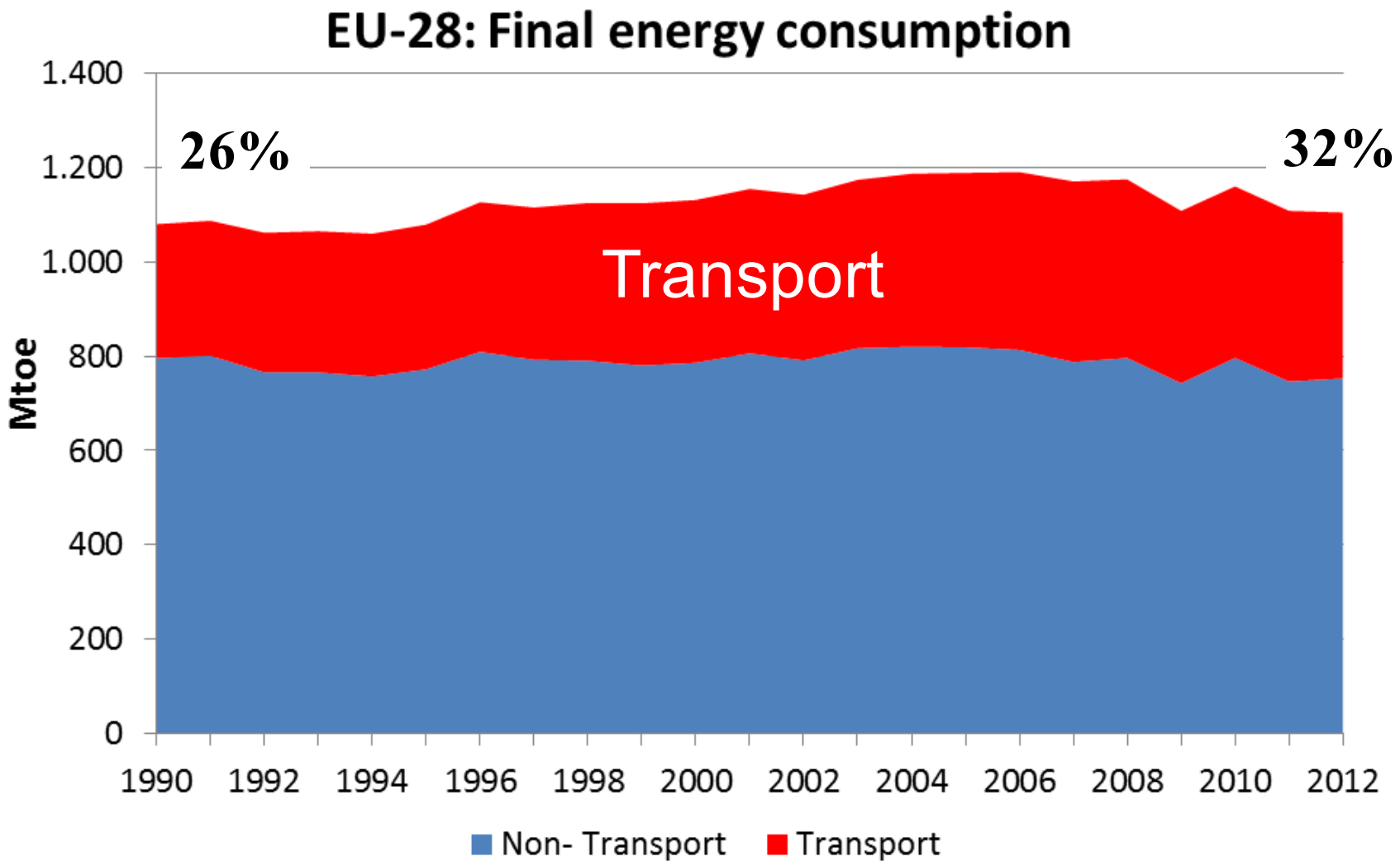
ON THE ENVIRONMENTAL BENIGNITY OF ELECTRIC VEHICLES

Amela Ajanovic, Reihard Haas
Energy Economics Group
Vienna University of Technology

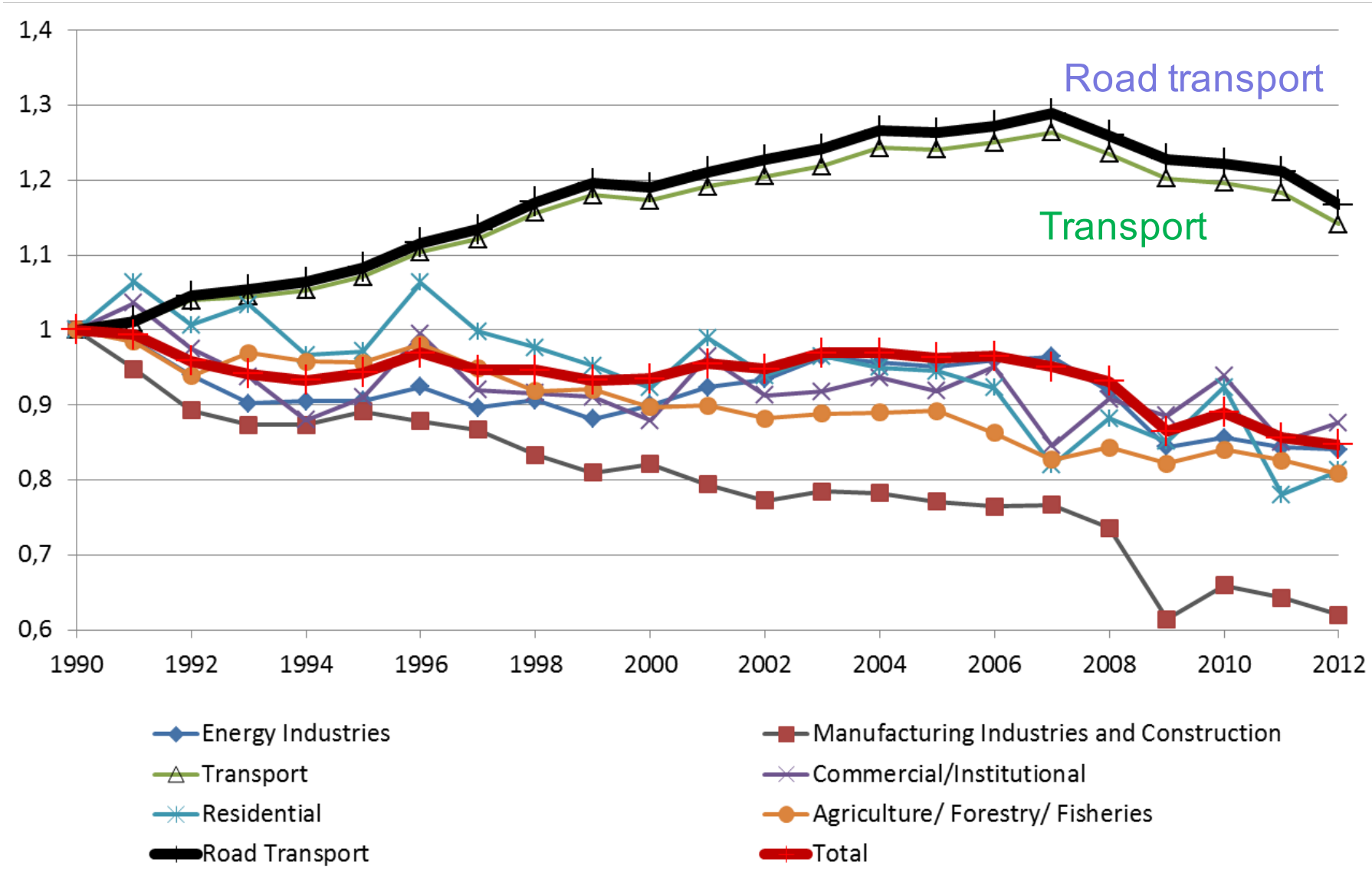
EnInnov
Graz, 2016

Content

- ✓ Introduction
- ✓ Electric vehicles
  - Economic and environmental assessment
- ✓ Policies
- ✓ Conclusions

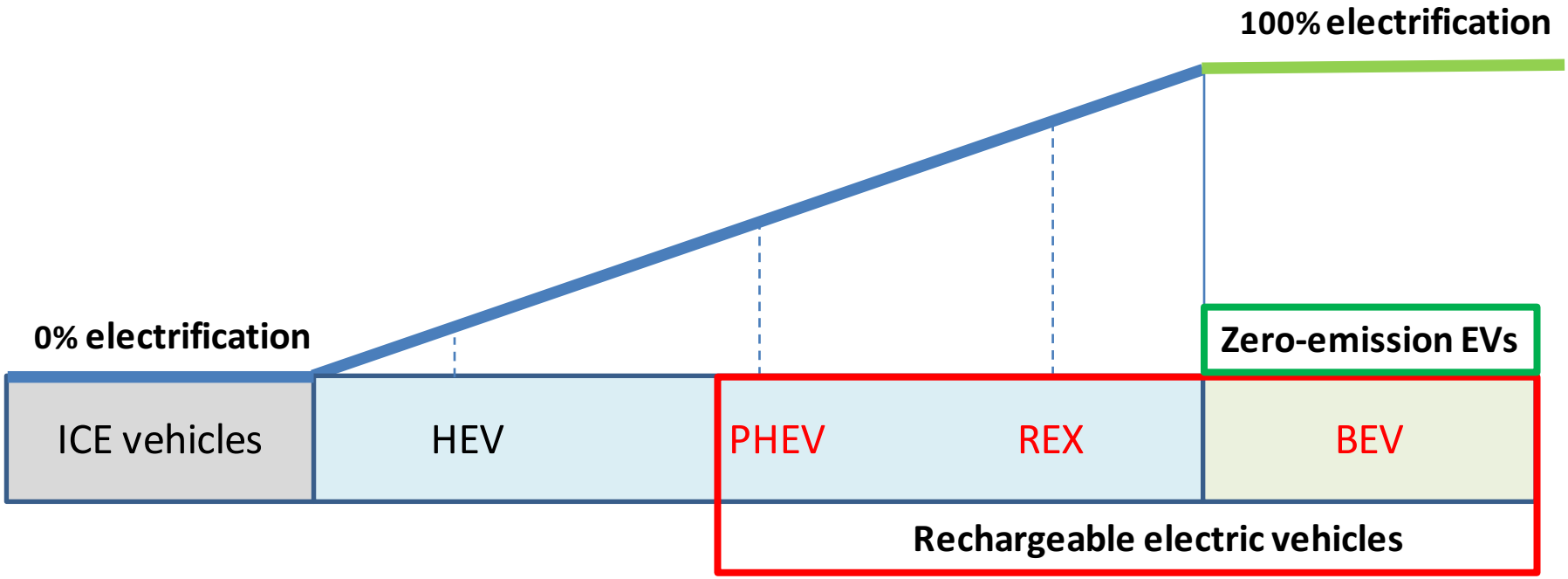

EU-28: Final energy consumption
1.400
1.200
1.000
800
600
400
200
0
Mtoe
26%
32%
Transport
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
Non- Transport
Transport

Introduction



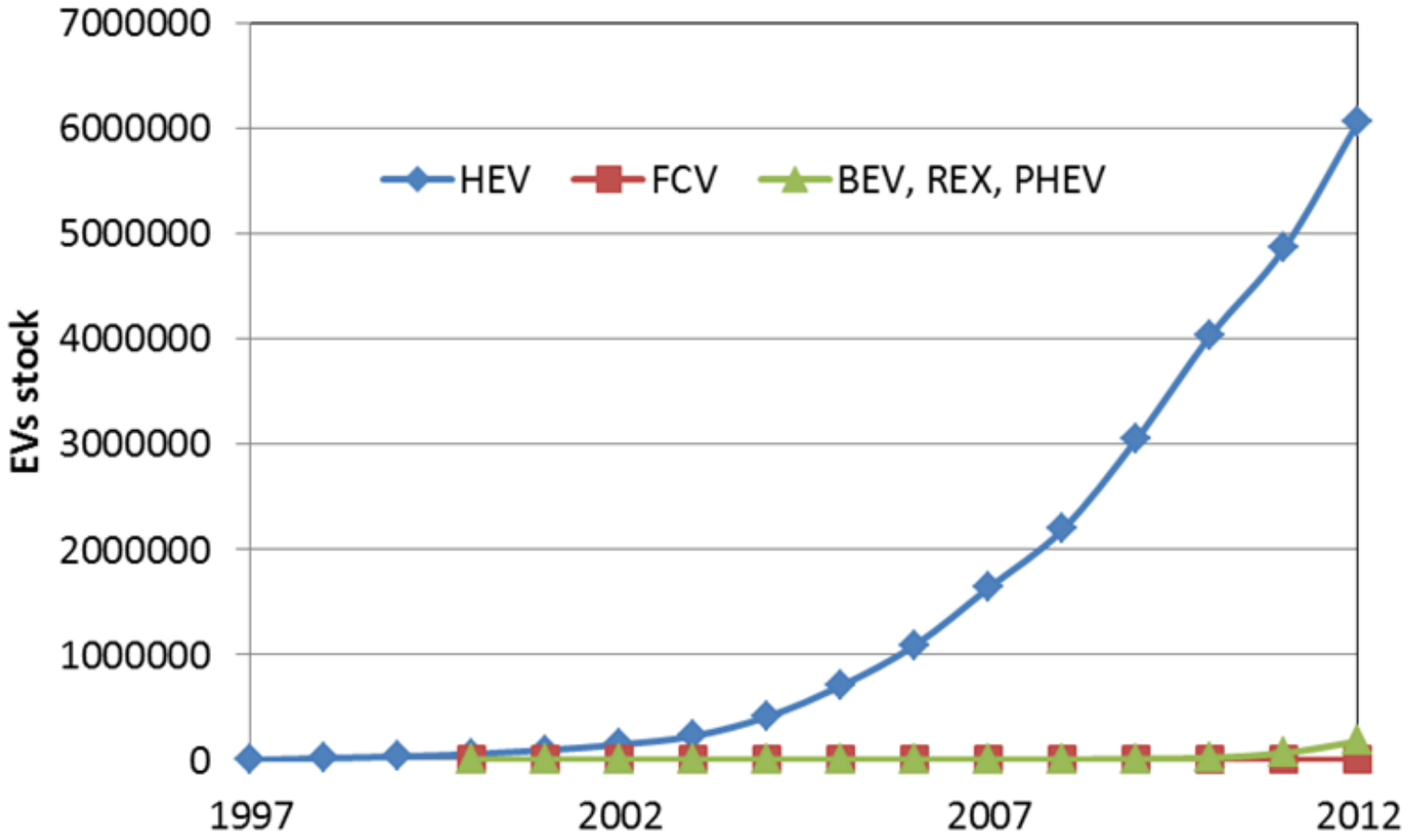
Development of GHG emissions in EU-28 countries (1990=1)

Electric vehicles



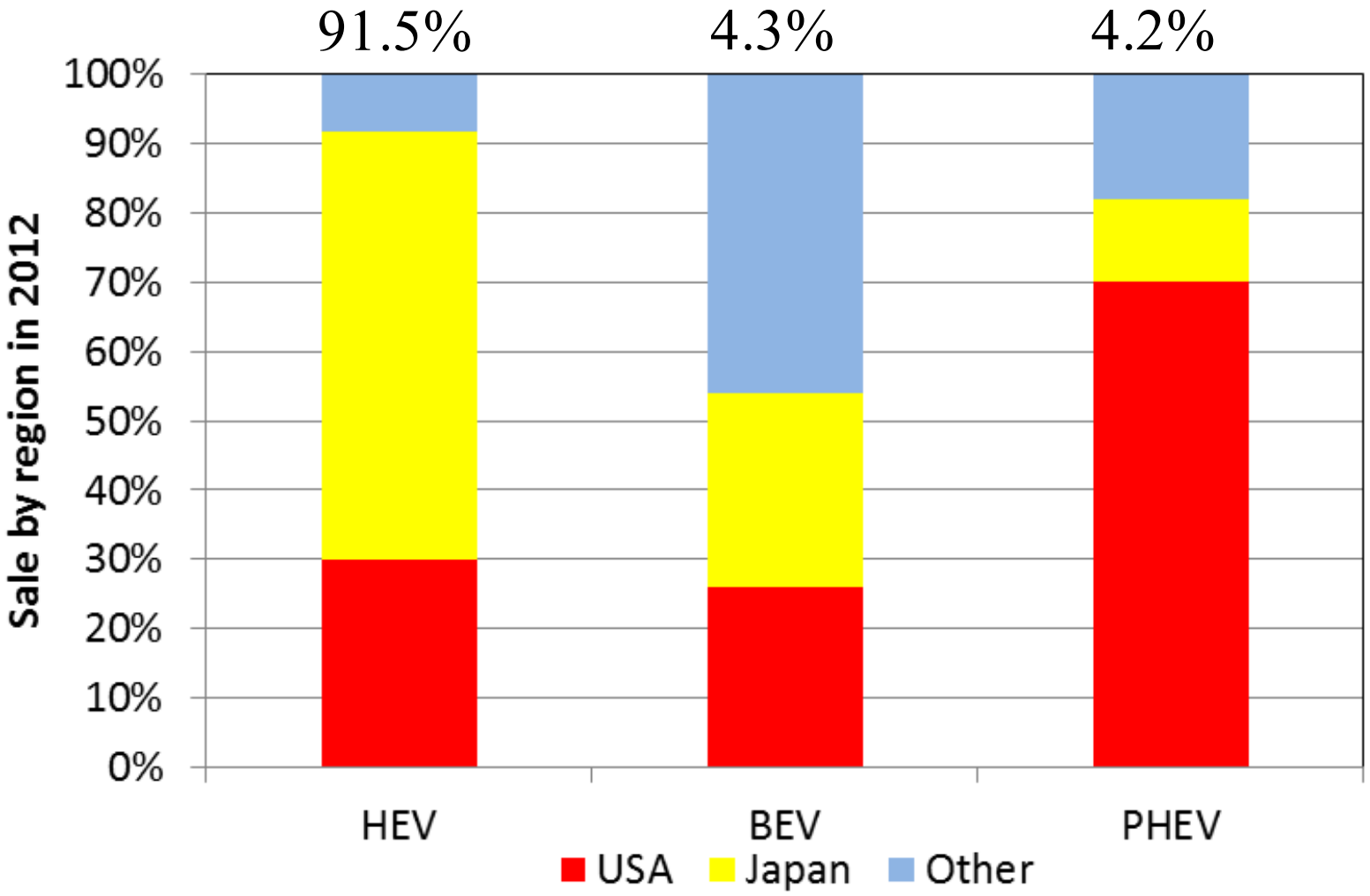
Level of electrification of electric vehicles

Global stock of EVs

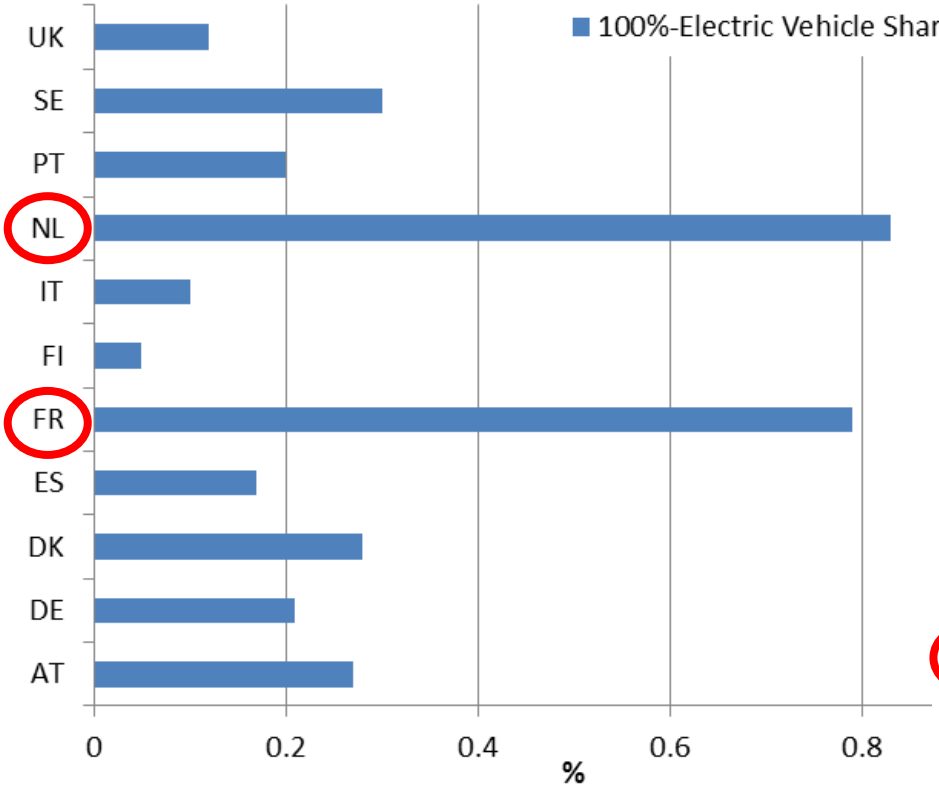


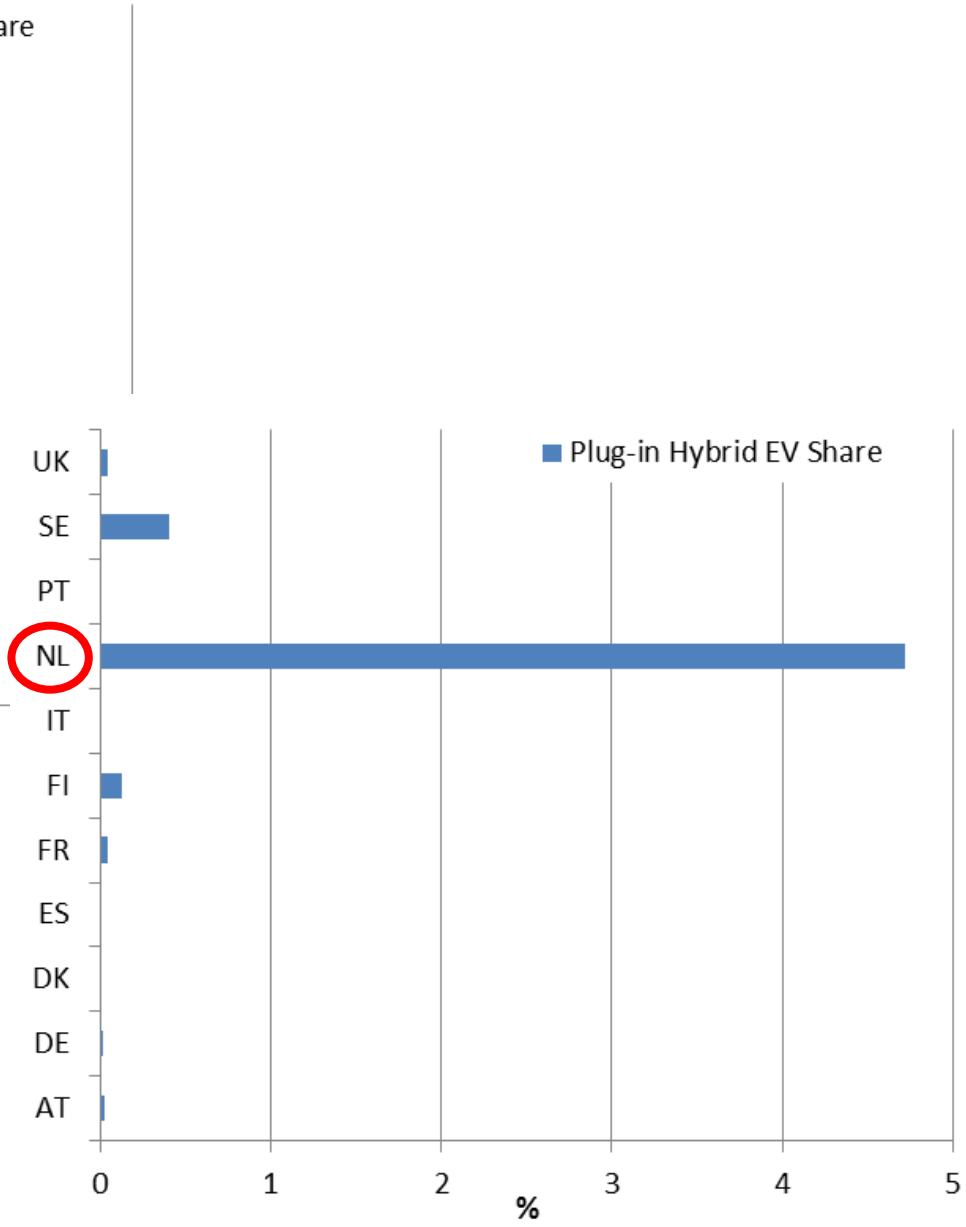
Development of the global stock of EVs

Sale of EVs in 2012

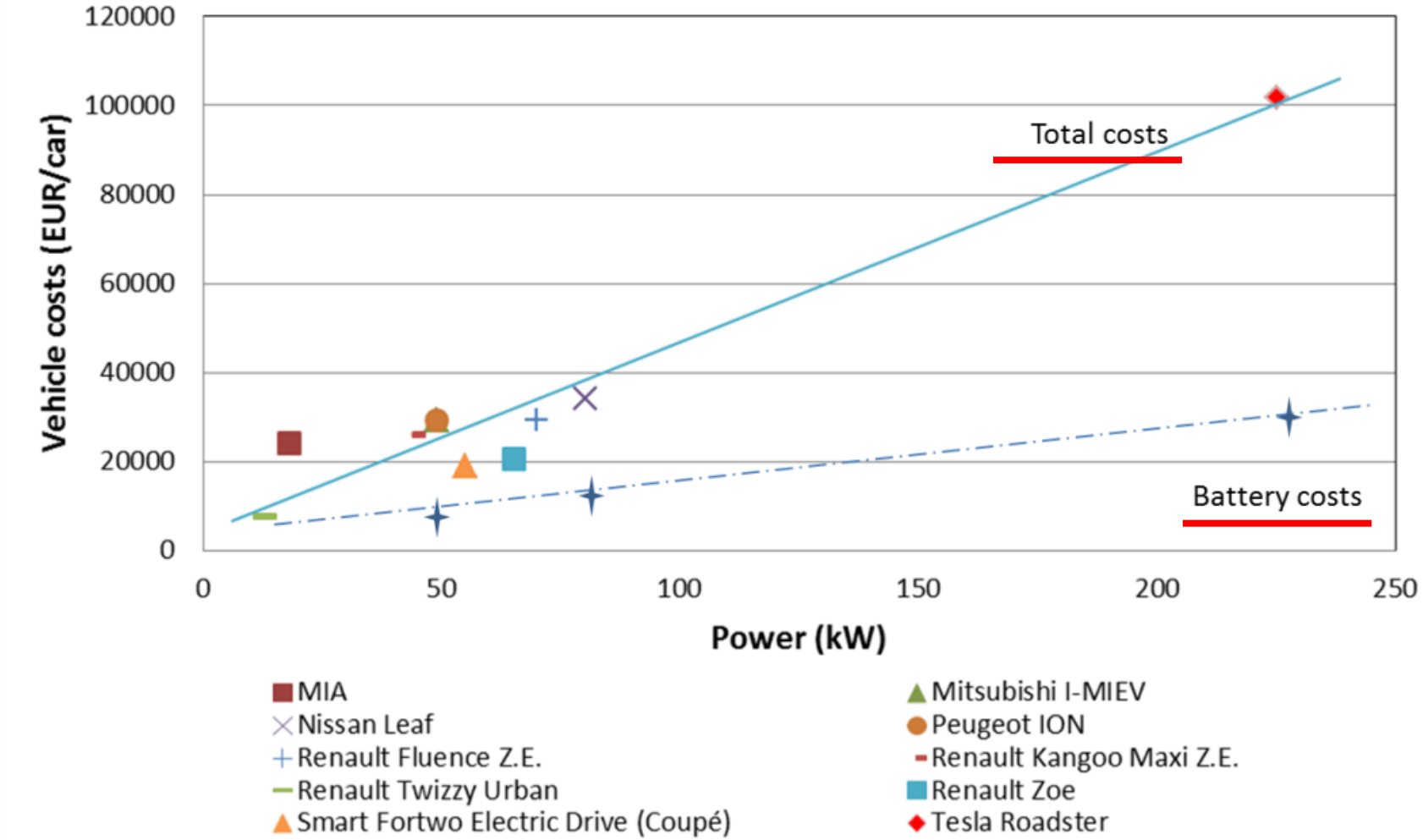


Share of electric vehicles



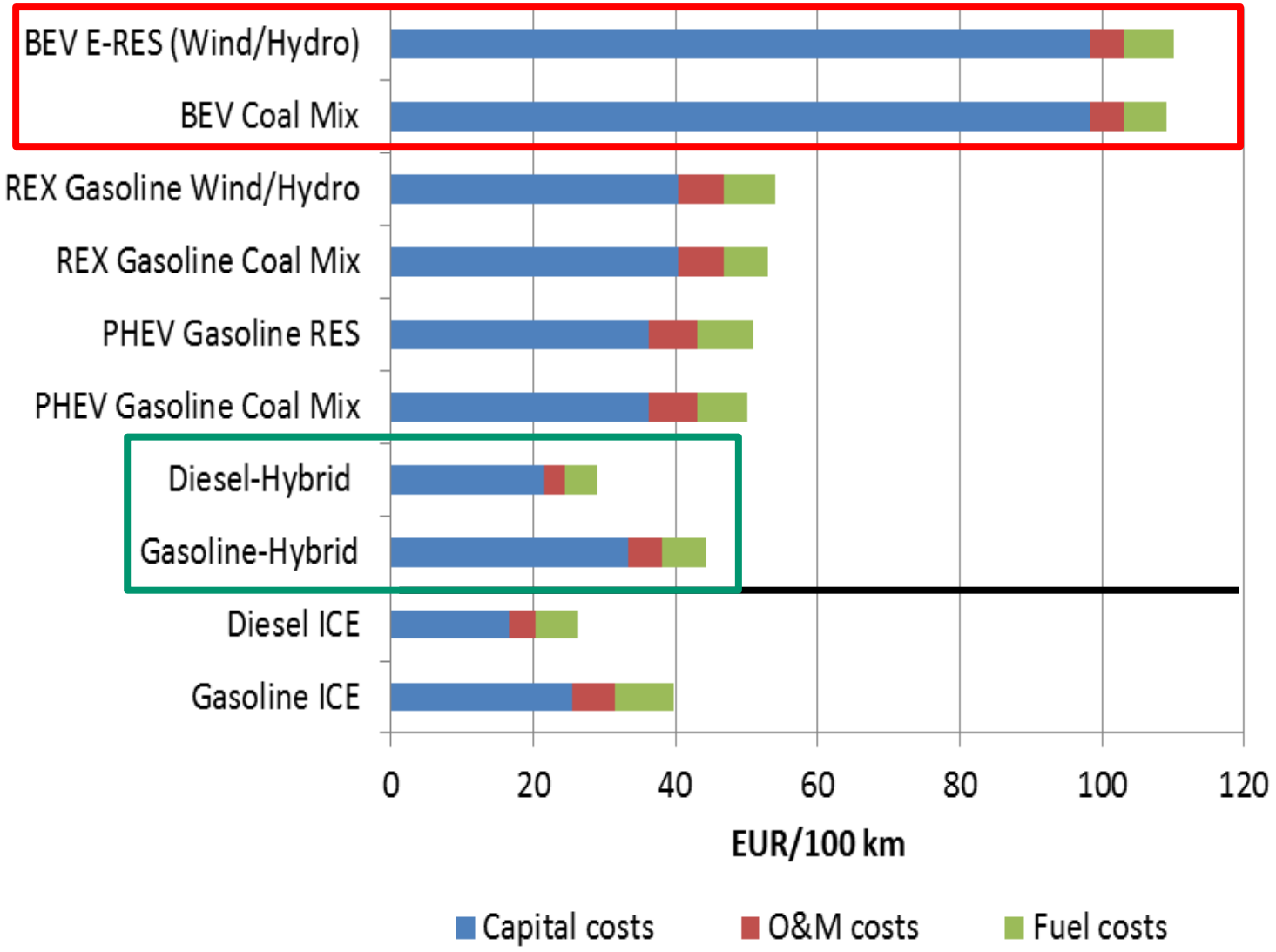


Costs of electric vehicles



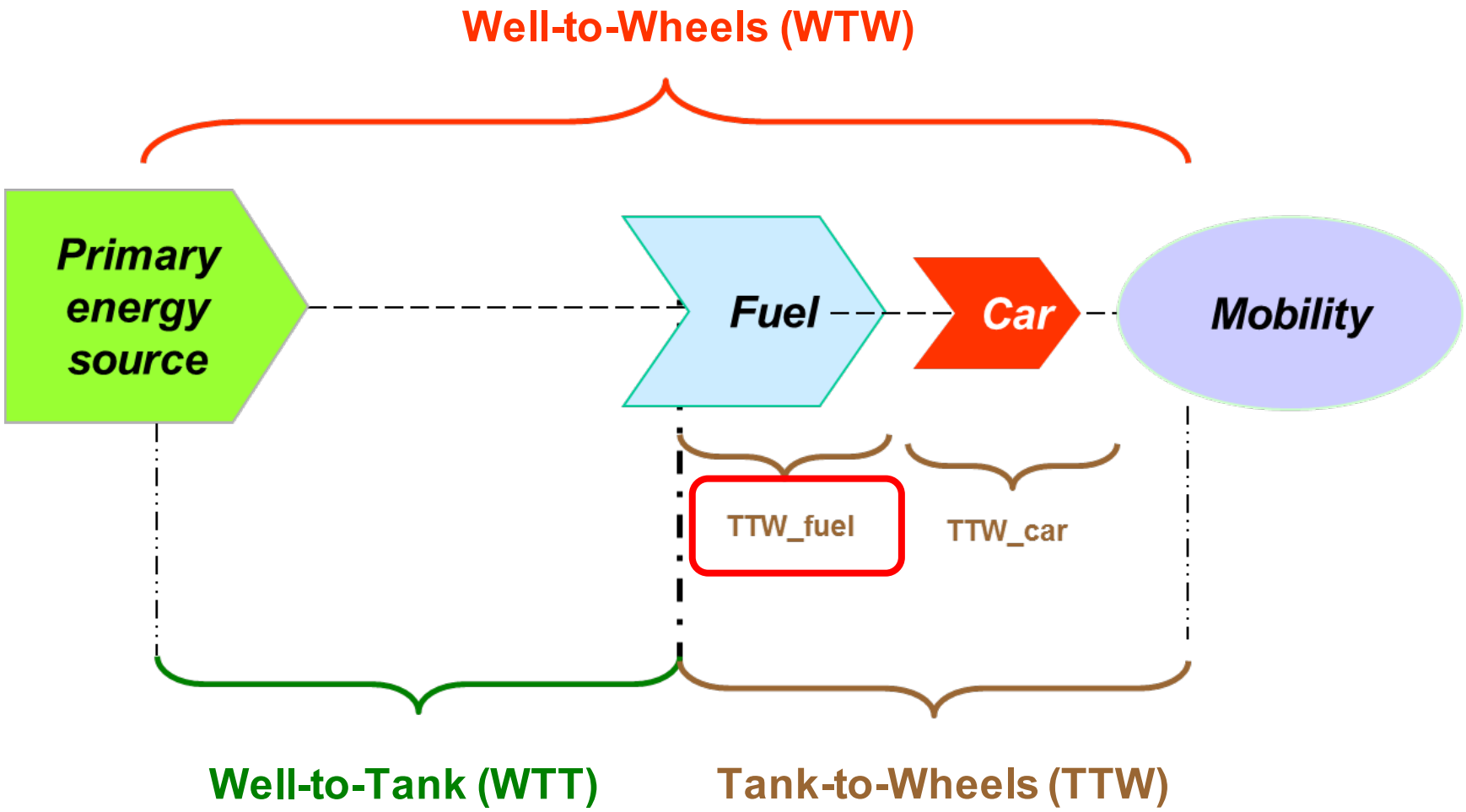
Total investment and battery costs of selected BEVs related to power of car

Economic assessment



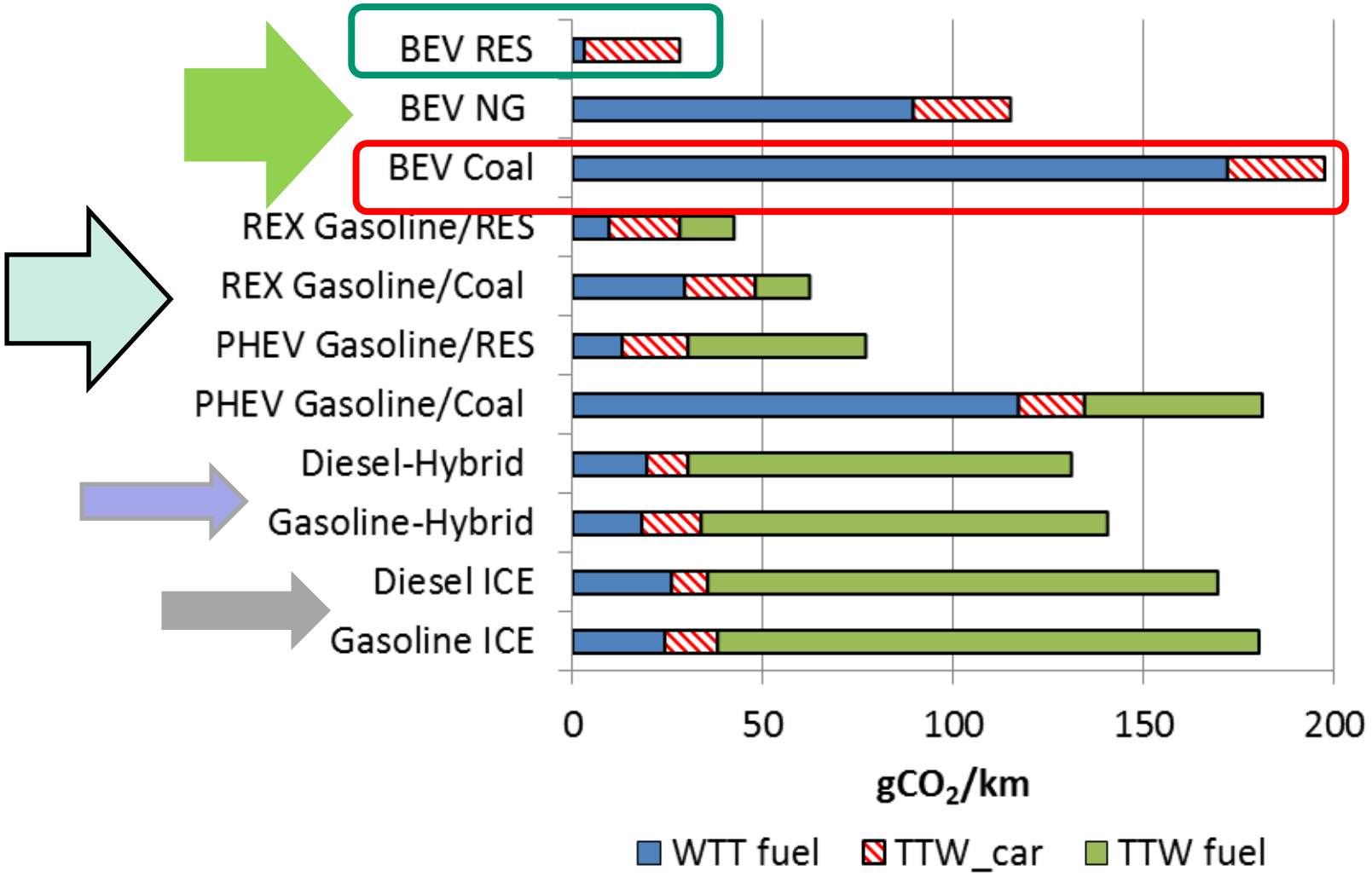
Total costs of service mobility per 100km driven in passenger cars

Environmental assessment



Energy supply chain

Environmental assessment



CO_2 emissions per km driven for various types of EVs in comparison to conventional cars (power of car: 80kW)

EU policies and targets

20-20-20

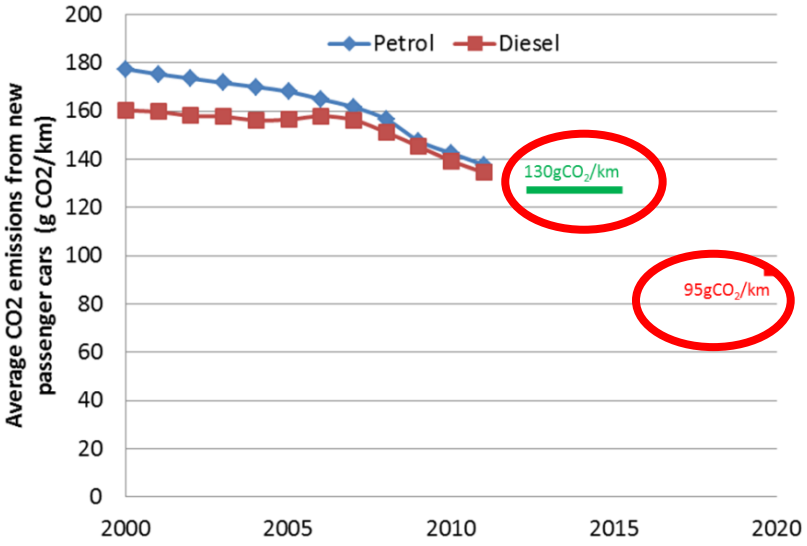
10%

40-27-27

ICE -50% in city

No ICE in city

2009 2010 2015 2020 2030 2050



20% GHG (2008)

60% GHG (1990)

The White Paper on Transport Policy

Monetary measures

In Europe, the most commonly used monetary measures are subsidies and exemptions (or reductions) from:

- road taxes (e.g., in DE, DK, CZ)
- annual circulation tax (e.g., in DE, GR, NO, SE,UK)
- company car tax (e.g., in FR, UK)
- registration tax (e.g., in NO, BE,DE, FI, NL)
- fuel consumption tax (e.g., in AT)
- congestion charges (e.g., in NO, SE, UK)

Non-monetary measures

The most important non-monetary measures are:

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

Electricity-specific factors

	Electricity-specific factors (gCO_2/kWh)
Austria	176.80
Belgium	224.77
Germany	672.22
Denmark	474.75
Finland	225.46
France	70.93
Greece	1921.09
Ireland	521.19
Italy	410.90
Netherlands	413.30
Norway	2.24
Portugal	400.15
Sweden	23.03
United Kingdom	508.50

Brander et al, 2011

Greece

- a carbon intensity of electricity mix in Greece is very high

MONETRAY MEASURES:

- EVs: exemption from the registration tax and the luxury tax

- EVs and HEVs with an engine capacity up to 1,929 cc are exempt from the annual circulation tax;

- HEVs with a higher engine capacity pay 50% of the normal circulation tax rate.

Norway

- MONETRAY MEASURES: EVs are exempted from registration tax, VAT, annual car tax, road toll and congestion charges

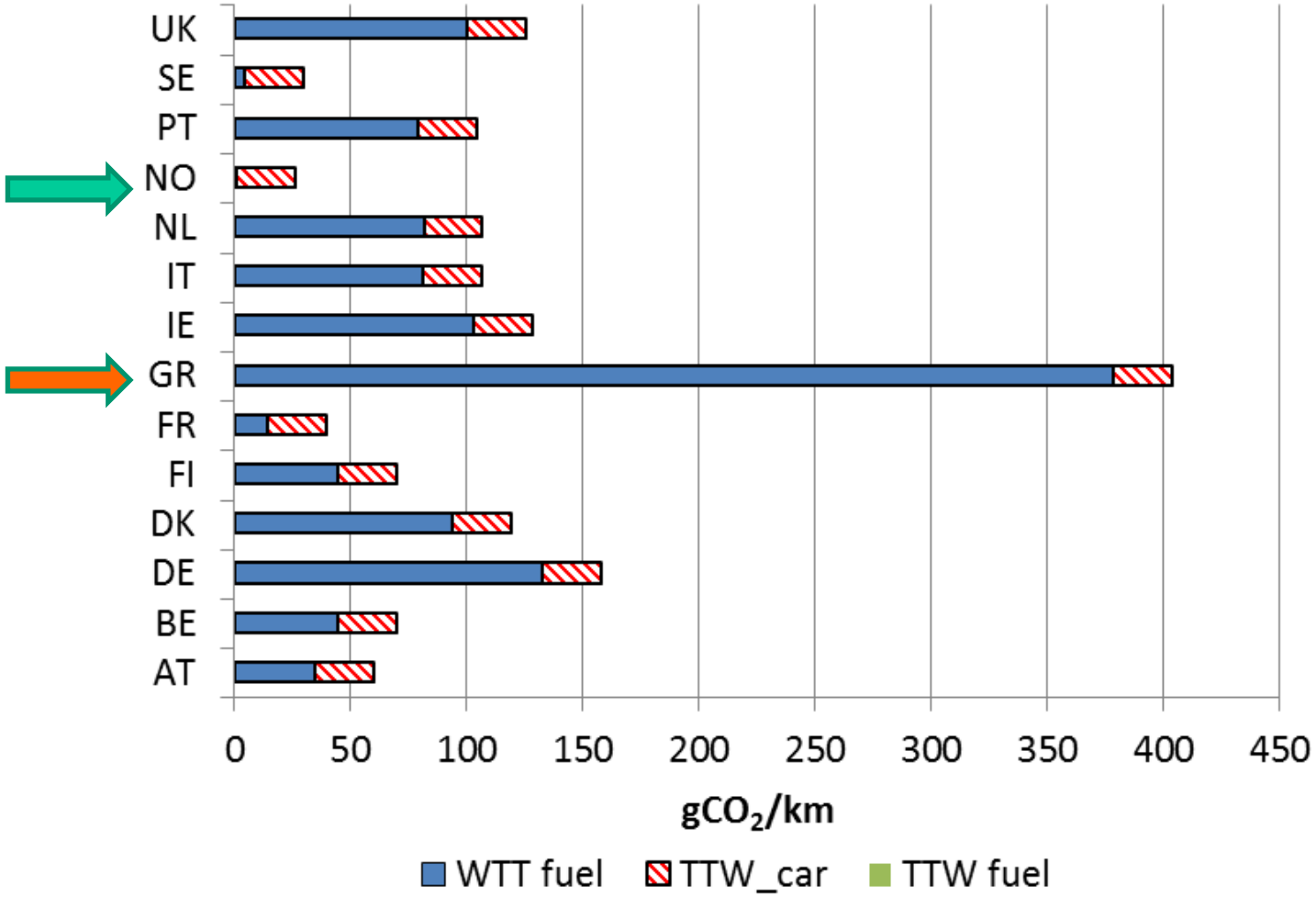
- NON-MONETRAY MEASURES: in Oslo drivers of EVs have access to bus lanes and free parking spaces

- INFRASTRUCTURE: a good public charging network is provided, about 10000 charging stations

- PRICE: gasoline price is very high, and electricity price is relatively low

- a carbon intensity of electricity mix in Norway is very low

Environmental assessment



CO_2 emissions per km driven for BEVs powered by grid electricity in different countries

Conclusions

- For broader penetration of electric vehicles …cost reductions, improvement of battery characteristics as well as development of infrastructure

- Different policies and measures are implemented to increase attractiveness of EVs ….most of the policies implemented will be abolished with the increasing number of EVs

Conclusions

- The final goal is not just to increase number of EVs, the goal is to reduce GHG emissions and air pollution
- Full environmental benefit – only if EVs are powered by electricity generated from renewable energy sources

Energy Economics Group

TU VIENNA
TECHNISCHE UNIVERSITÄT WIEN
VIENNA UNIVERSITY OF TECHNOLOGY

ajanovic@eeg.tuwien.ac.at