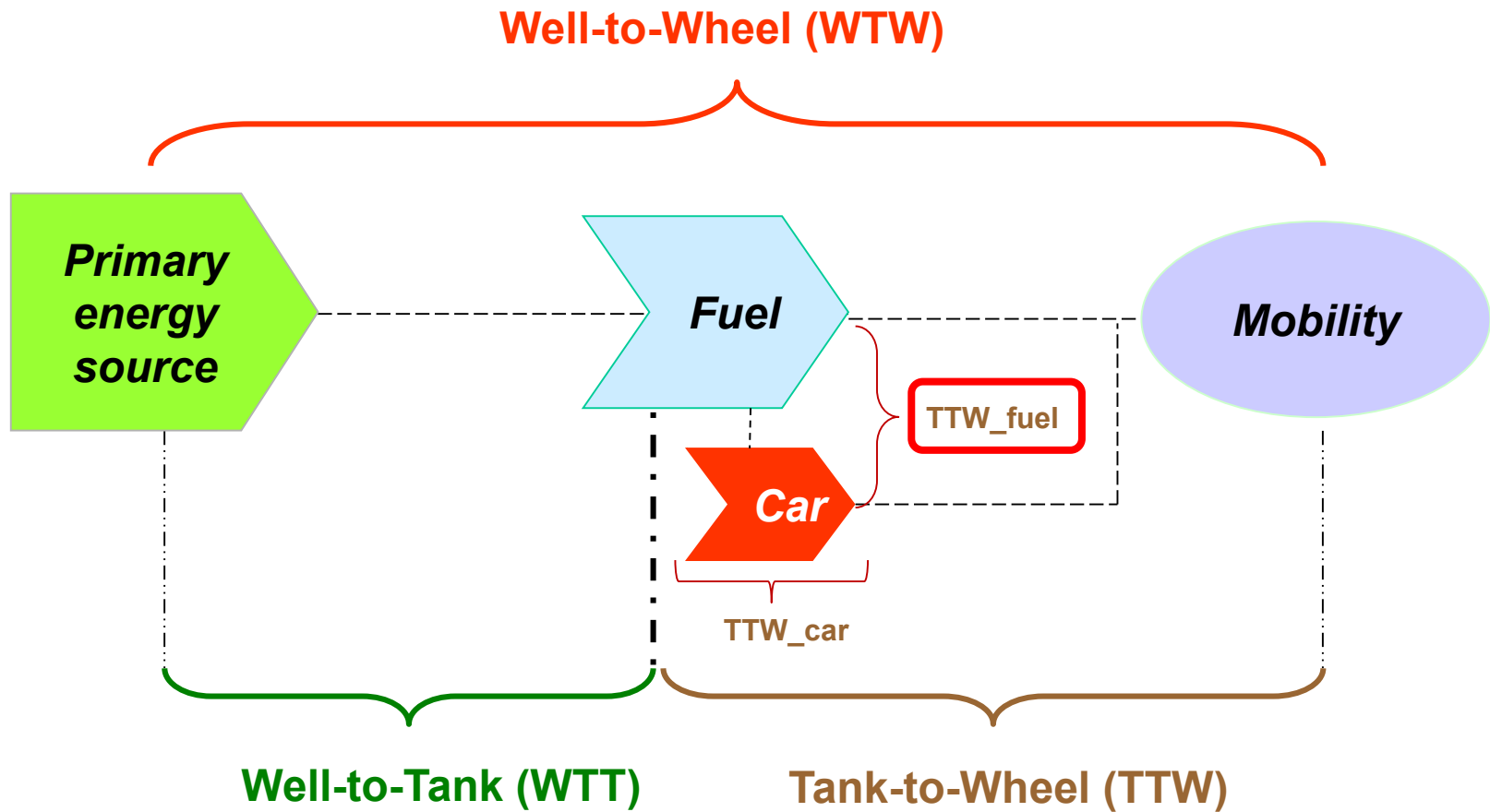
- free parking spaces
- possibility for EVs drivers to use bus lanes
- wide availability of charging stations
- permission for EVs to enter city centers and zero emission zones

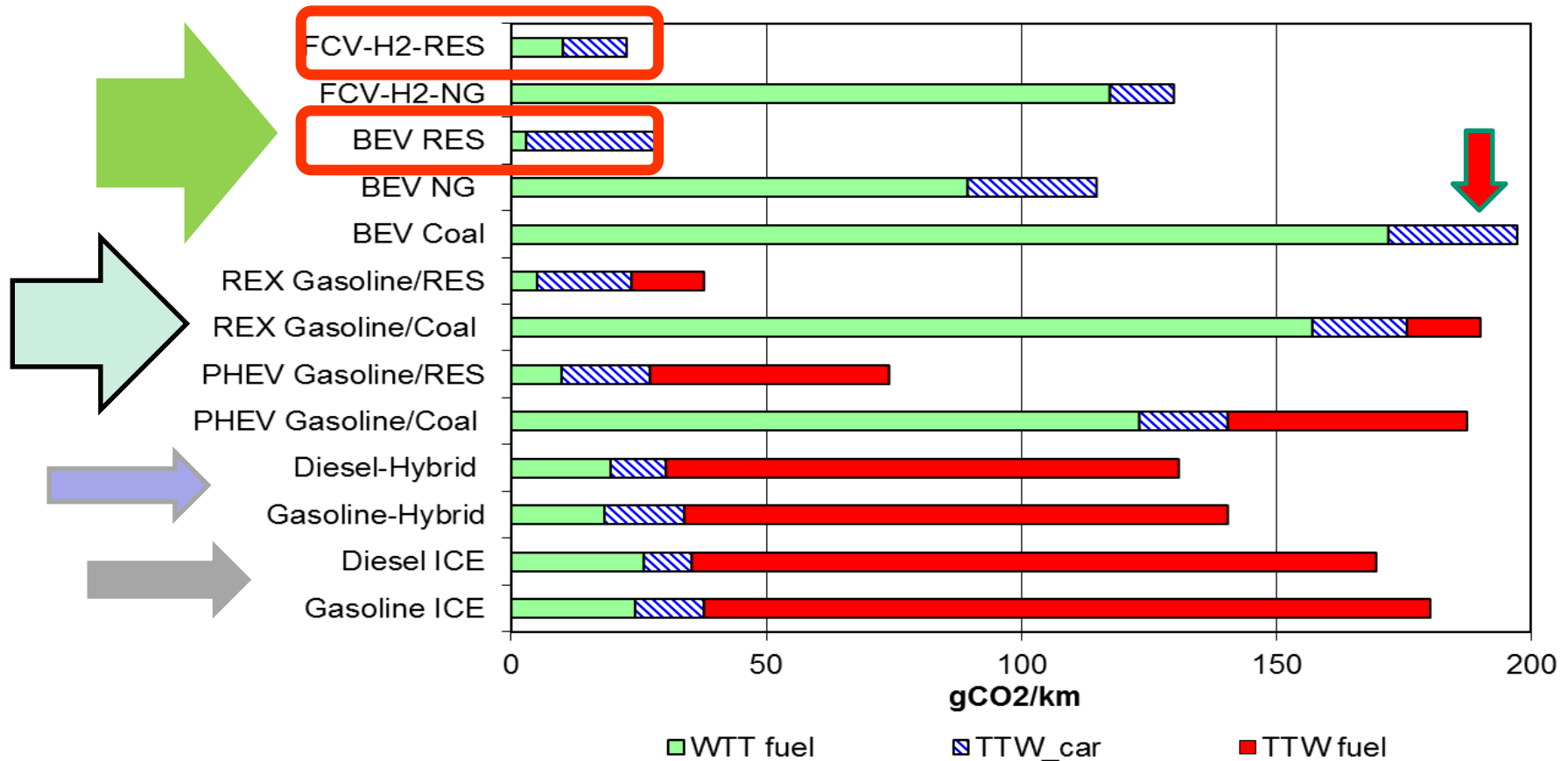


Electric vehicles

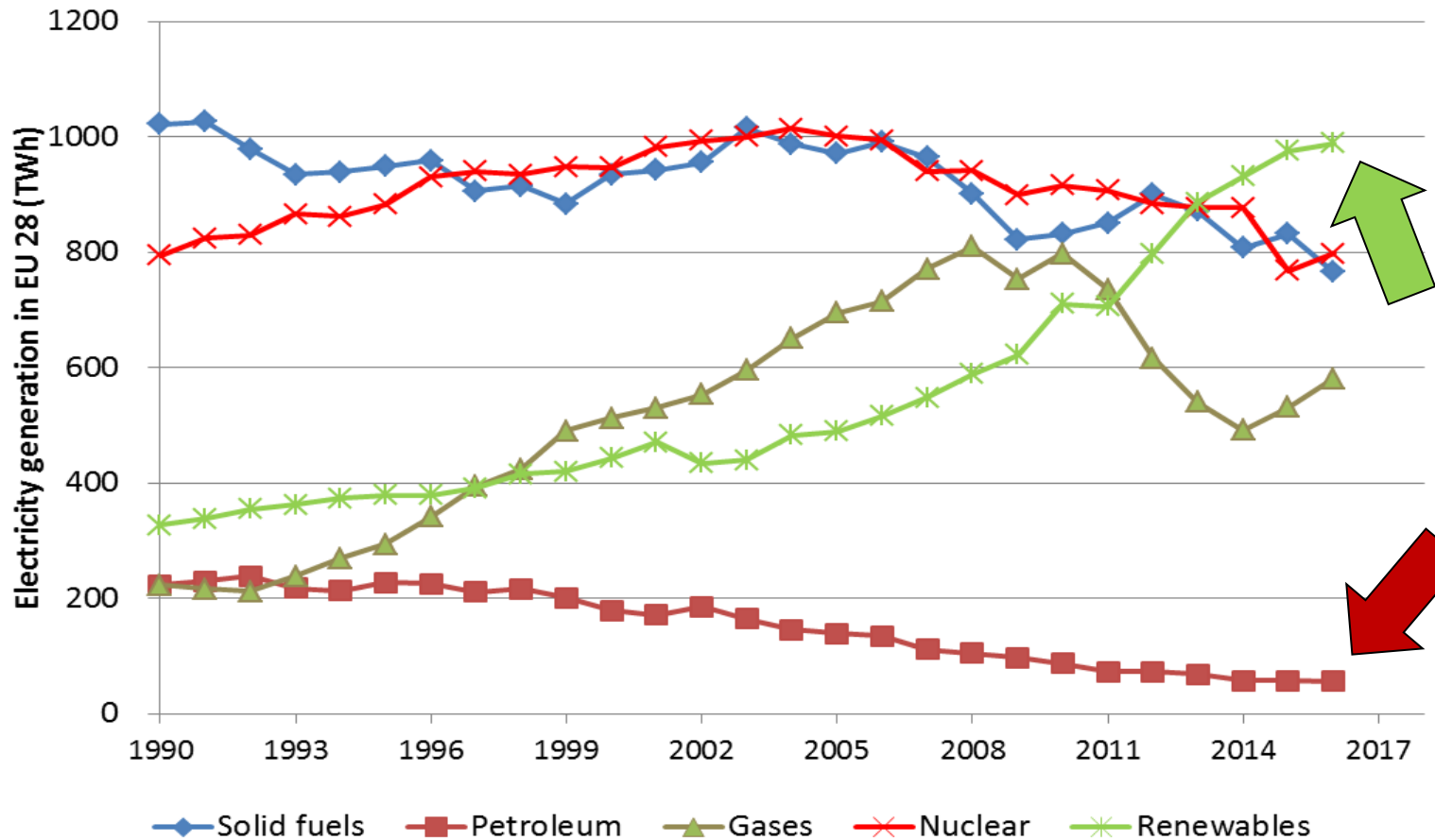


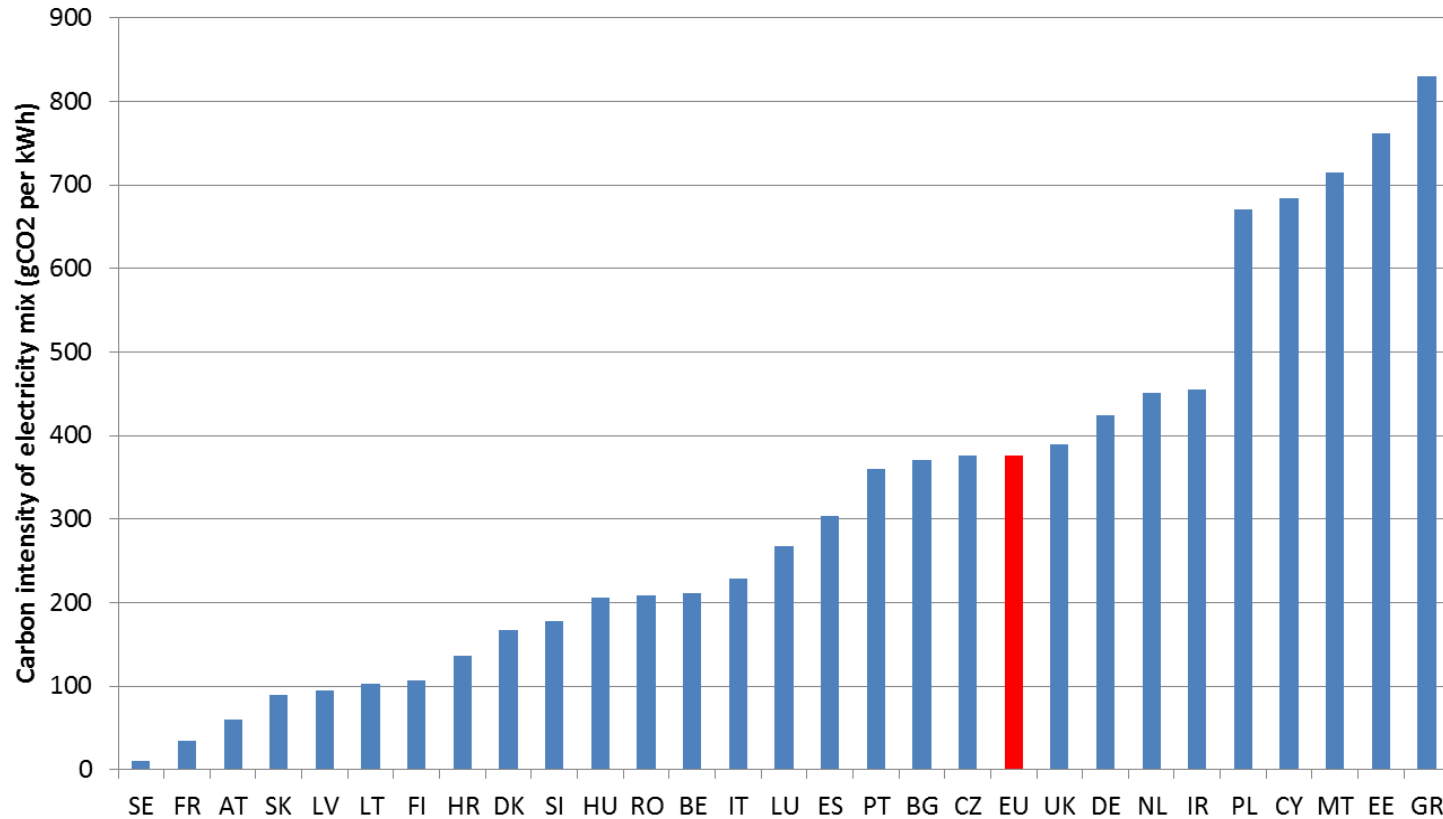
- BEV & FCV - 3,000 € subsidy, but only up to a purchase price of 50,000 € for private use or 60,000 € for commercial use.
- PHEV & REX - 1,500 €.... However, PHEV with diesel are no longer eligible for the subsidies.
- Electric cargo bikessubsidy of 400 €
- Charging stations in multi-party houses - 600 € (if cars are purchased at the same time).
- Publicly accessible rapid charging stations - 10,000 €.
- Rapid charging stations for commercial vehicles 20,000 €.





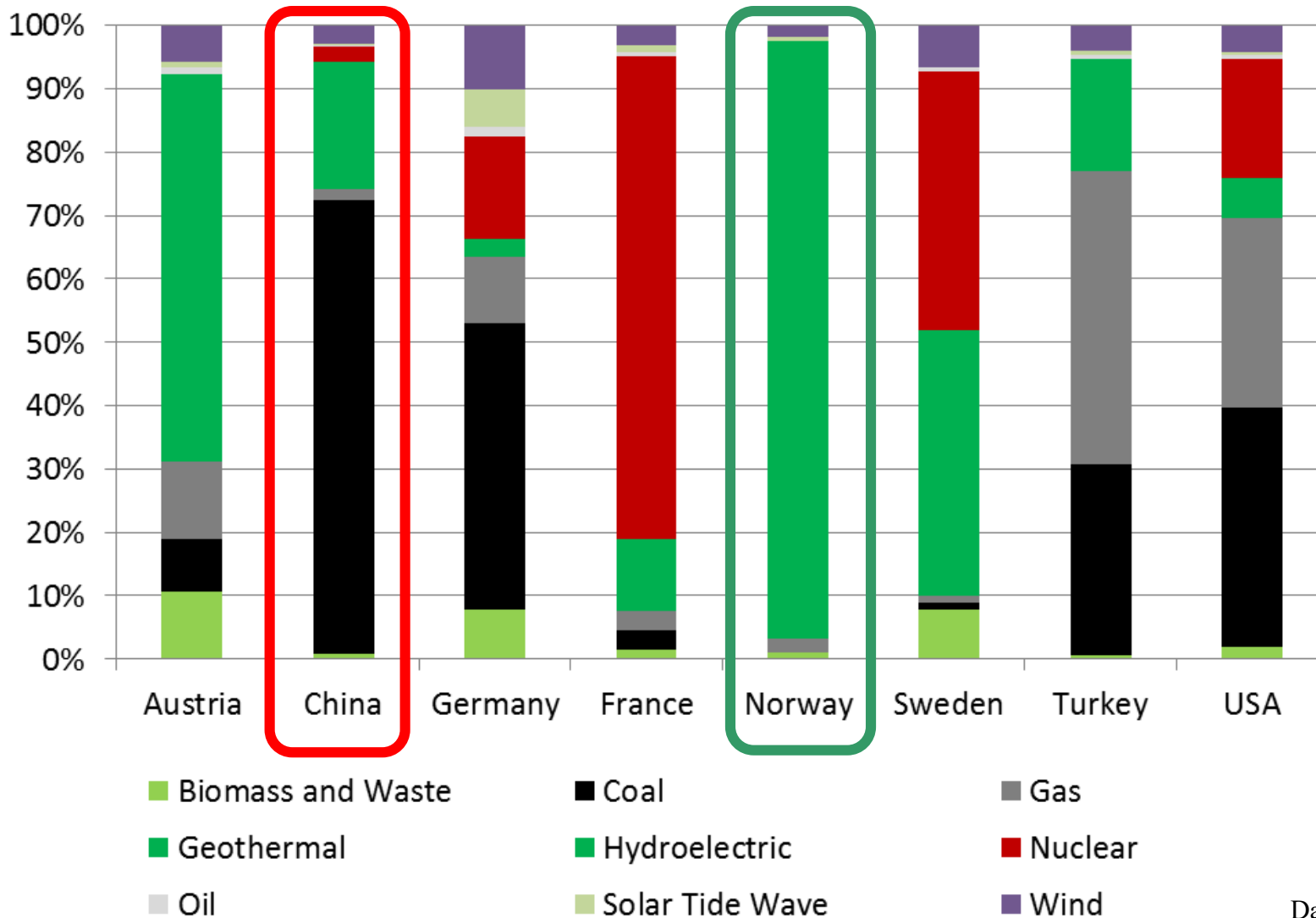
CO₂ emissions per km driven for various types of EV in comparison to conventional cars (power of car: 80kW)

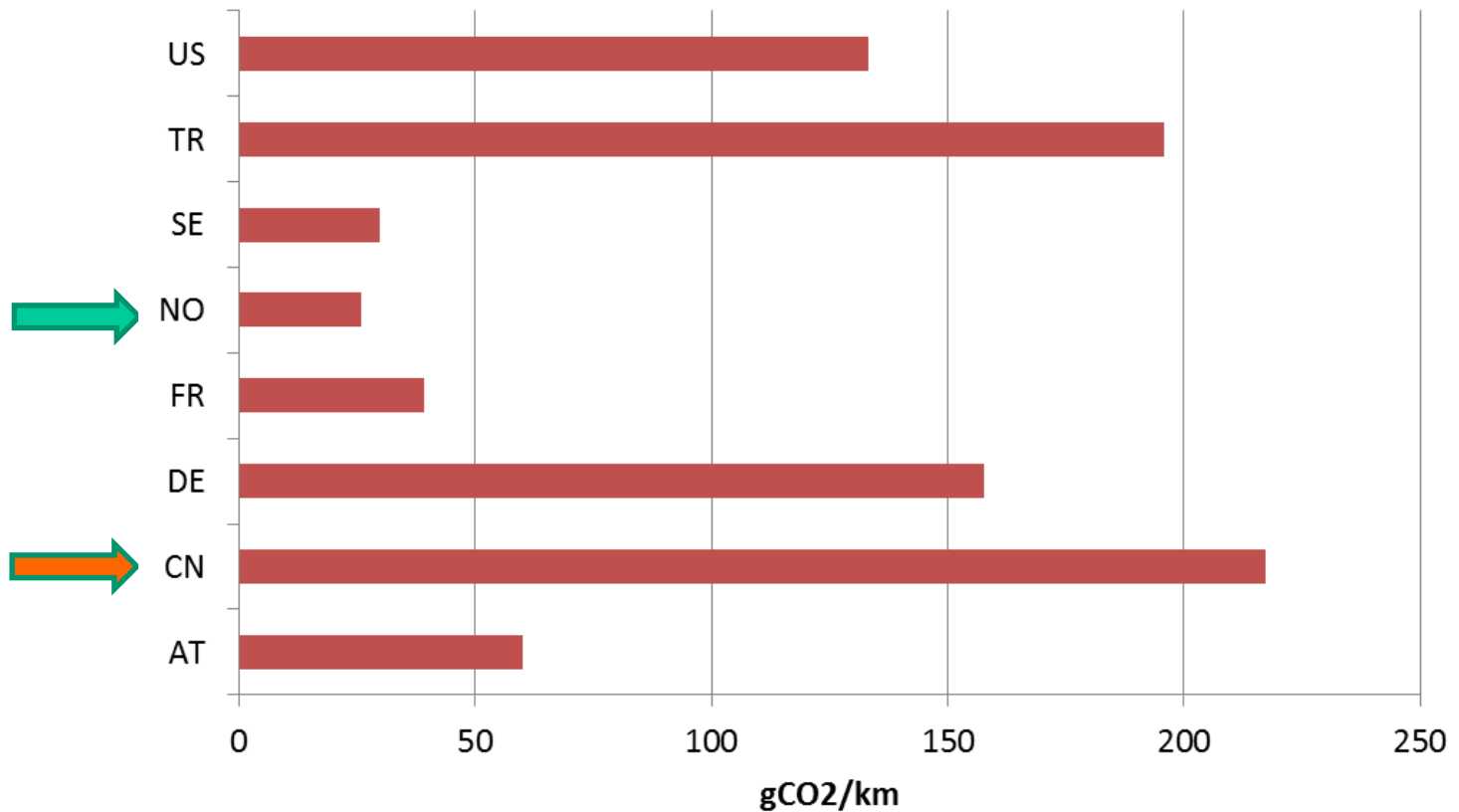




CO2 per kWh electricity generated in different European countries, 2014

Electricity mix





CO₂ emissions per km driven for BEVs powered by grid electricity in different countries

- The transport sector
...almost no progress
- Biofuels
... policy shape development...advanced biofuels
- Electrification
...slow penetration of EVs ...cost reductions, improvement of battery characteristics, as well as development of infrastructure
 - Most of the policies implemented will be abolished with the increasing number of EVs
 - Future policy design should ensure high environmental benefits of EVs.
 - Full environmental benefit – only if EVs are powered by electricity generated from renewable energy source

ajanovic@eeg.tuwien.ac.at