#### **Electric mobility** Status, policies and prospects

Clean Transport Forum - 22 September 2016, Bogota Marine Gorner, International Energy Agency



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### The role of electric cars in sustainable transport

Total GHG emissions – all sectors GHG emissions – transport 14 Aviation 4DS Shipping 4DS 12 Well to wheel GHG emissions (Gt CO<sub>2</sub>) Rail 10 Trucks Buses 8 Cars and LCVs 2 and 3 wheelers 2DS 6 Aviation reduction 2DS Shipping reduction Rail reduction 44% Trucks reduction Buses reduction Cars and LCVs reduction 2015 2020 2025 2030 2035 2040 2045 2050 2015 2020 2025 2030 2035 2040 2045 2050 2 and 3 wheelers reduction Other transformation reduct Other transformation Power reduction Power

Transport reduction Agriculture reduction

45

40

35

30

25

20

15

10

5

0

GHG emissions (Gt CO<sub>2</sub>)

- Services reduction
- Residential reduction
- Industry reduction

Transport Agriculture Services Residential

Industry

Electric cars can make a major contribution, but are also needed:  $\rightarrow$  "avoid, shift, improve"  $\rightarrow$  electrified road freight and mass transport

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# The role of electric cars in sustainable transport

Electric cars benefits

	Climate	Health	Energy security
Better energy efficiency than internal combustion engines			
Absence of tailpipe emissions $(CO_2 \text{ and pollutants})$		(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.

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

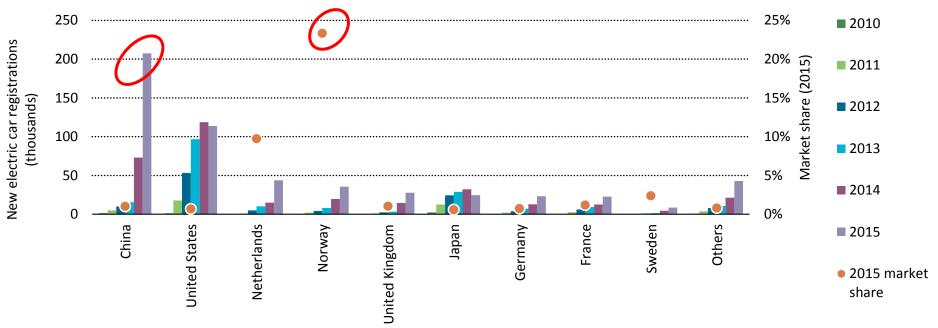
- EVI: Multi-government policy forum established in 2009 under CEM
- Knowledge-sharing on policies and programs that support EV deployment
- Global EV Outlook 2016, released on 31 May
- EVI data and analysis are at the basis of IEA's WEO and ETP scenarios





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## GEVO 2016: the electric car market in 2015



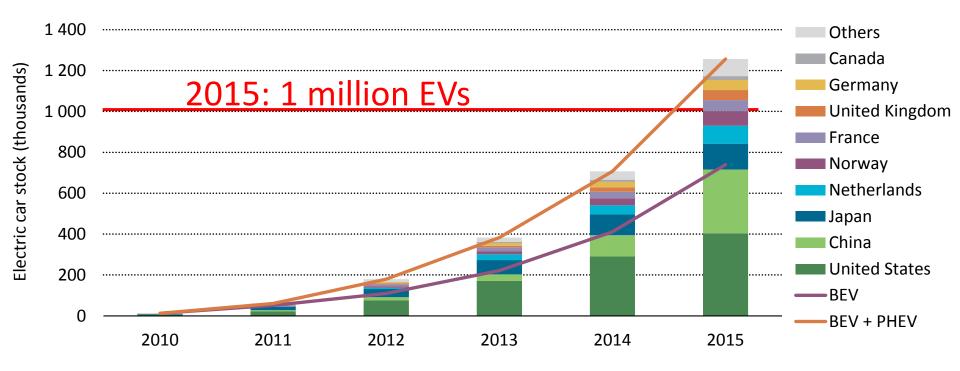
- 550,000 EVs sold in 2015 (+ 70%)
- China became the first EV market in 2015
- 9/10 EVs sold in 8 countries (China, US, Netherlands, Norway, UK, Japan, Germany, France)
- 7 countries >1% market share (Norway, Netherlands, Sweden, Denmark, France, China, UK)

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#### 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)

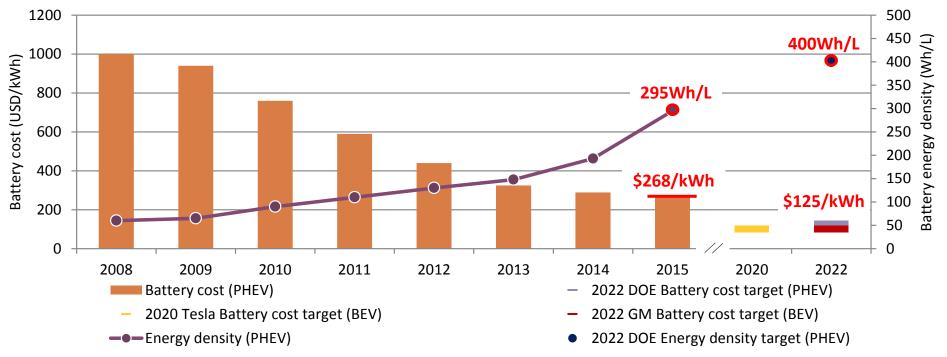
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## RD&D: battery costs and energy density



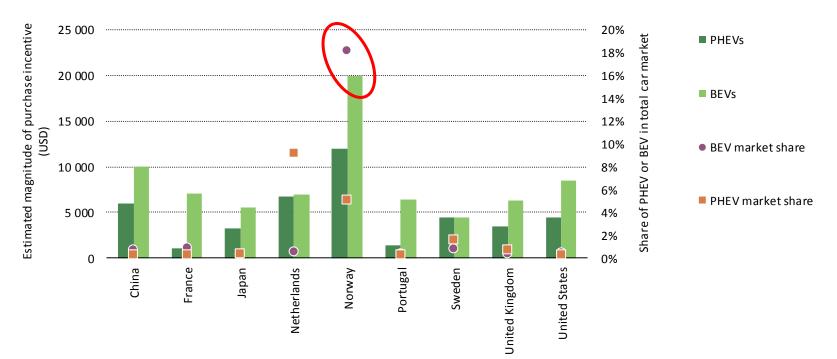
- PHEV battery costs:
  - -73% in the past 7 years
  - Ambitious announcements in the next future: -58% to go in the next 7 years
- Wider model availability (Renault-Nissan, BMW, GM, Tesla (...) did not offer the same variety of EVs 5 years ago... )
- Further improvements needed to enable longer ranges for lower costs, addressing range anxiety and increasing EV competitiveness

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#### Purchase incentives and EV market shares, 2015



Various policy mechanisms behind the "market pull"

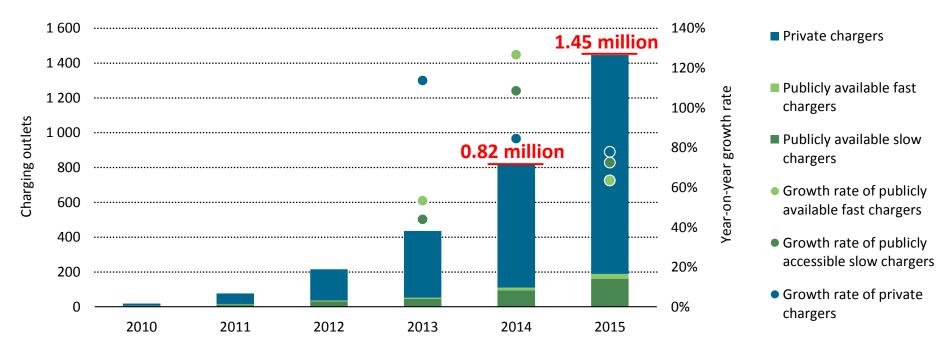
- Differentiated taxation: CO<sub>2</sub>-based rebates, technology-based rebates, feebates, VAT exemptions
- Waivers on charges, preferential treatment possible if differentiated number plates are in place
- Norway stands out in terms of incentives and EV adoption
- Difficult to come to conclusions for other markets (very early phase)

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#### **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

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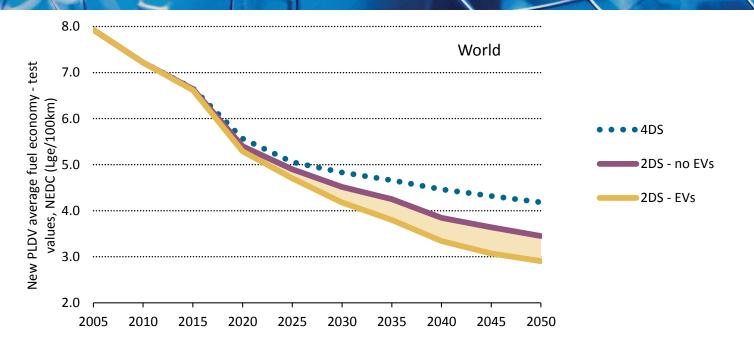
## Policy needs

- A policy framework with high taxes on conventional fuels and stringent fuel economy standards is favorable for EVs
- Purchase and circulation incentives and the availability of charging infrastructure are positively correlated with EV uptake
  - Need for fiscal measures (e.g. differentiated taxation, feebates) to kick start the market uptake
  - Need for mechanisms supporting the deployment of recharging infrastructure
- Additional measures can further increase the value proposition of EVs
  - Examples: waivers on access restrictions (bus lanes) and urban/parking pricing schemes
- Incentives can only be transitional
  - Risk of tax revenue losses (incl. from fuel purchase). Need to adapt taxation mechanisms.
  - Risk of congestion effects and detrimental effects to public transportation.
  - Need for close monitoring and periodical revisions to adapt to a fast evolving market

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## Illustration: a possibly sizeable contribution of EVs to fuel economy targets



#### **GFEI targets**

 2030: fuel consumption per km of new LDVs 50% better than in 2005

#### IEA 2DS

- GFEI target needs ICE improvement, hybrids & EVs
- EVs (PHEV and BEVs): sizeable impact after 2020



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#### **EV deployment targets**

140 million World 160 ..... Historical 140 Electric cars in the vehicle stock (millions) Horizon 2050 (2DS): IEA 2DS 120 • 450-550 million EVs 100 Paris Declaration • 25% global car stock EVI 2020 target 60 20 million 100 million 13 million 40 Cumulative country **1.26 million** 20 targets 0 2010 2015 2020 2025 2030 7 14% 6 12% 10% 5 million electric cars PHEV stock 4 8% **BEV** stock -- EV sales share 3 6% --+-- EV stock share 2 4% 2% 1 Latin America, 0 0% IEA 2DS 2020 2030

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#### Thank you for your attention