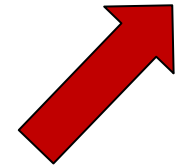
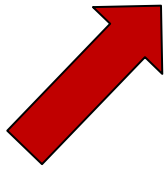
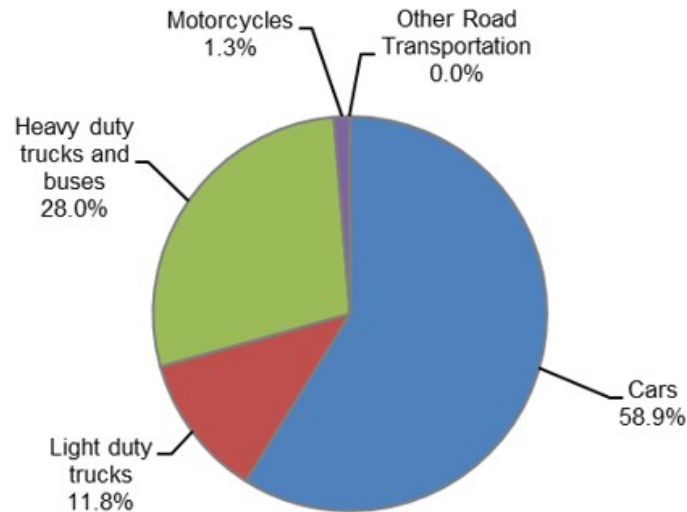
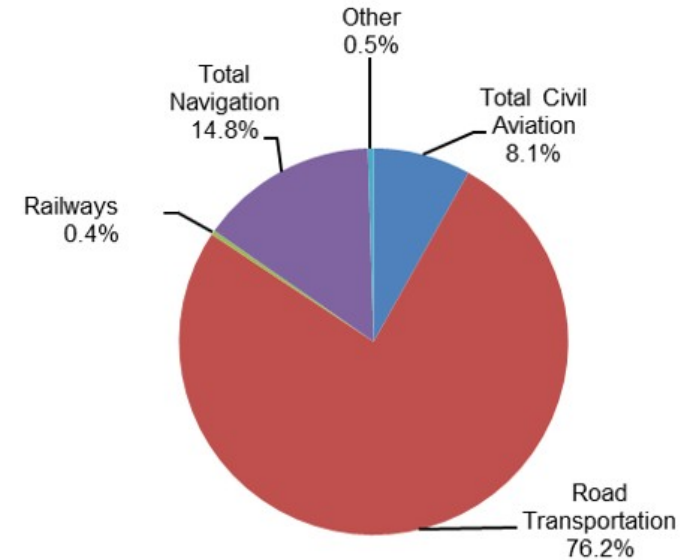
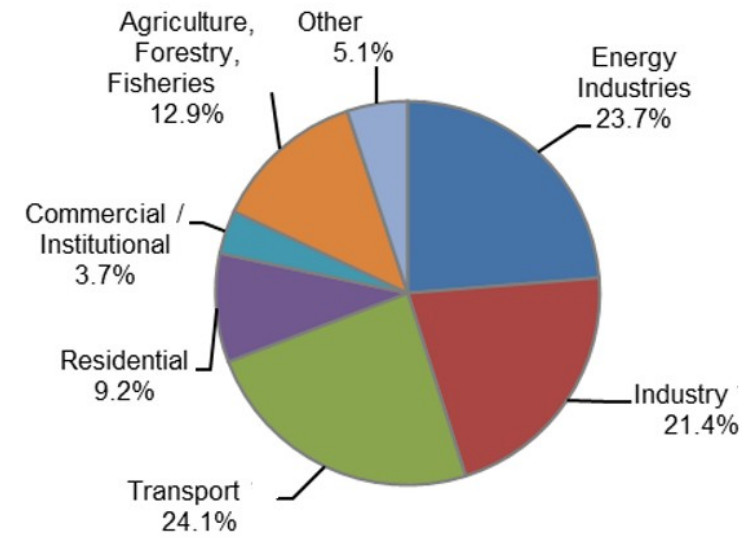


The future challenges for electric passenger cars

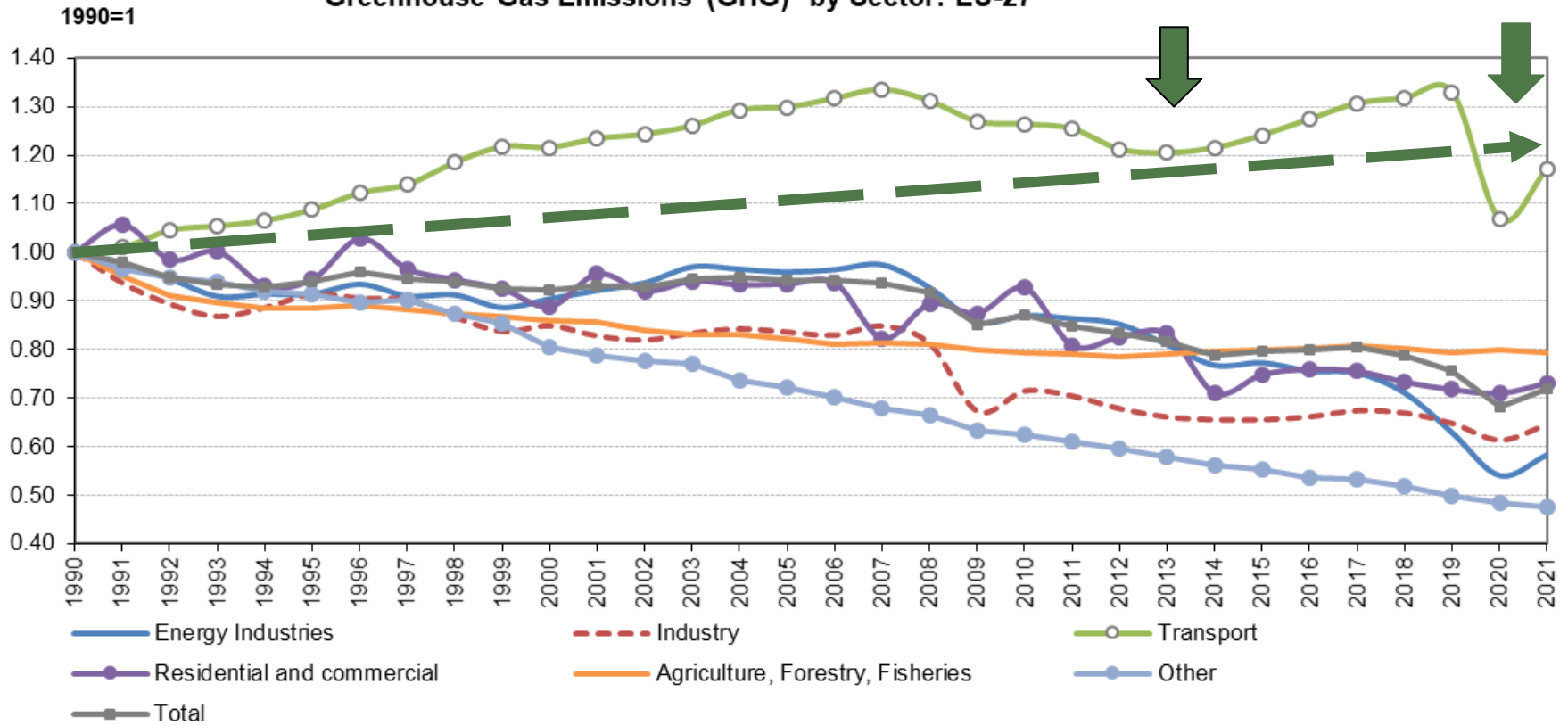
Amela Ajanovic
Energy Economics Group
TU WIEN

**18. Symposium Energieinnovation,
14.-16.02.2024, Graz/Austria**

- Introduction
- Policy framework
- Electric vehicles
 - Major advantages and challenges
- Conclusion



Greenhouse Gas Emissions (GHG) by Sector: EU-27



EU - the first climate-neutral continent by 2050

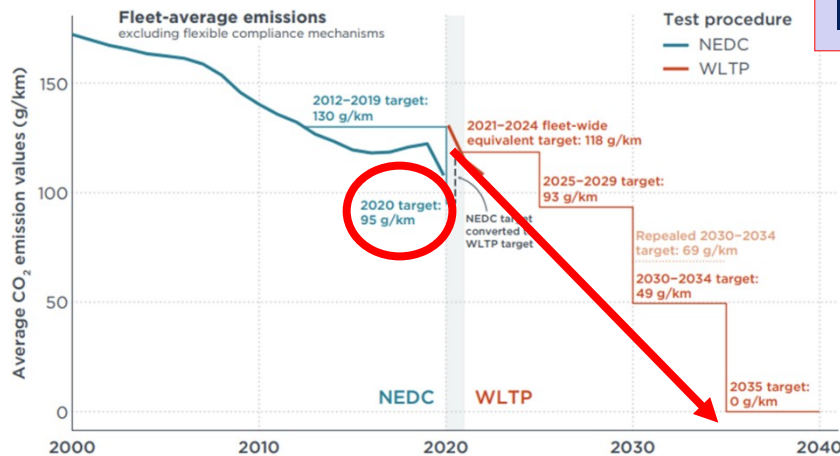
European Green Deal

RED III: at least 29% renewables in the final energy consumption in the transport sector by 2030

Sustainable and Smart Mobility Strategy

at least 30 million zero-emission cars will be in operation on European roads

nearly all cars, vans, buses as well as new heavy-duty vehicles will be zero-emission.



ICE -50% in city

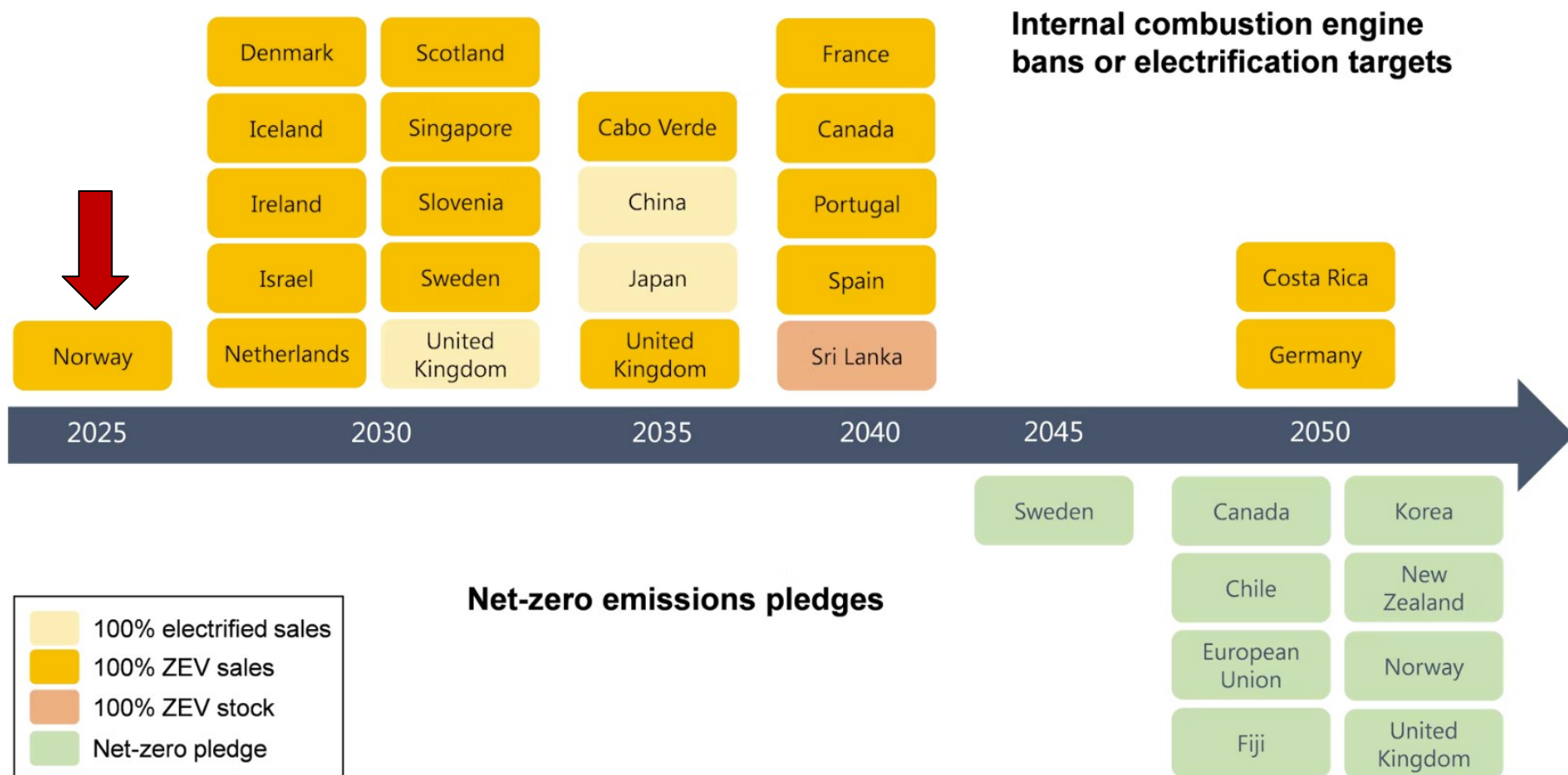
20% GHG (2008)

No ICE in city

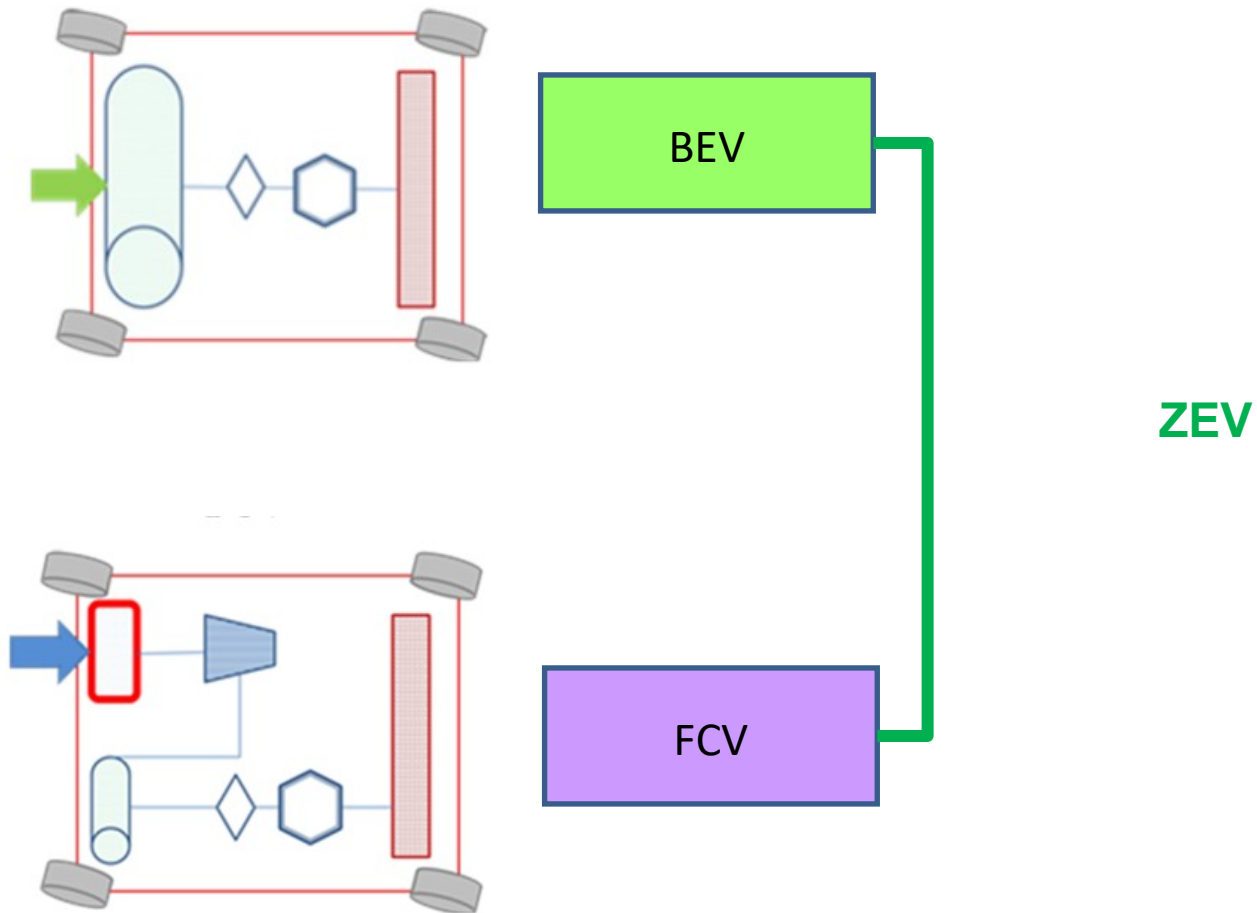
60% GHG (1990)

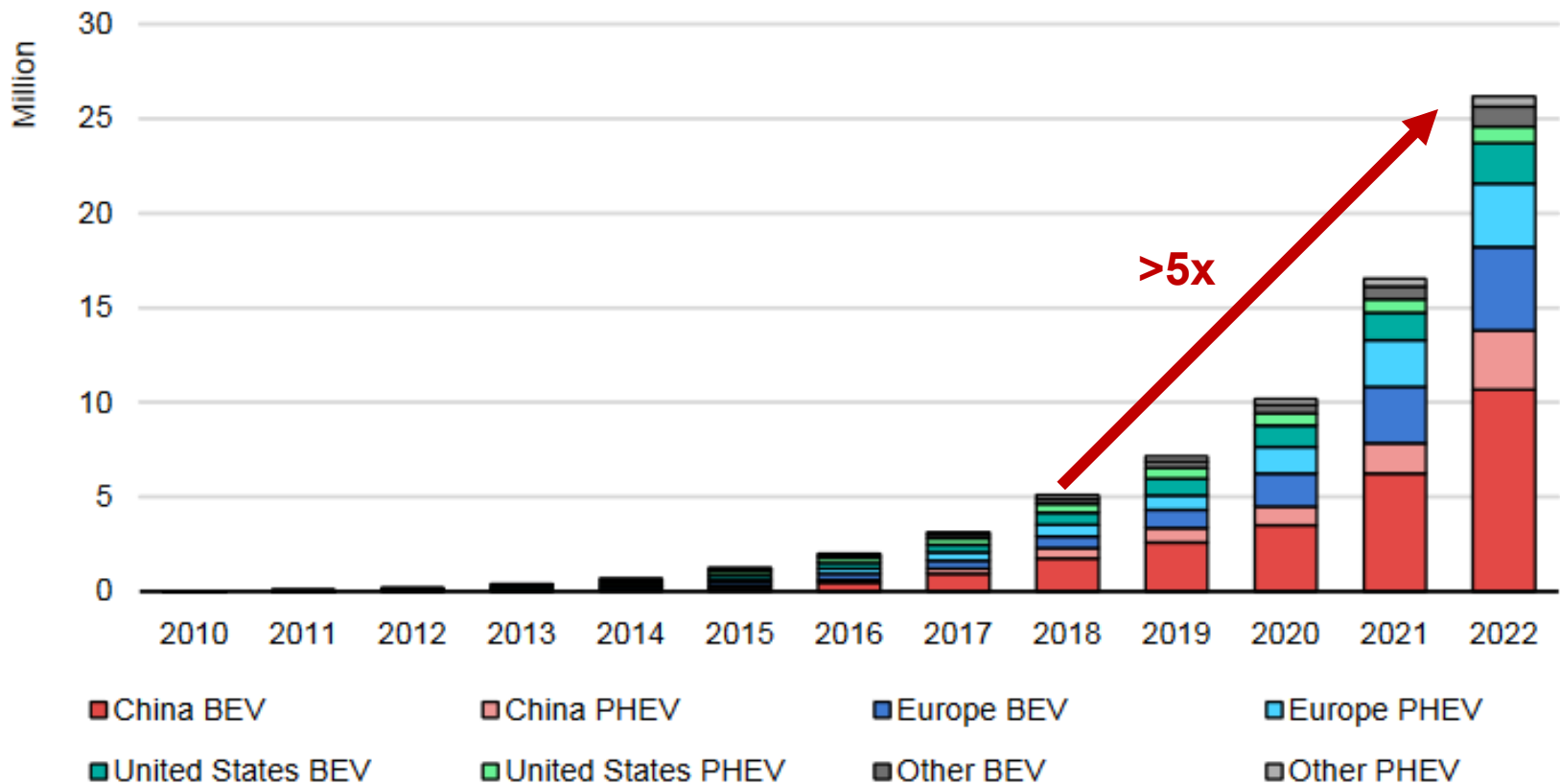
Transport White Paper

Announced 100% ZEV sales targets and bans on ICE vehicle sales



Zero-emission vehicles

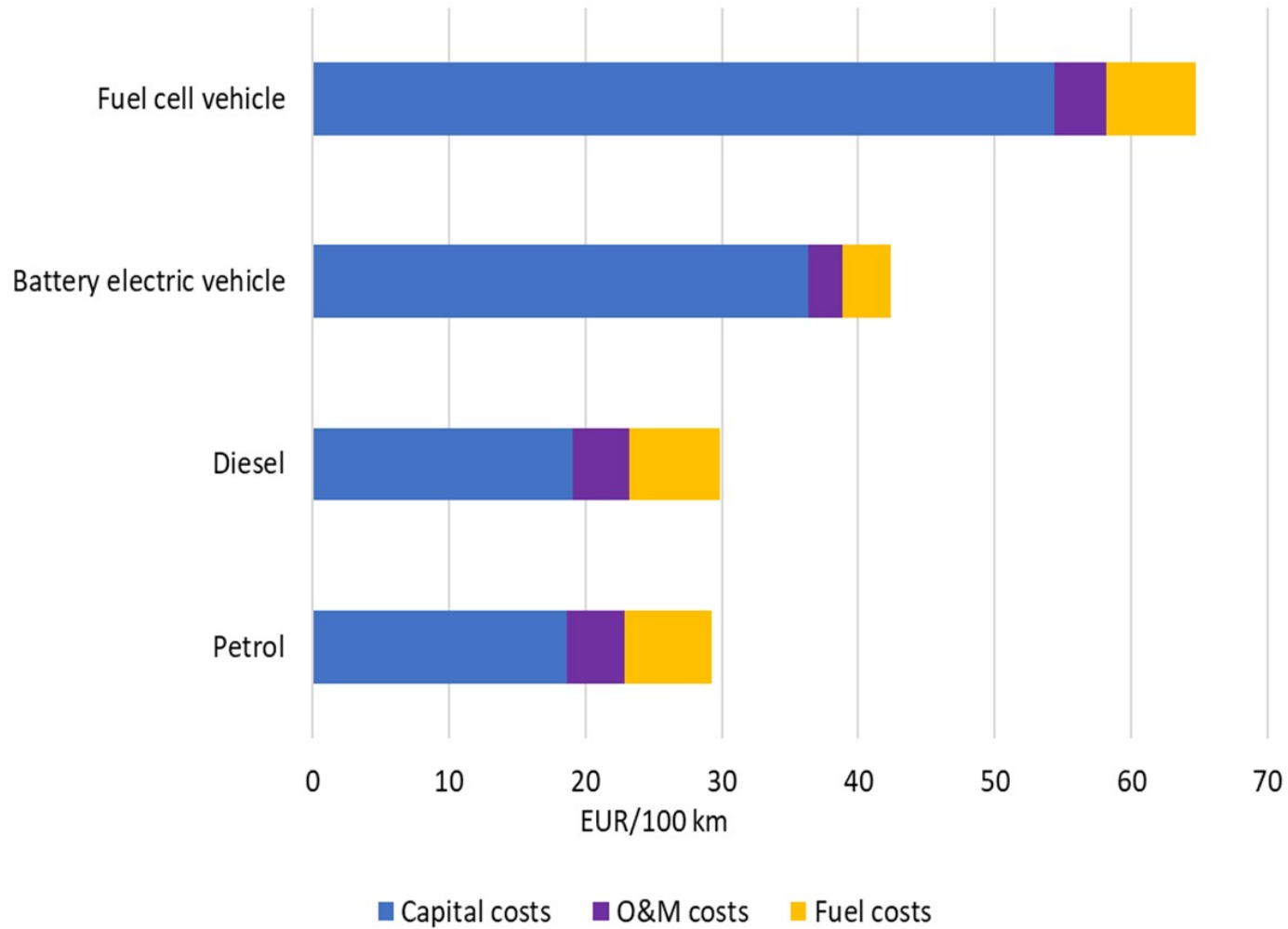




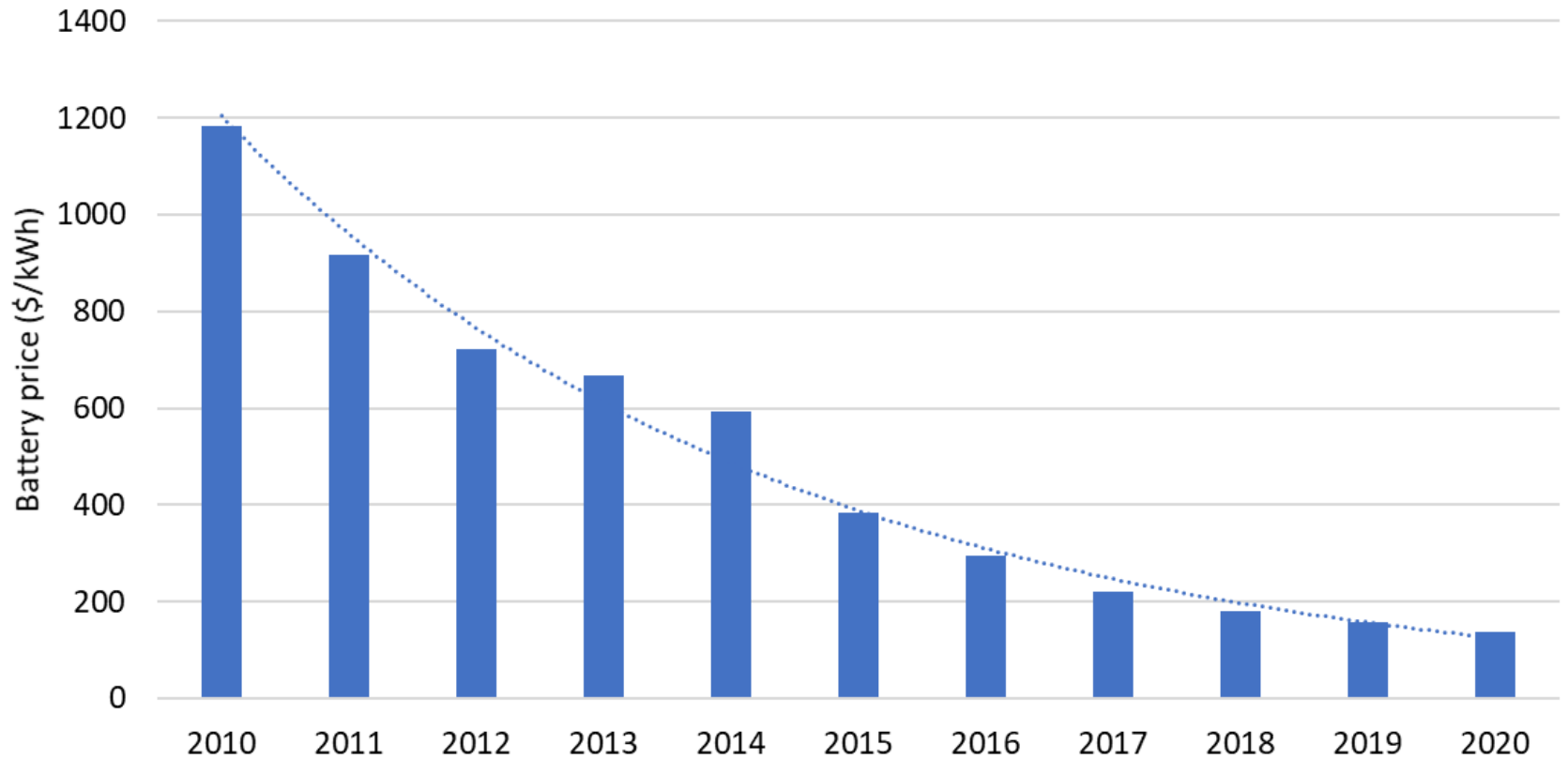
IEA. CC BY 4.0.

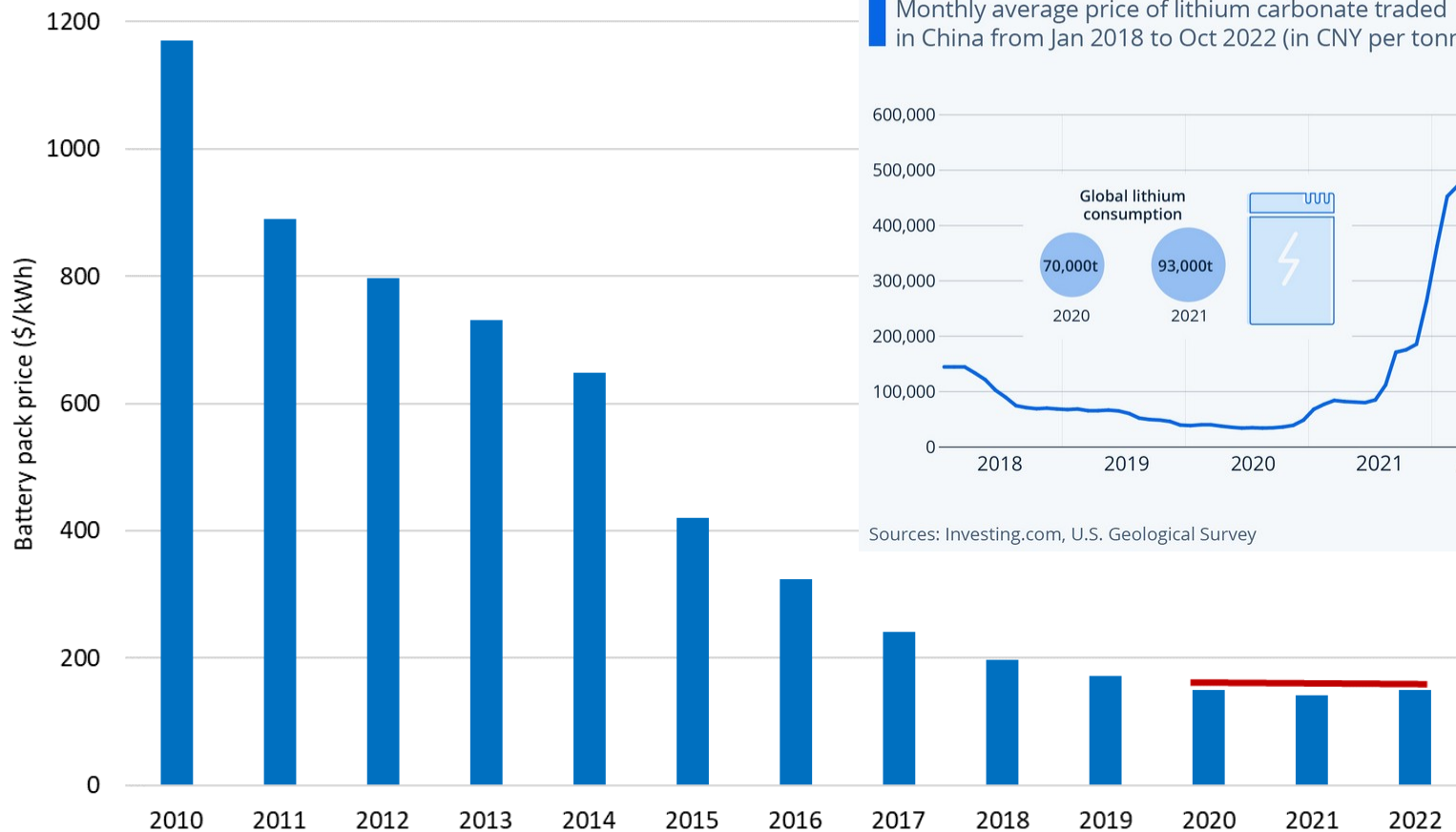
Over 26 million electric cars were on the road in 2022

Electric vehicles

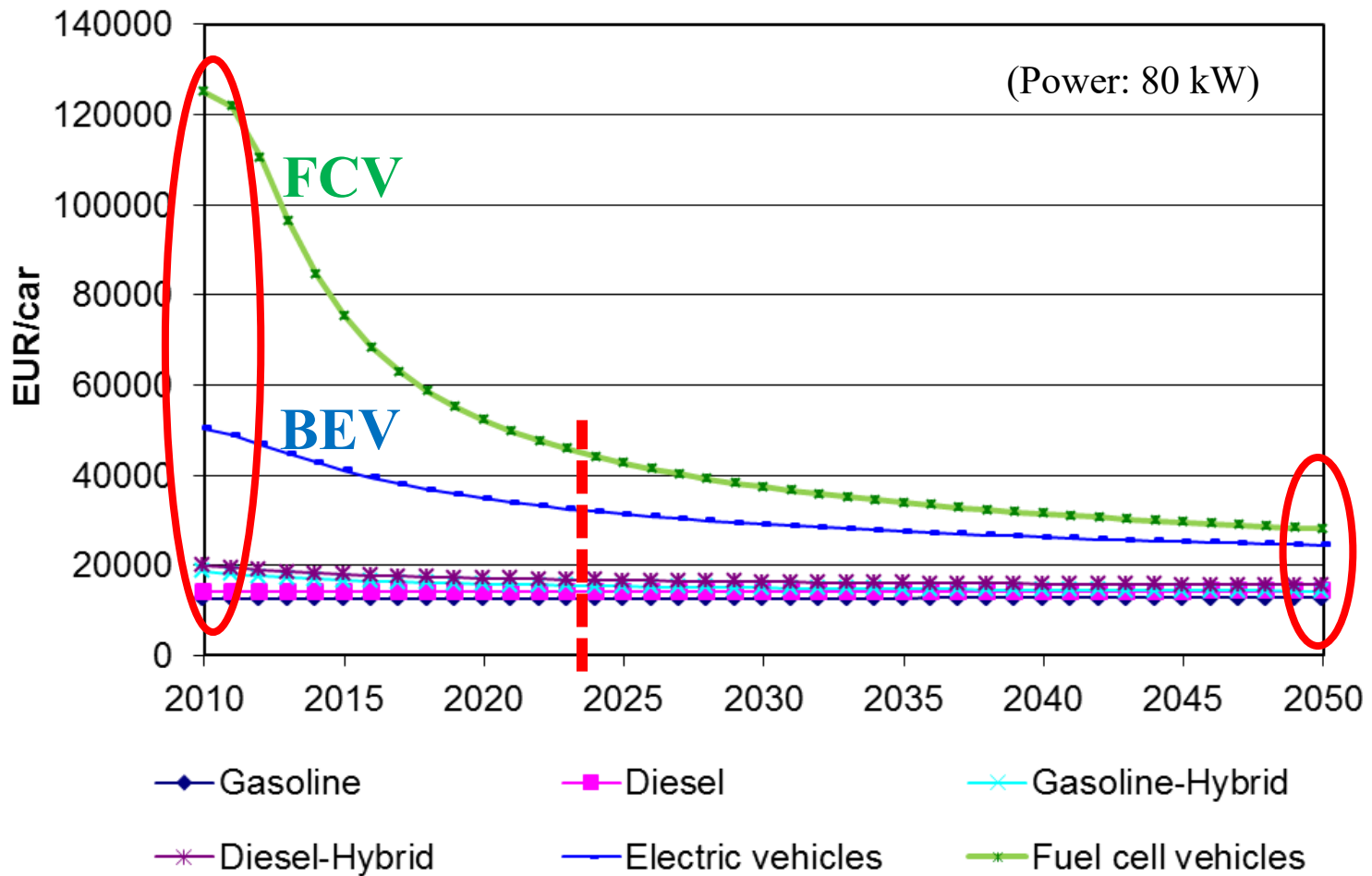


Battery pack prices





Scenario for development of investment costs



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.

EV sales in the EU

~ **73%** of all EU electric car sales are concentrated in just four Western European countries with some of the highest GDPs : **Sweden, the Netherlands, Finland and Denmark**

Electric cars **< 3% of total sales**
= average GDP **< €17,000**

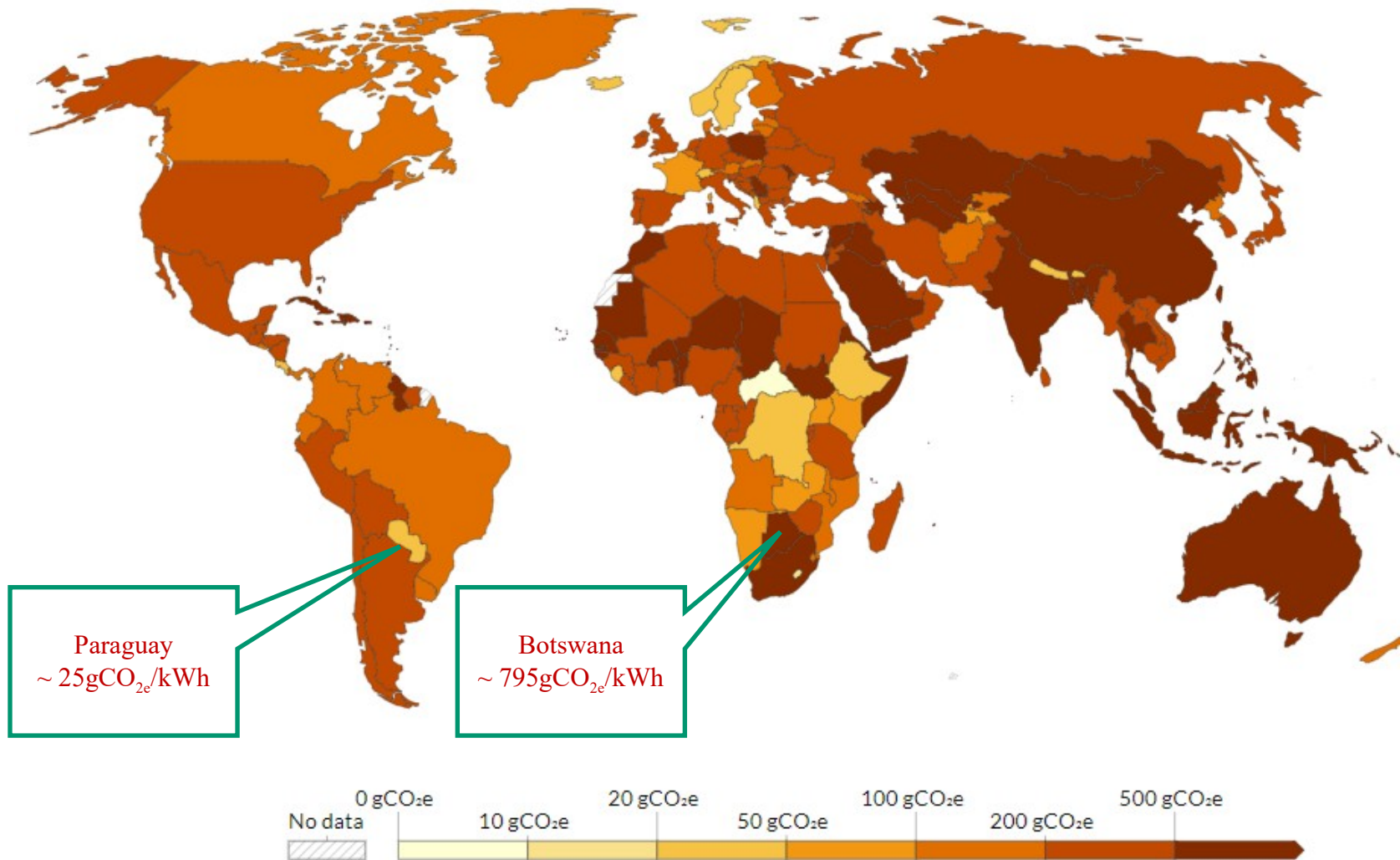
Electric cars **> 15% of total sales**
= average GDP **> €46,000**

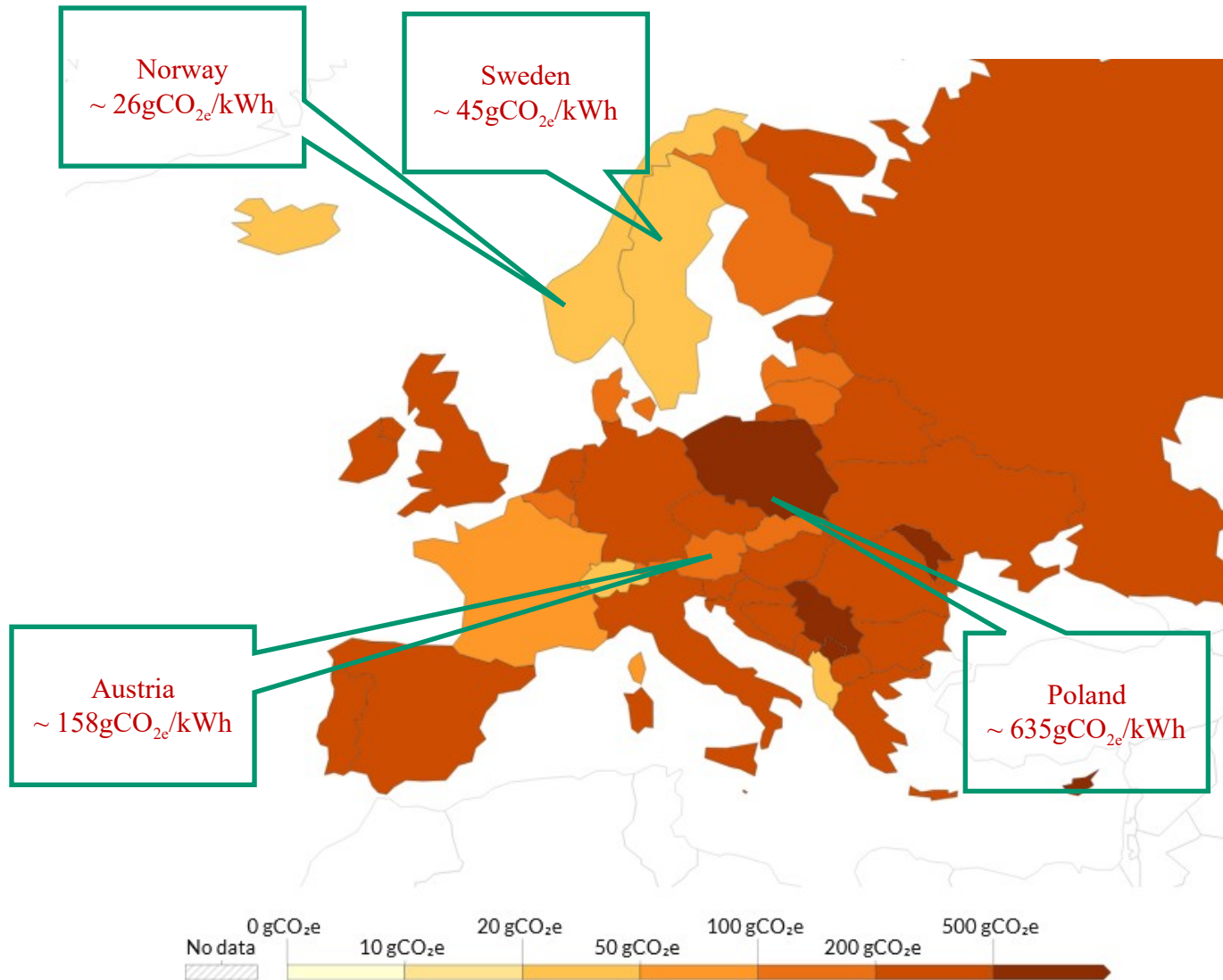
Charging infrastructure in the EU

~ **50%** of all charging points for electric cars in the EU are concentrated in only two countries – **the Netherlands** (90,000 chargers) and **Germany** (60,000).



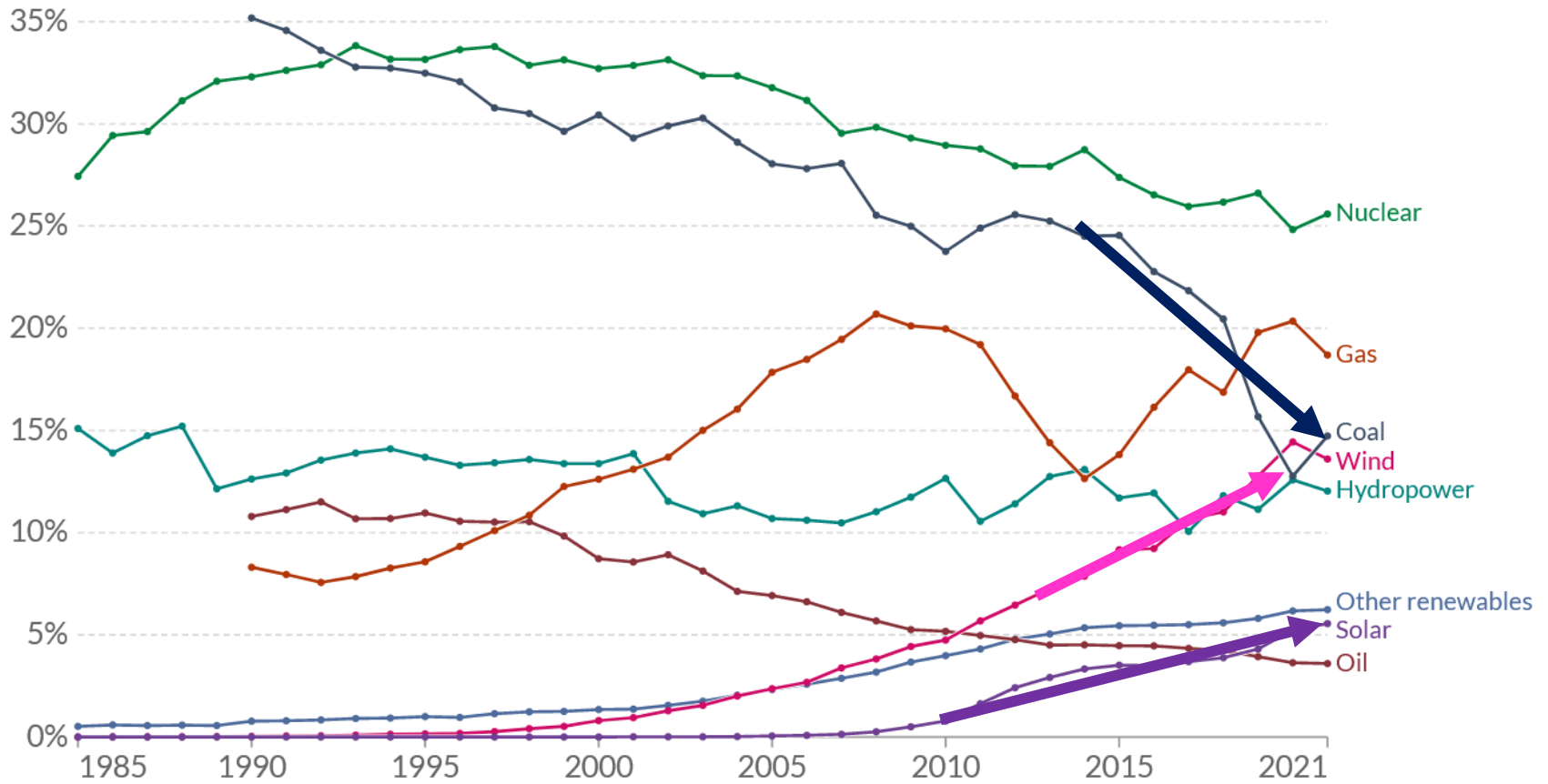
Artist: Marian Kamensky

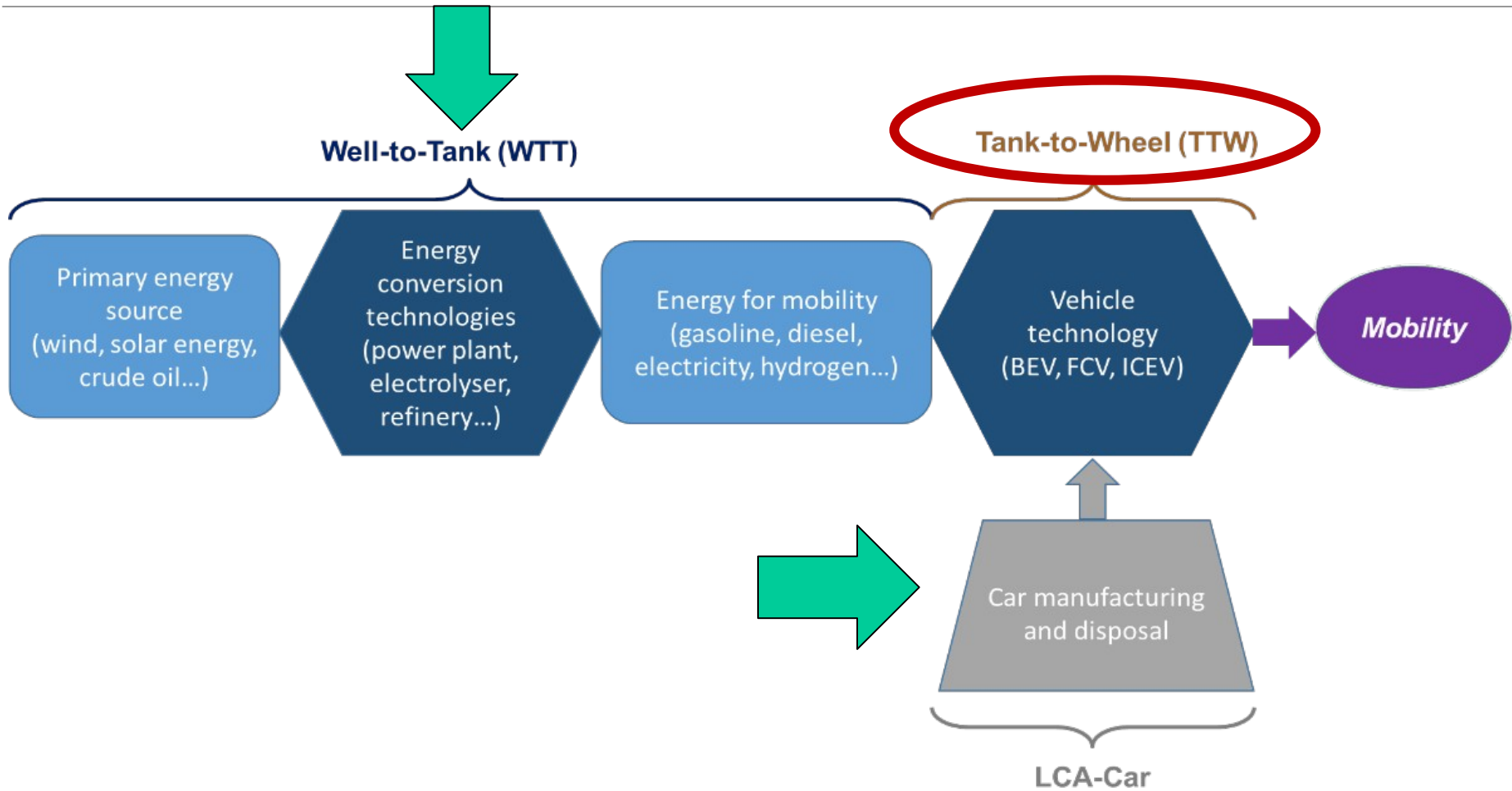




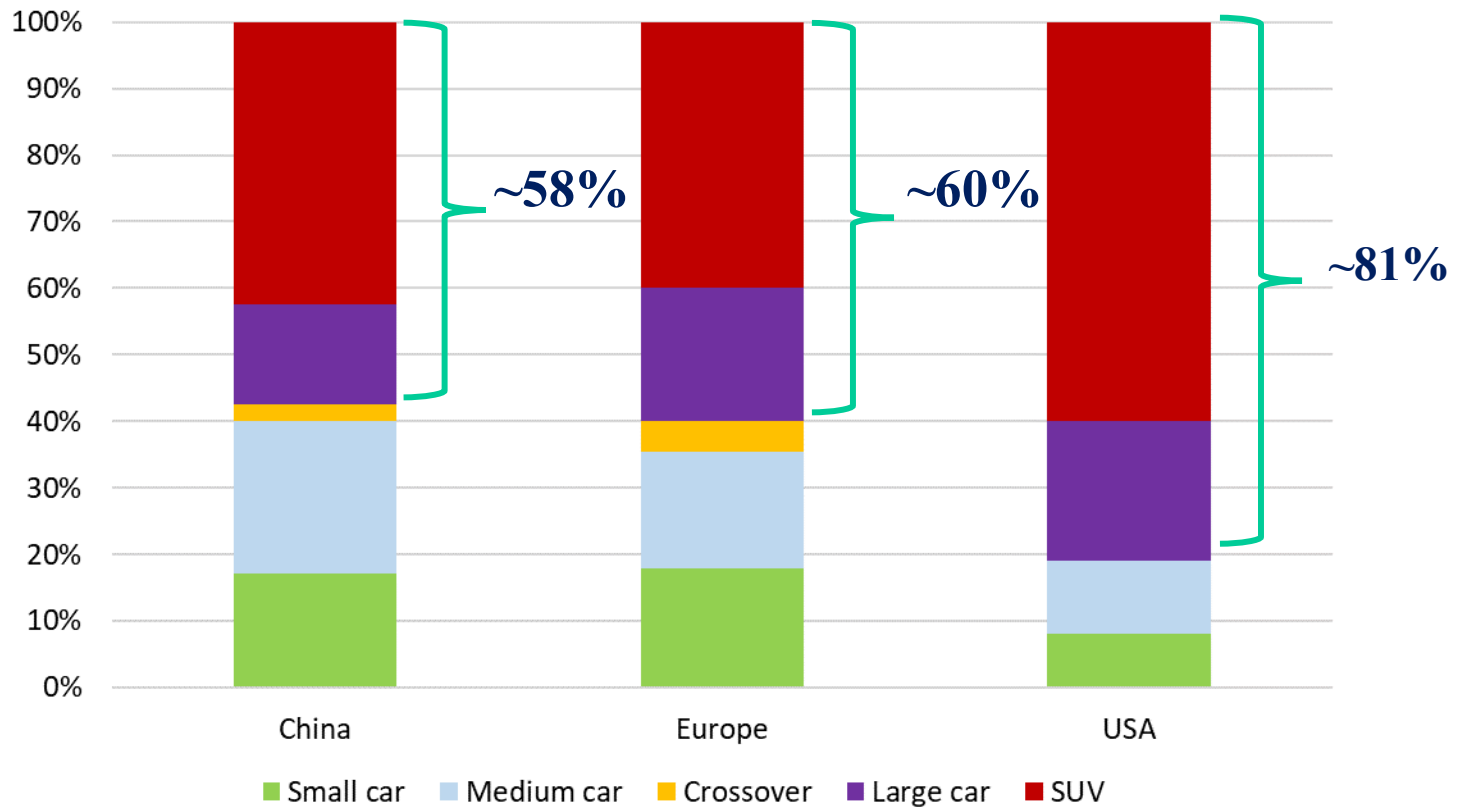
Carbon intensity is measured in grams of carbon dioxide-equivalents emitted per kilowatt-hour of electricity.

Share of electricity production by source, EU-27

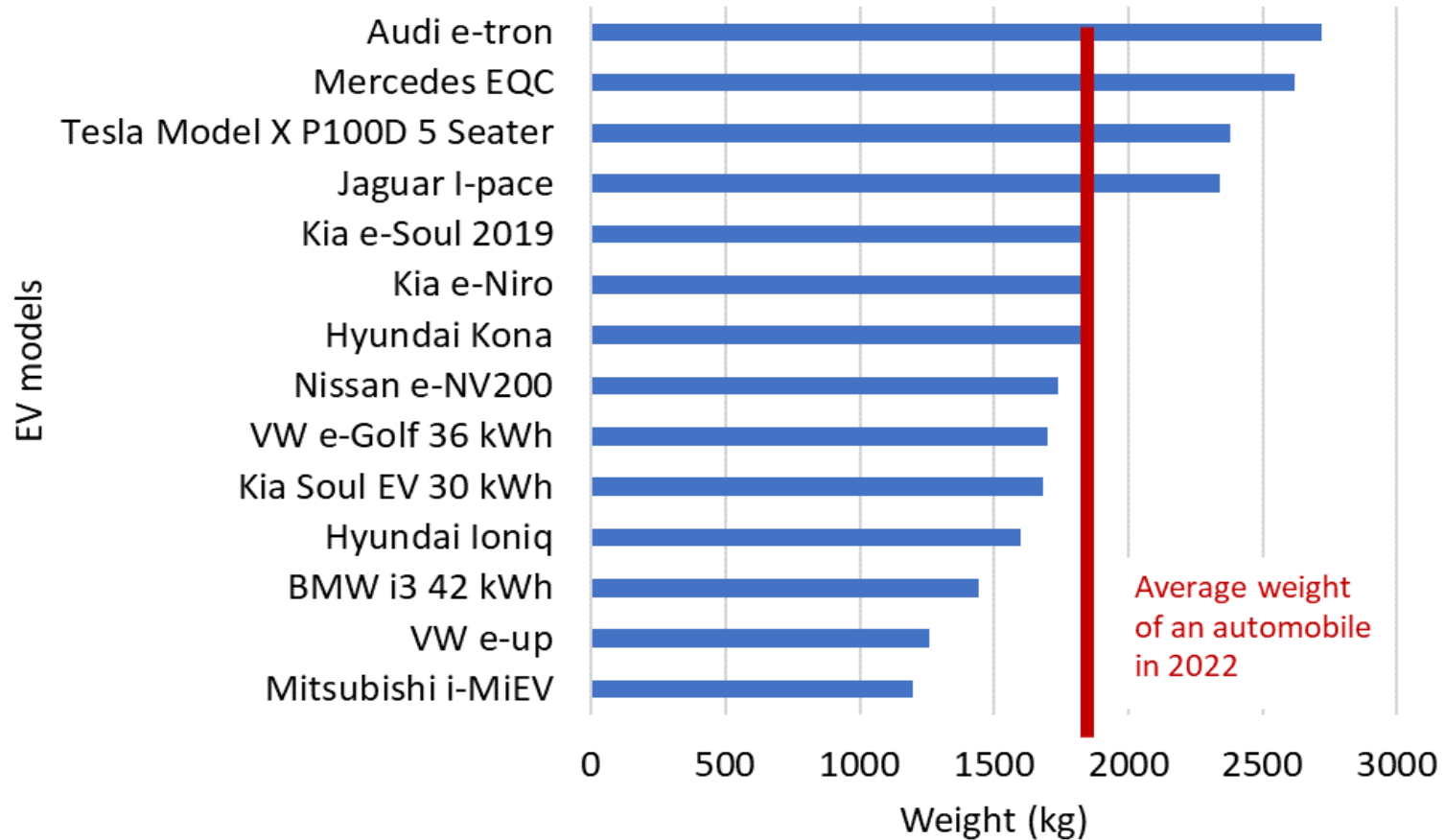




EV models (2022)



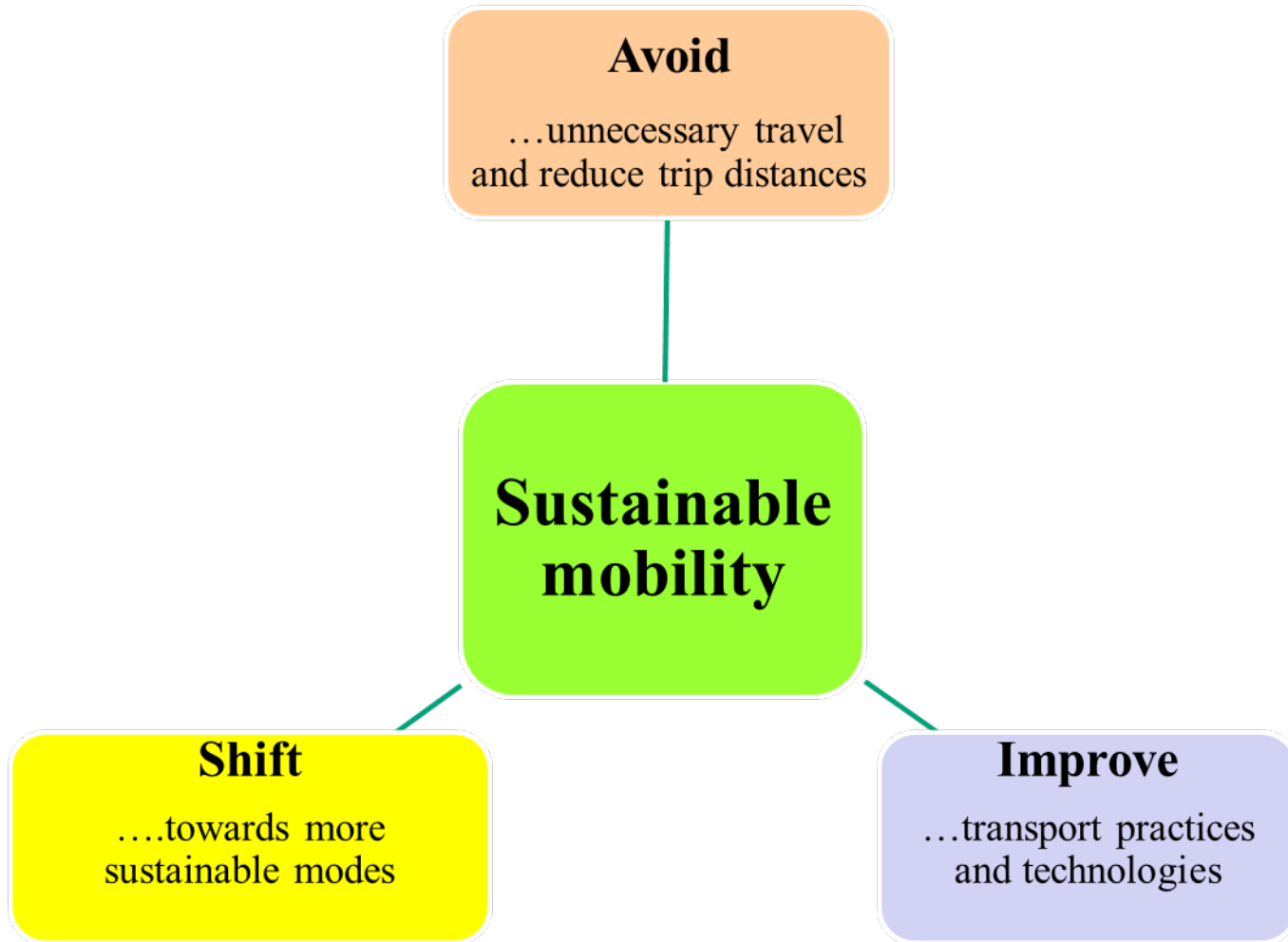
Electric vehicle weight





***Environmental
and social
challenges***





- EVs
 - part of the solution
 - costs, battery, infrastructure

- Policy design
 - with the increasing number of EVs...new policies
 - high environmental benefits of EVs
 - electricity from RES

- Sustainability
 - from the mining of the materials up to electric mobility
 - Avoid-Shift-Improve strategy

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Ajanovic A., R. Haas, M. Schrödl (2021). **On the Historical Development and Future Prospects of Various Types of Electric Mobility**, *Energies* 14 (4), 1070

Ajanovic A., Haas R. (2019). **Economic and Environmental Prospects of Battery Electric- and Fuel Cell Vehicles: A Review**. *Fuel Cells*. Wiley Online Library. DOI: 10.1002/fuce.201800171

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Ajanovic A., Haas R. (2018). **Economic prospects and policy framework for hydrogen as fuel in the transport sector**. *Energy Policy* 123 (2018) 280–288. <https://doi.org/10.1016/j.enpol.2018.08.063>

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Ajanovic A. (2015). **The future of electric vehicles: prospects and impediments**. *WIREs Energy Environment* 2015. doi: 10.1002/wene.160, 2015