"100% Renewable Energy and more",
Decarbonisation and Resource Efficiency Workshop,
8 November 2016, Berlin

Deployment of electric vehicles and support policies

Findings from the Global EV Outlook 2016

Marine Gorner, International Energy Agency

International Energy Agency
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The role of electric cars in sustainable transport

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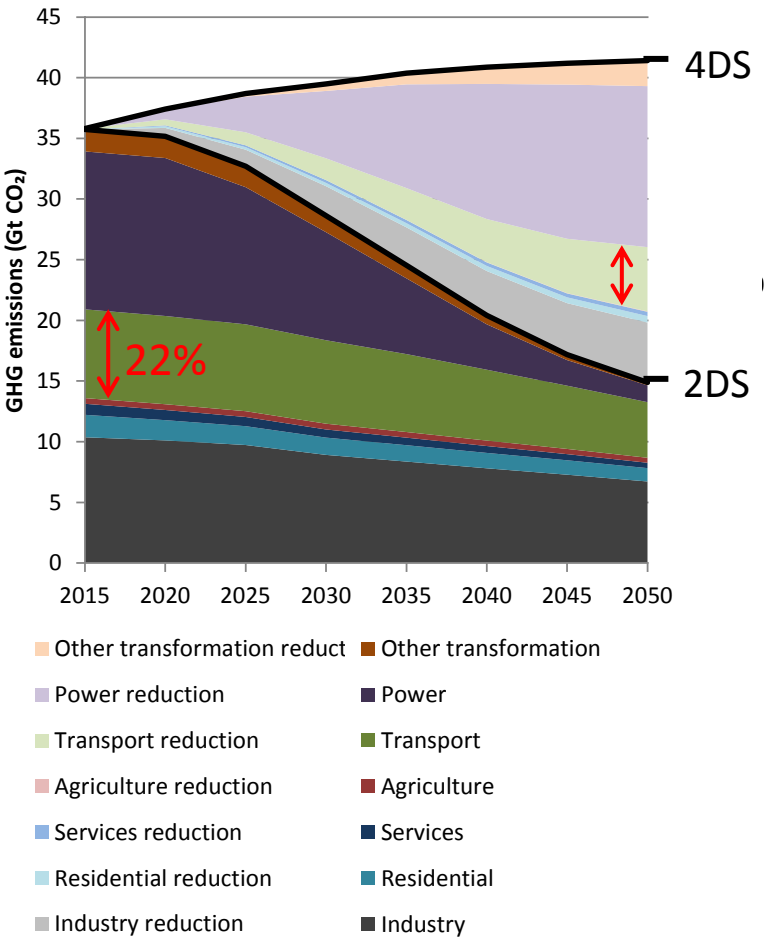
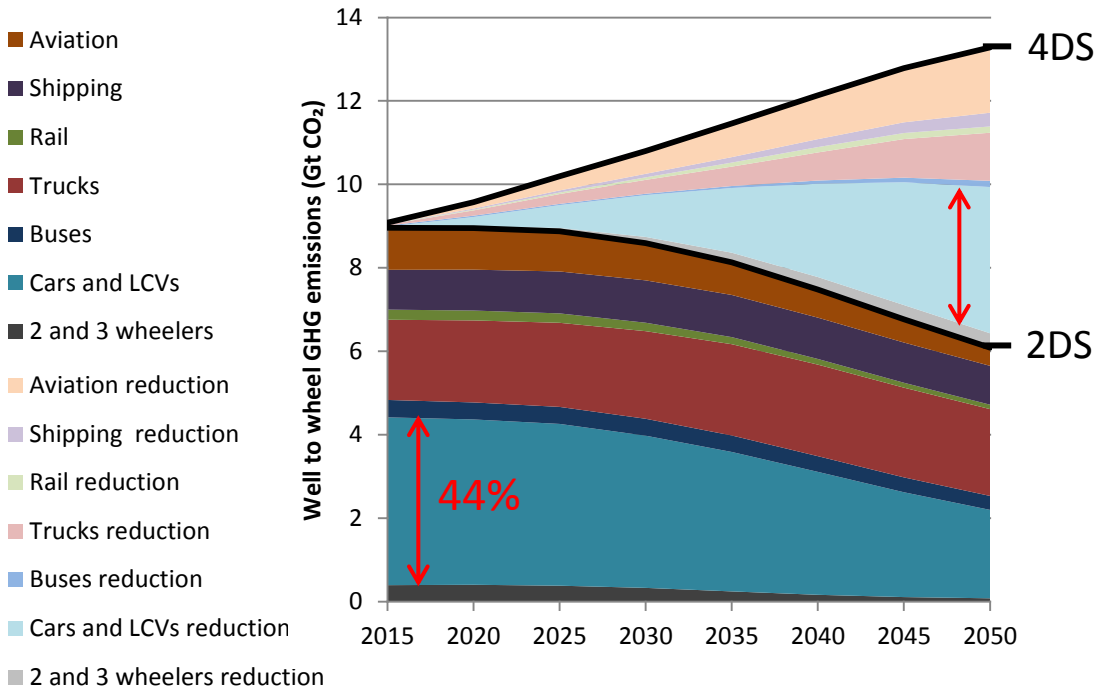
Total GHG emissions – all sectors



GHG emissions – transport



Electric cars can make a major contribution, but are also needed:

→"*avoid, shift, improve*"

→ electrified road freight and mass transport

The role of electric cars in sustainable transport

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- Electric cars benefits

	Climate	Health	Energy security
Better energy efficiency than internal combustion engines			
Absence of tailpipe emissions (CO_2 and pollutants)		*(paramount in urban areas)*	
Low-carbon mode, provided that the electricity mix is low-carbon			
Reduction of oil dependency			*(+ potential for harvesting local, renewable energy sources)*

- Main hurdles and challenges
  - Upfront cost
  - Charging infrastructure and range anxiety

- Need for policy action to lift up barriers, spur adoption and harvest the benefits of EVs.

The Electric Vehicles Initiative and IEA's EV-related work

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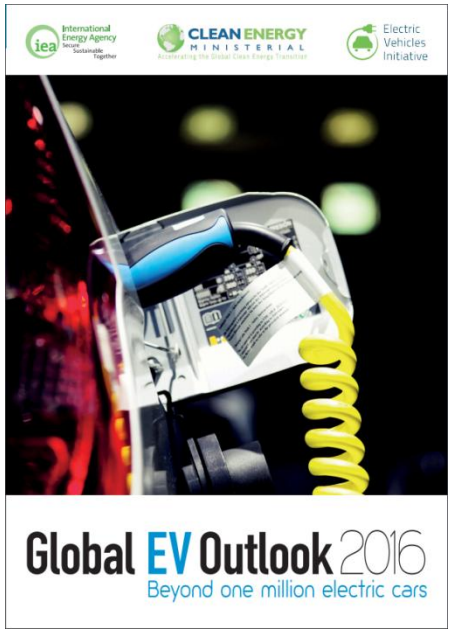
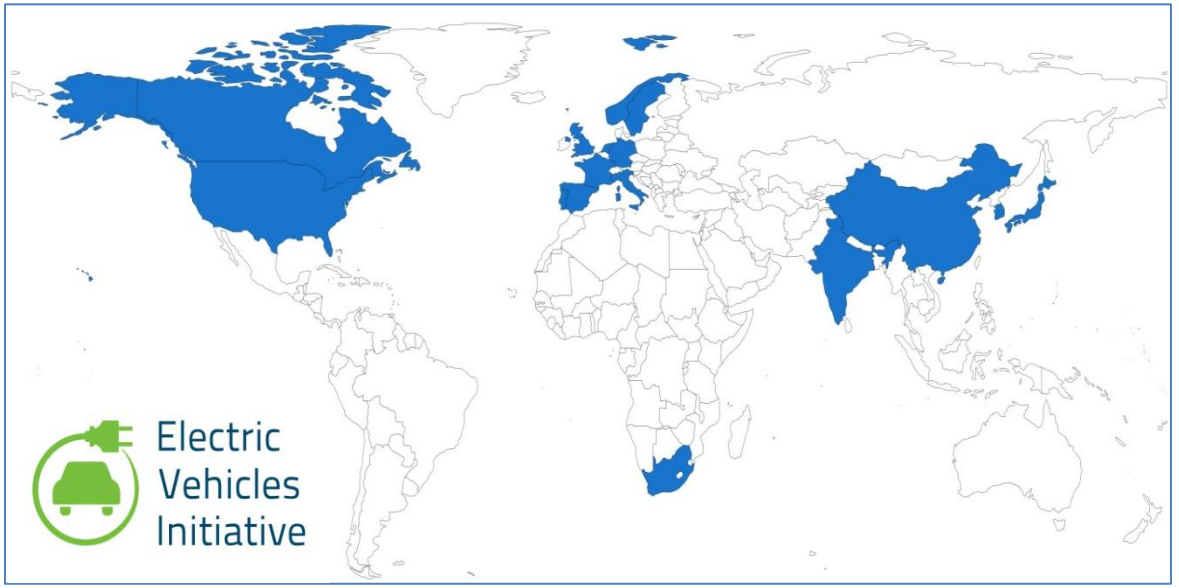
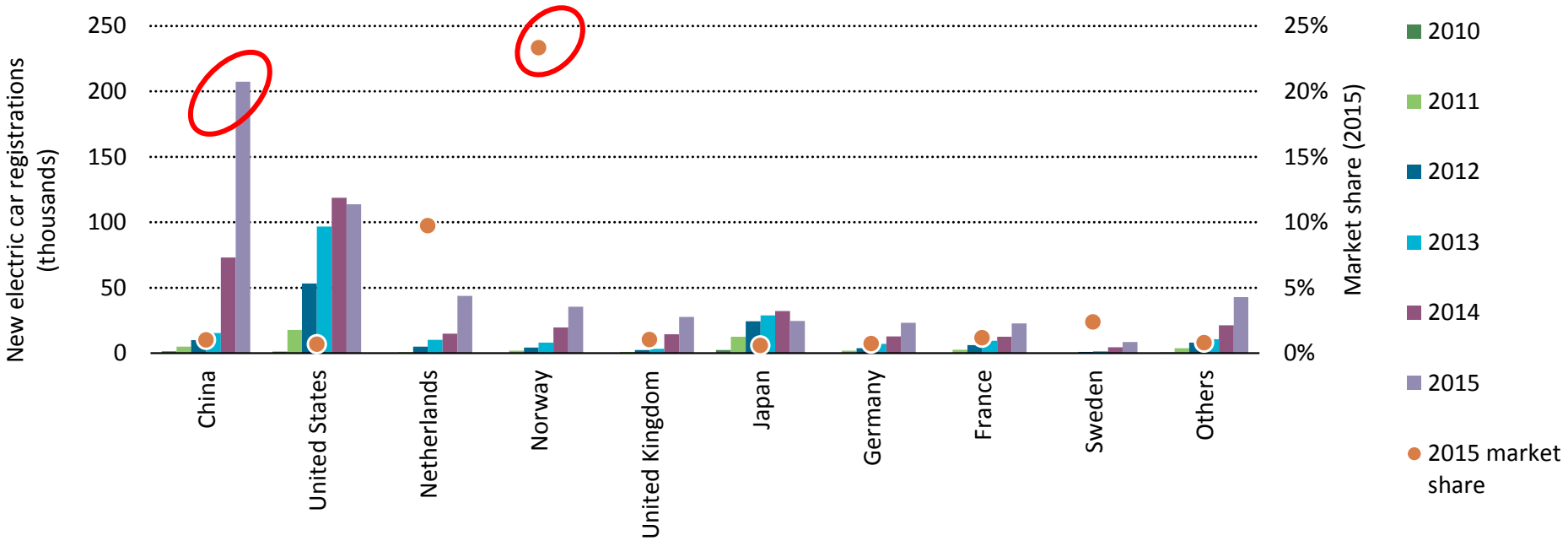
- EVI: Multi-government policy forum established in 2009 under CEM
- Knowledge-sharing on policies and programs that support EV deployment
- Global EV Outlook 2016, released on 31 May
- EVI data and analysis are at the basis of IEA's WEO and ETP scenarios



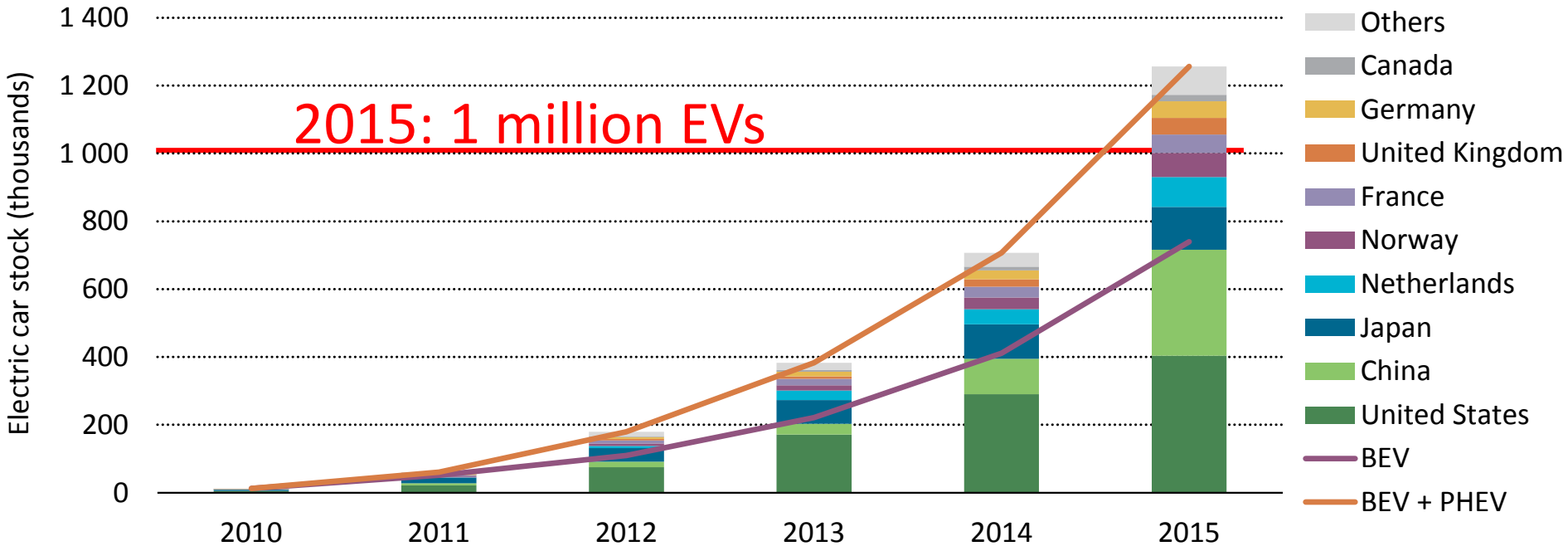


GEVO 2016: the electric car market in 2015



- 550,000 EVs sold in 2015 (+ 70%)
- China became the first EV market in 2015
- 9/10 EVs sold in 8 countries (China, US, Netherlands, Norway, UK, Japan, Germany, France)
- 7 countries >1% market share (Norway, Netherlands, Sweden, Denmark, France, China, UK)

EV stock evolution, 2010-2015



- 1.26 million EVs in circulation by end of 2015
- 59% BEVs
- 4/5 EVs in 5 countries (US, China, Japan, Netherlands, Norway)
- Other modes: 200 M e-2Wheelers, 173 k e-buses (mainly in China)

Recent market developments: EV sales and market share

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- What is happening in 2016?

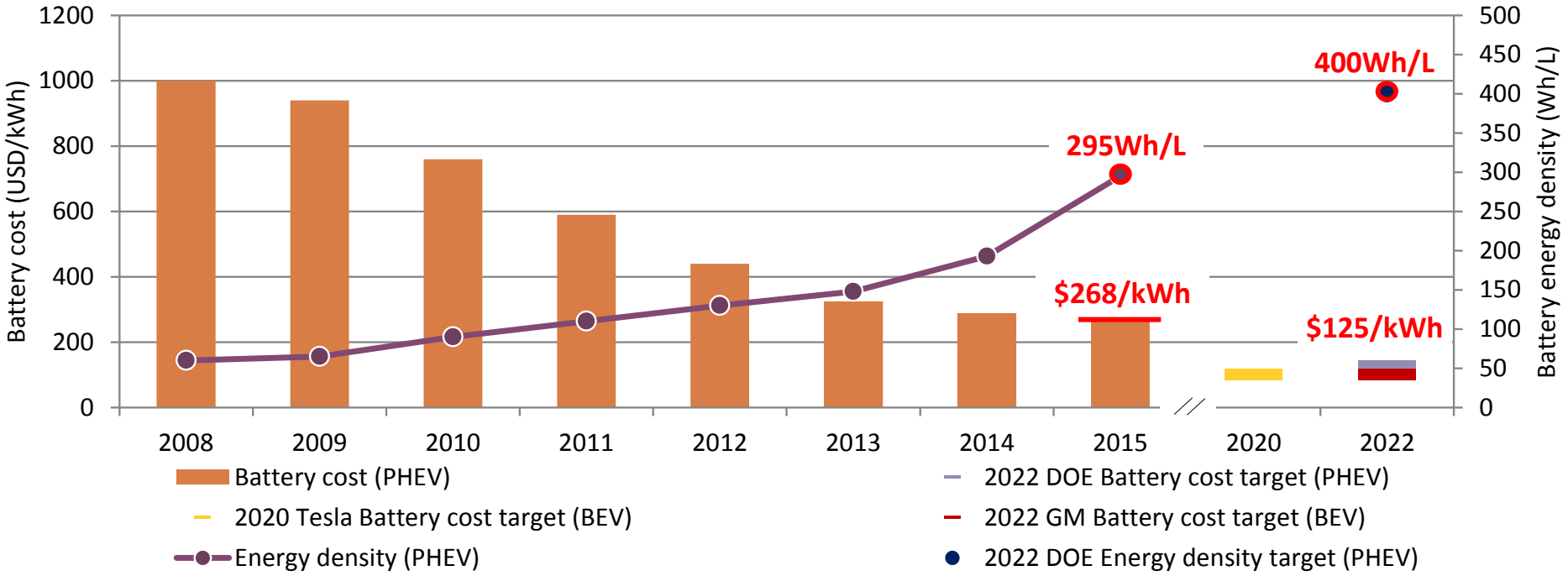
↗ **EU**: +20% sales in Q1-Q2 2016 compared to Q1-Q2 2015

⇗ **China**: +160% sales in Q1-Q2 2016 compared to Q1-Q2 2015

↘ **Netherlands**: 2.5% market share in 2016 (ytd) vs. 10% in 2015, due to changes in support mechanism and drop in PHEV sales

→ expecting dynamic global growth in 2016, mainly driven by China sales

RD&D: battery costs and energy density

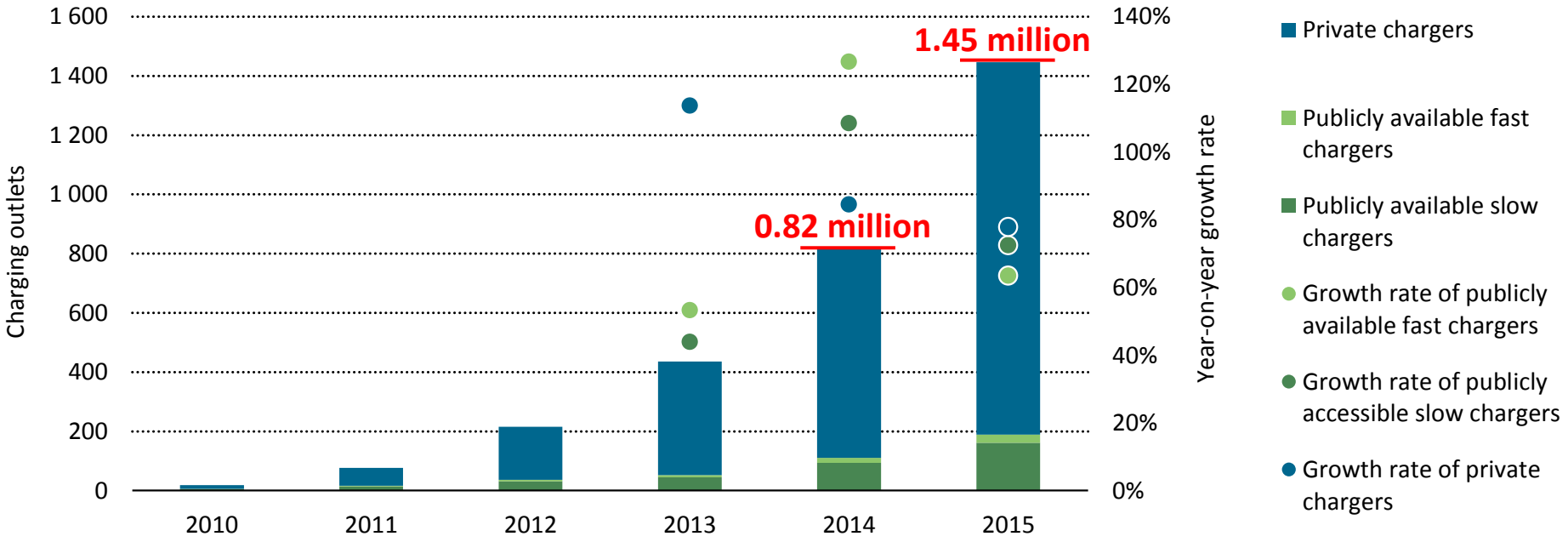


- PHEV battery costs:
  - -73% in the past 7 years
  - Ambitious announcements in the next future: -58% to go in the next 7 years

➢ *Wider model availability (Renault-Nissan, BMW, GM, Tesla (…) did not offer the same variety of EVs 5 years ago…)*

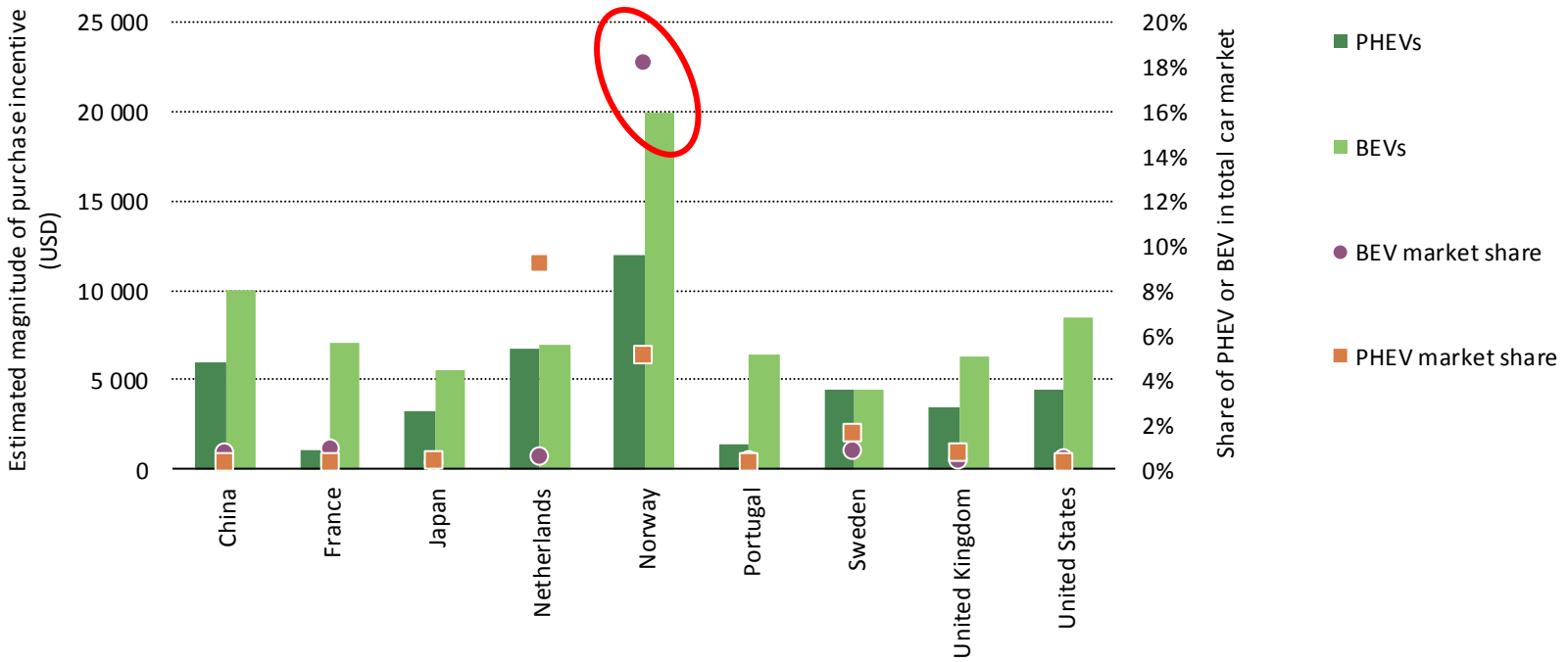
➢ *Further improvements needed to enable longer ranges for lower costs, addressing range anxiety and increasing EV competitiveness*

EV Supply Equipment



- The deployment of publicly accessible chargers is positively correlated with the growth in EV sales
- Need for charging network to overcome range anxiety barrier
- Incentives are not just needed for vehicle purchase

Purchase incentives and EV market shares, 2015



- Various policy mechanisms behind the "market pull"
  - Differentiated taxation: CO_2-based rebates, technology-based rebates, feebates, VAT exemptions
  - Waivers on charges, preferential treatment possible if differentiated number plates are in place
- Norway stands out in terms of incentives and EV adoption
- Difficult to come to conclusions for other markets (very early phase)

EV support policies needed in multiple fields of mobility

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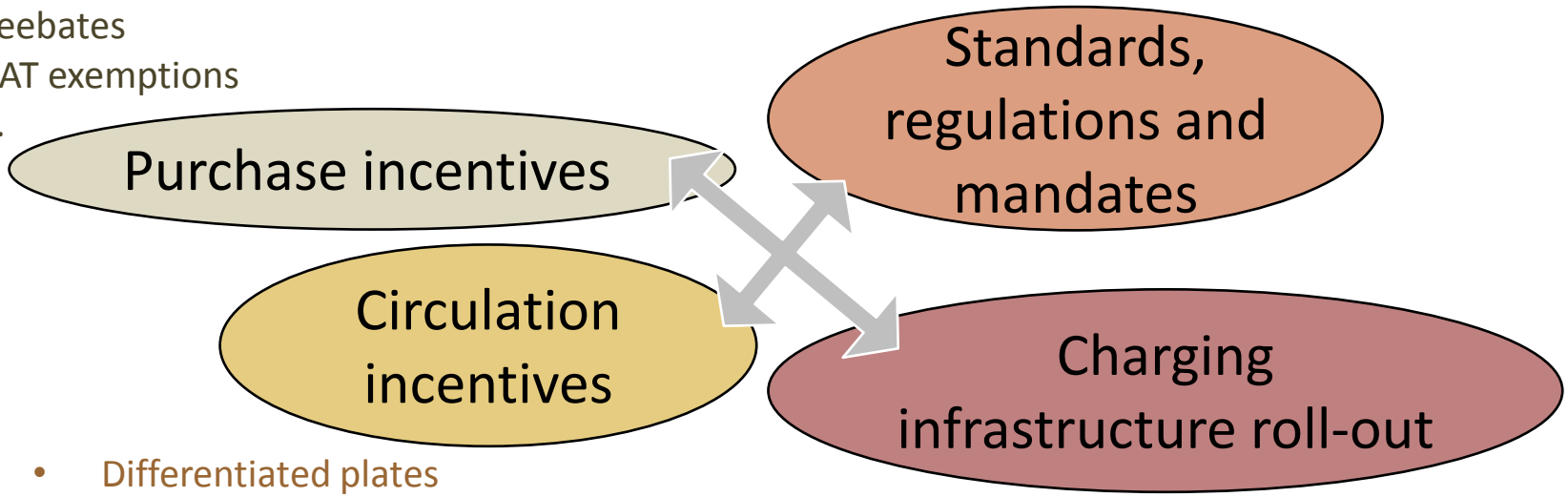
- CO_2-based, technology-based differentiated taxation and rebates
- Feebates
- VAT exemptions
- …

- Fuel economy standards
- Fuel taxes
- Public fleets, taxi fleets initiatives
- …



- Differentiated plates
- Access to bus lanes
- Free/dedicated parking
- Circulation/congestion charge exemption
- …

- Direct public investment
- Public-private partnerships
- Charger standards harmonization
- Fast and slow charging network planning
- …

EV support policies: challenges and future evolutions

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Today:

Countries are still in trial and error phase:

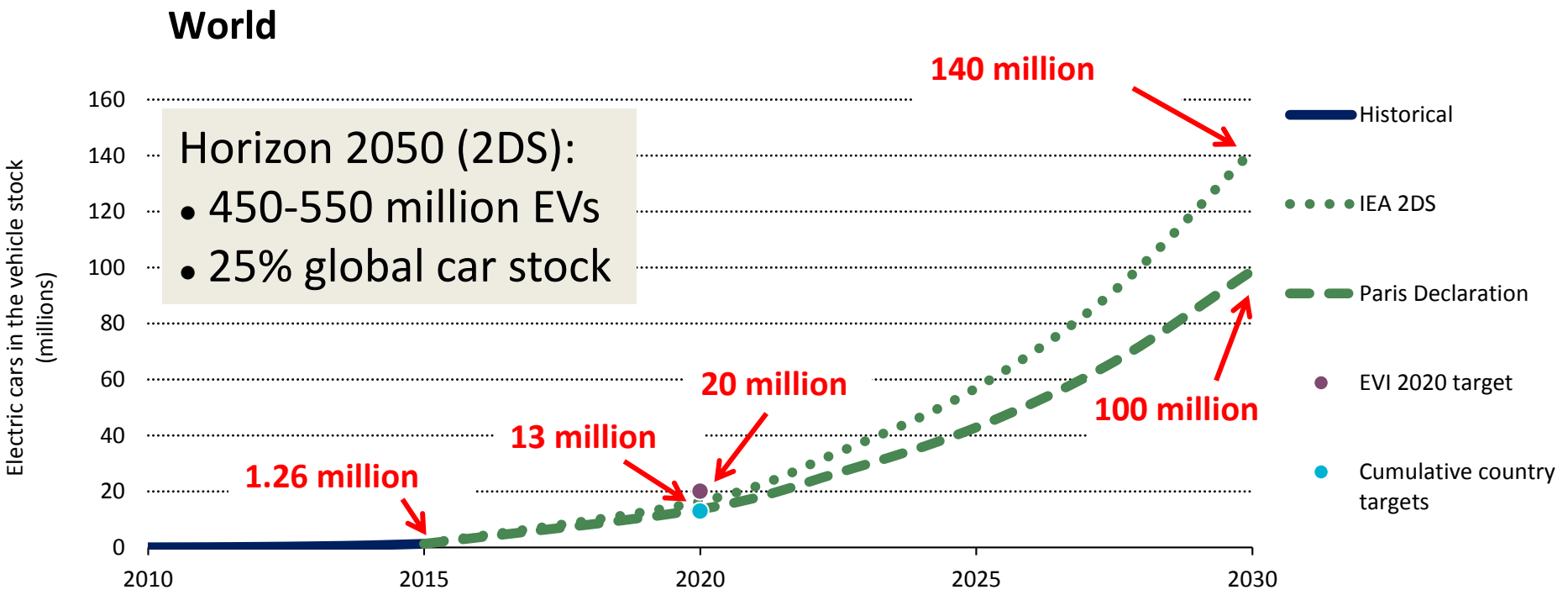
- Which policies have the highest impacts?
- Do any policies have unanticipated adverse effects?
- What is the cost-optimal and most effective combination of support policies?

Tomorrow:

- How to accompany mass market deployment within budget constraints …
- How to rethink vehicle taxation to accommodate for fuel tax losses (electric cars do use public infrastructure and remain part of the congestion challenge) …
- How to prevent potential competition between EVs and public transport …

… without hampering EV rollout?

EV deployment targets



→ Implications in terms of production scale up and need for raw materials?

EV deployment scenarios

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- Impacts on the grid?

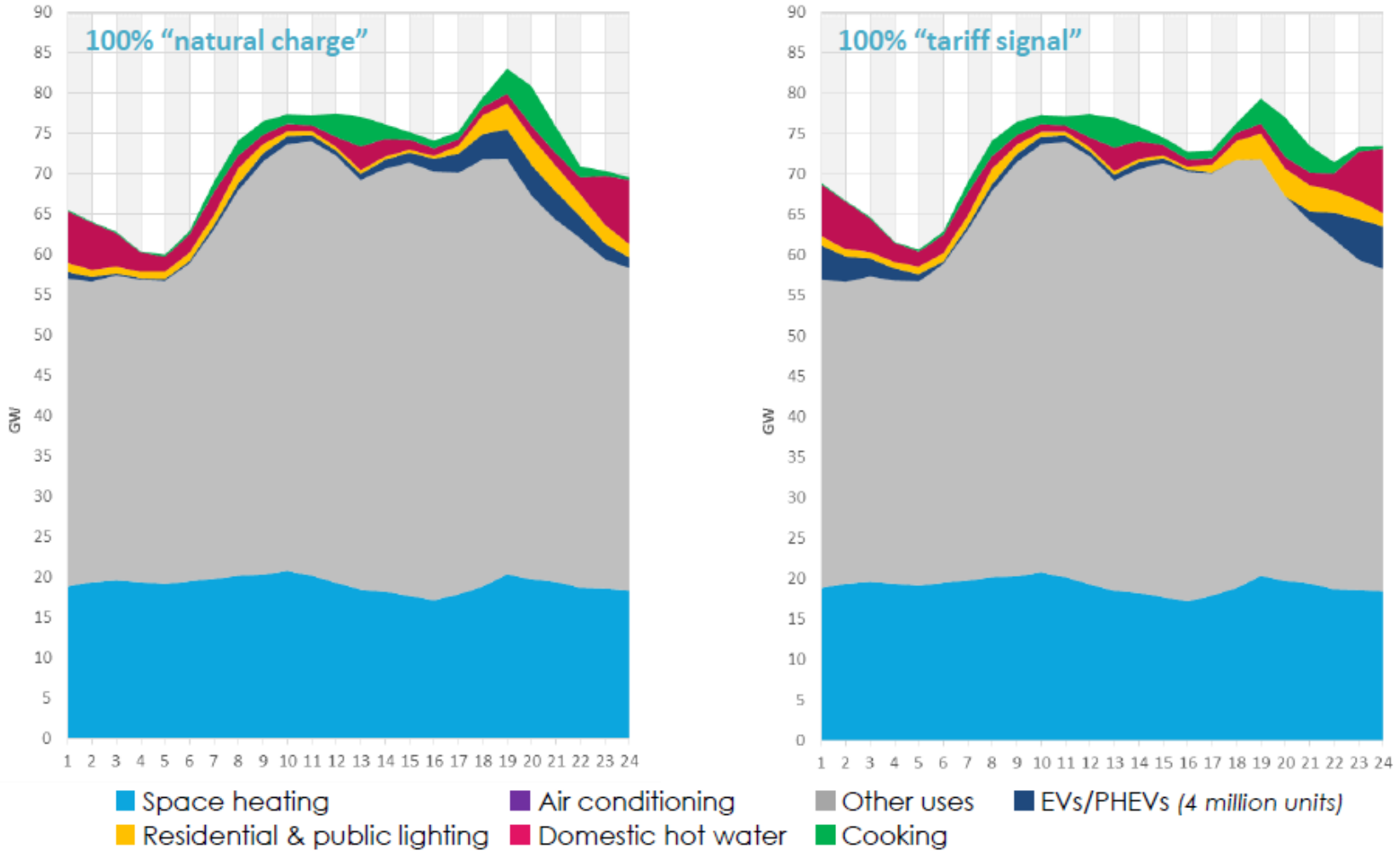
Slow charging:

- Potential for flexibility through variable charging: requires price signal, demand-side management tools, but not necessarily “vehicle-to-grid” operations.
- Synergies with the integration of variable renewables

Fast charging:

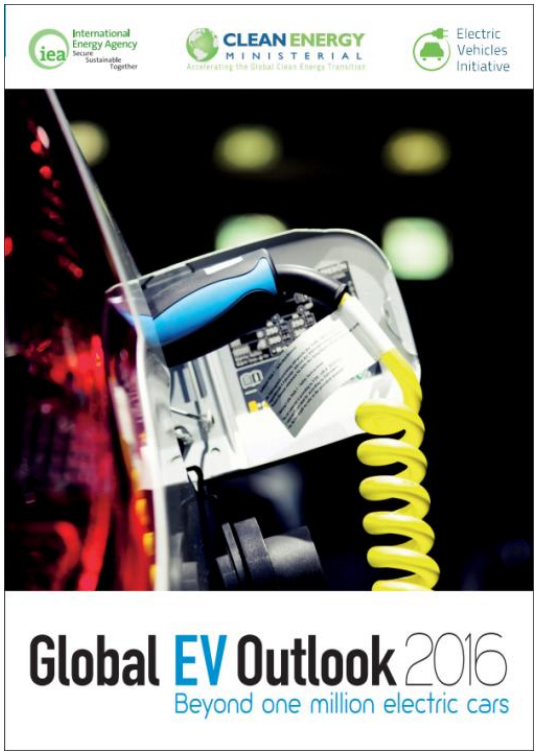
- Potentially disruptive locally for distribution grids
- Does not offer flexibility
- However, fast charging is not likely to take place in the evening demand peak (home chargers are slow chargers)

(RTE) Hourly load of a winter day with different charging modes



Source:
Réseau de Transport d'Electricité (RTE), France. Slide presented at the Paris "CEEM, Conference Electric vehicles and the electricity system" on 17 October 2016.
Presentation available at http://www.ceem-dauphine.org/assets/dropbox/CEEM_Conference_-_RTE_-_Impact_of_EV_development.pdf

Thank you for your attention



The Global EV Outlook 2016 is freely accessible online