

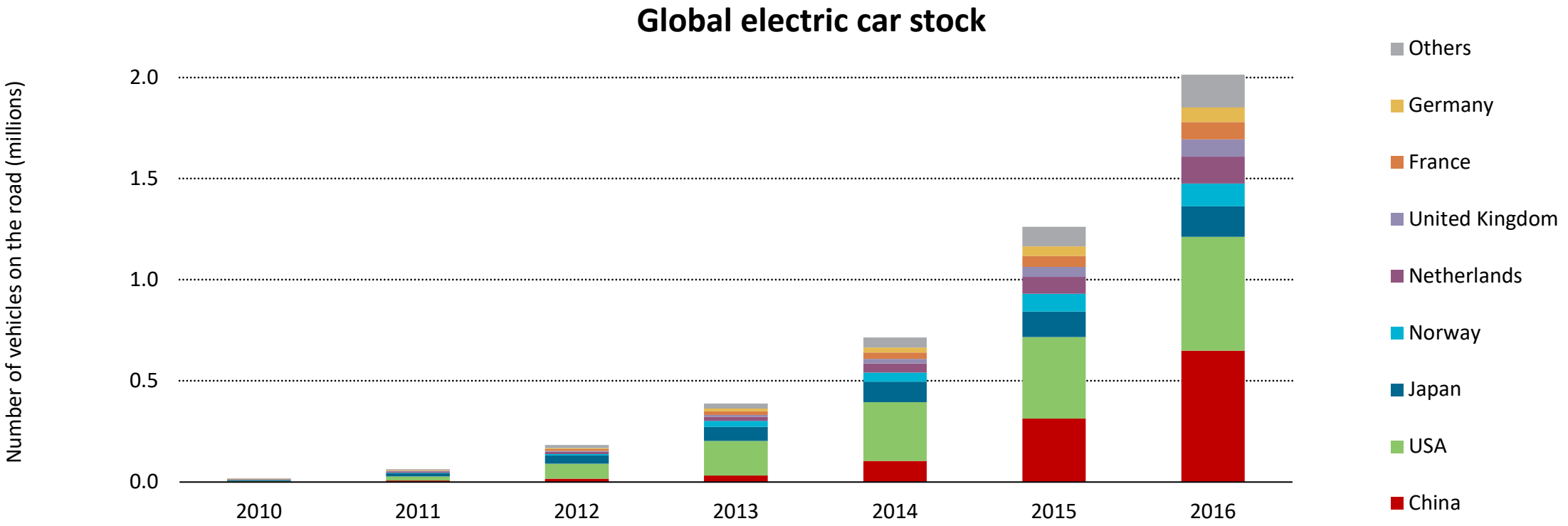
Promoting the transition to electric mobility

Pierpaolo Cazzola, International Energy Agency

Energy Efficeincy Training Week – Paris, 17 May 2018

IEA

Electric mobility is breaking records…



Source: *Global EV Outlook 2017*

The global electric car fleet reached 2 million in 2016, and one more million EVs were added in 2017

…but it still represents far less than 1% of the global LDV market

Most electric car sales took place in a few countries having high ambitions and supporting EVs deployment

Policy support remains critical

Rationale to include EV as part of energy efficiency in transport

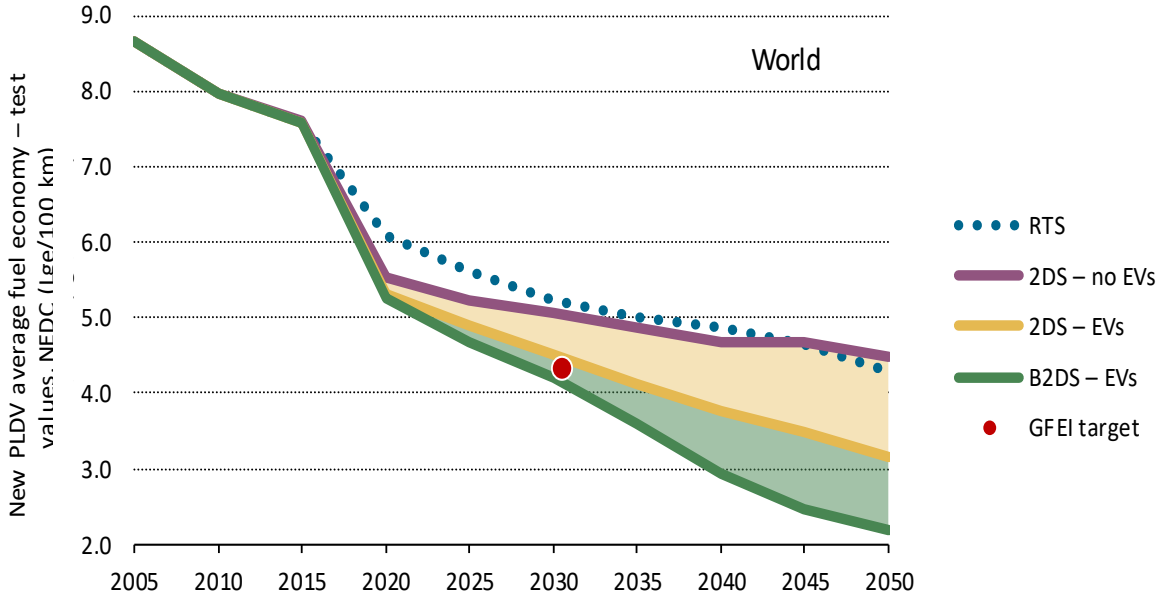
- **The policy context is changing rapidly**
  - **Changes in global test procedures** used to measure fuel economy and pollutant emissions of LDVs make it more challenging to meet regulatory requirements from ICEs
  - Some of the **major global vehicle markets** (China, EU and India) are **adopting policies that clearly support the uptake of EVs**
  - Announcements from governments include **commitments for an EV market share increase in by 2030** (EV30@30 CEM Campaign) and **the ICE phase out in the 2030s/2040s (**France, India, the Netherlands, Norway, the UK)
- **Battery technologies are evolving**
  - Prospects for future developments confirm the encouraging signs in cost and performance improvements observed over the past decade
- **The automotive industry is mobilising investments**
  - Several **OEMs announced plans to deploy EVs**, and a number of them indicated **deployment targets for the 2020 to 2025** time frame

Rationale to include EV as part of energy efficiency in transport

EVs need to play a central role in scenarios meeting the ambition of the Paris Agreement, given

- the **need for a major deployment of zero-emission technologies for LDVs** in 2050
- the **strong decarbonization of the power sector** (already on its way, with 60% of the new power generation capacity added in 2016 coming from renewables and major announcements to abandon coal)
- the **pivotal role of EVs for the facilitation of the clean energy transition**, and namely the integration of variable renewables in the energy mix

Contribution of EVs for fuel economy improvements in IEA scenarios



Source: IEA analysis based on scenarios developed for the *Energy Technology Perspectives 2017* report

Embracing EVs in GFEI activities (4/4)

GFEI partners are aware of the significant benefits offered by EVs

- EVs clearly offer the best efficiency advantage over the conventional ICE powertrains
- EVs promote a shift from petroleum fuels to electricity, helping to diversify the transport energy mix
- EVs are a pivotal technology for the facilitation of the clean energy transition
- EVs are the most effective solution for the reduction of local pollution
- PEVs allow for net savings over the vehicle life and, if battery costs approach USD 100/kWh, allow to achieve cost parity with ICEs even for first owner economics, even with current mileage, in many global regions

GFEI partners welcome the developments taking place on the electrification of transport and embrace a strong roll out of EVs in helping to reach the GFEI target

GFEI will work proactively to integrate policies stimulating the adoption of EVs in their technical assistance and capacity building work for the development of fuel economy policies

Electric Vehicles Initiative (EVI)

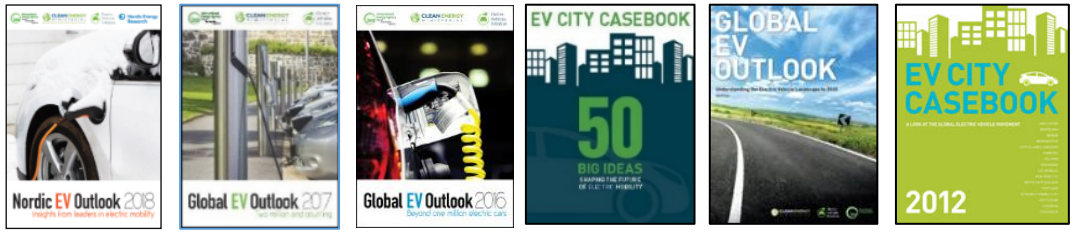
Electric Vehicles Initiative

Multi-government policy forum dedicated to conducting collaborative activities that support the design and implementation of domestic electric vehicle (EV) deployment policies and programs

In 2010, EVI was one of several initiatives launched under the CEM

Currently co-chaired by Canada and China, and coordinated by the IEA

Released several analytical publications, demonstrating leadership to strengthen the understanding of the opportunities offered by electric mobility to meet multiple policy goals



Members



Instrumental to mobilize action and commitments (Paris Declaration on Electro-Mobility and Climate Change at COP21, Government Fleet Declaration at COP22)

Launched the EV30@30 Campaign in June 2017

Now launching the **Pilot City Programme**

Also working with the **Global Environment Facility** on the preparation of a project for the support of EV policy-making in developing regions

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EV30@30 Campaign

Designed to accelerate the global deployment of electric vehicles

Sets a collective aspirational goal to reach 30% sales share for EVs by 2030

Launched at the 8th CEM meeting, in Beijing, by Minister Wan Gang



Implementing actions include:

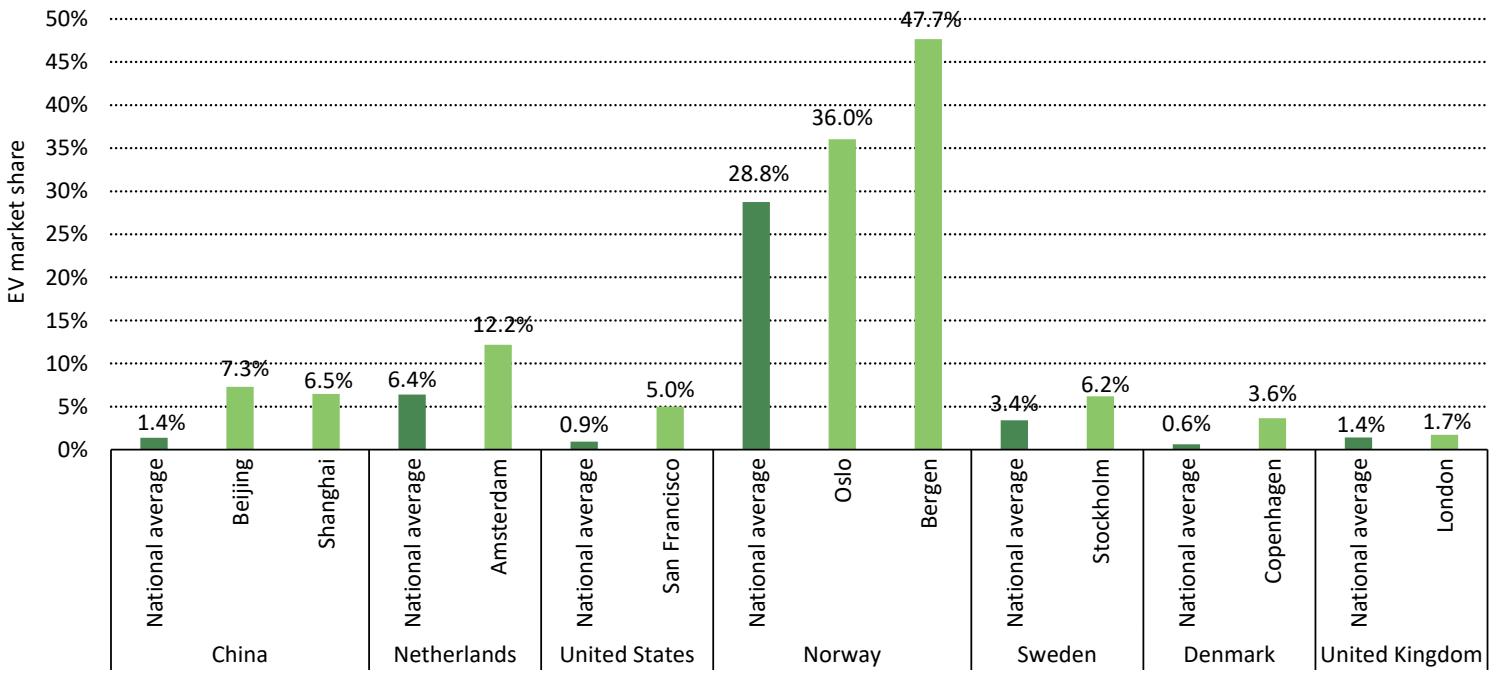
- Supporting the deployment of chargers and tracking its progress,
- Galvanising public and private sector commitments for electric vehicle (EV) uptake in company and supplier fleets
- Scaling up policy research and information exchanges
- Supporting governments in need of policy and technical assistance through training and capacity building
- **Establishing the Global EV Pilot City Programme, aiming to achieve 100 EV-Friendly Cities over five years**

Members

Supported buy several partners

Cities can be a privileged space for EV support and deployment

Market share of electric cars in leading EV countries compared to EV-friendly cities, 2016:



(Nearly one third of global electric car sales took place in just 14 cities in 2015)

- "Cities have been at the **forefront** of stimulating EV deployment"
- "Leading EV cities have shown that, as a result of **dedicated local policies** complementing national EV policy schemes, they can create a **favourable environment** for EV use and **reduce consumer barriers**"
- "Cities can have a **leadership** role in developing and testing **innovative** policy actions before widespread adoption"

(Global EV Outlook 2017, IEA)

Cities have a unique role to play in supporting EVSE rollout and in implementing measures enhancing the value-proposition of driving electric. They act as innovation test-beds for the future of mobility

EVI Global EV Pilot City Programme

Electric Vehicles Initiative

Topics

- Urban planning
- Infrastructure and charging technology
- Mass transit (including electric buses)
- Mobility as a service (including car and ride sharing)

EV Pilot City Programme

GLOBAL EV CITY

Activities

- Support greater **dialogue** with and provide **support** to municipal governments
- Identify **good practices** and facilitate their **replication** and improvement
- **Monitor and report** progress : data and information sharing among PCP members
- Engage in the organization of the **Pilot City Forum**

Goal

- 100 EV-Friendly Cities within five years

EVI Global EV Pilot City Programme

Almost 30 cities already joined today

Country	Cities
Canada	Calgary, Halifax Regional Municipality, Stratford, Surrey, Richmond, Winnipeg
China	Beijing, Rugao, Shanghai, Shenzhen, Yancheng
Finland	Helsinki, Espoo, Oulu, Tampere, Vantaa
Japan	Aichi, Kanagawa and Kyoto Prefectures; Tokyo Metropolitan Government
Netherlands	Metropolitan Region Amsterdam and G4 Cities (Utrecht, Amsterdam, the Hague, Rotterdam)
Norway	Bergen (upcoming), Oslo
Sweden	Stockholm
Thailand	Betong (interested), Nonthaburi (interested)
United Kingdom	Dundee, London
United States	New York City

Upcoming activities

EV Pilot City Forum in Helsinki, May 28-29, 2018

- First **exchange event of the PCP**, allowing to facilitate **networking** and **communication** across interested stakeholders





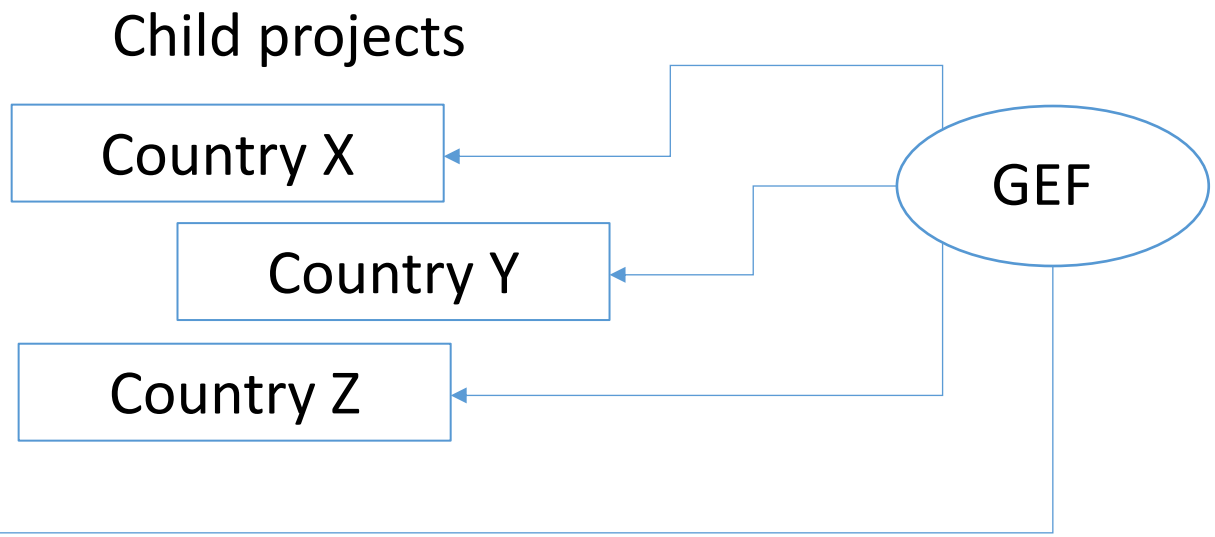
Global Environment Facility project on EV policy implementation

- GEF expression of interest, project under elaboration between UNEP and IEA
- Strong alignment with the EV30@30 Campaign, esp. on capacity building items
- Opportunity to widen EVI reach (Latin America, Africa, Central and South-East Asia, and Central and Eastern Europe)
- Structure: global (parent) component linked with several national (child) projects
- Total GEF funding allocation clioe to 100 Million
- Need for co-funding commitments

Global project (policy matrix)

	Vehicles (by mode)	Chargers	Power system
National	…	…	…
Local	…	…	…

+ pilot (selected countries)



Global EV Outlook 2017 and Nordic EV Outlook 2018

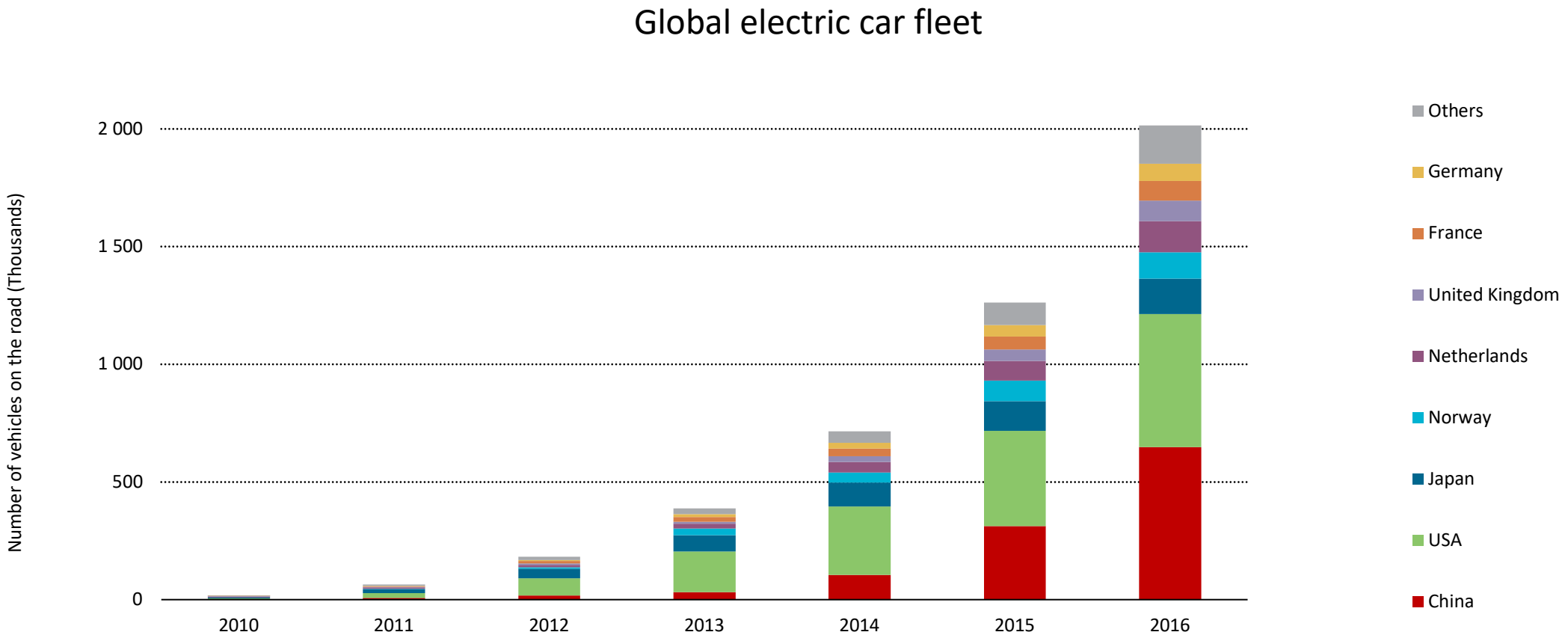
- GEVO: Annual EVI report drafted at IEA
  - Data reporting (EV stock, sales, EVSE, battery costs)
  - Policy analysis and TCO assessment
  - CO_2 impact and role of EVs in low carbon scenarios (2030 timeframe)
  - Insights on grid integration





- NEVO:
  - One-off publication, released March 2018
  - Insights from market leaders
  - Successes and lessons learnt, consumer behaviour, overview of EVSE and grid stakeholders and key challenges
  - Key takeaways as an inspiration to other countries?

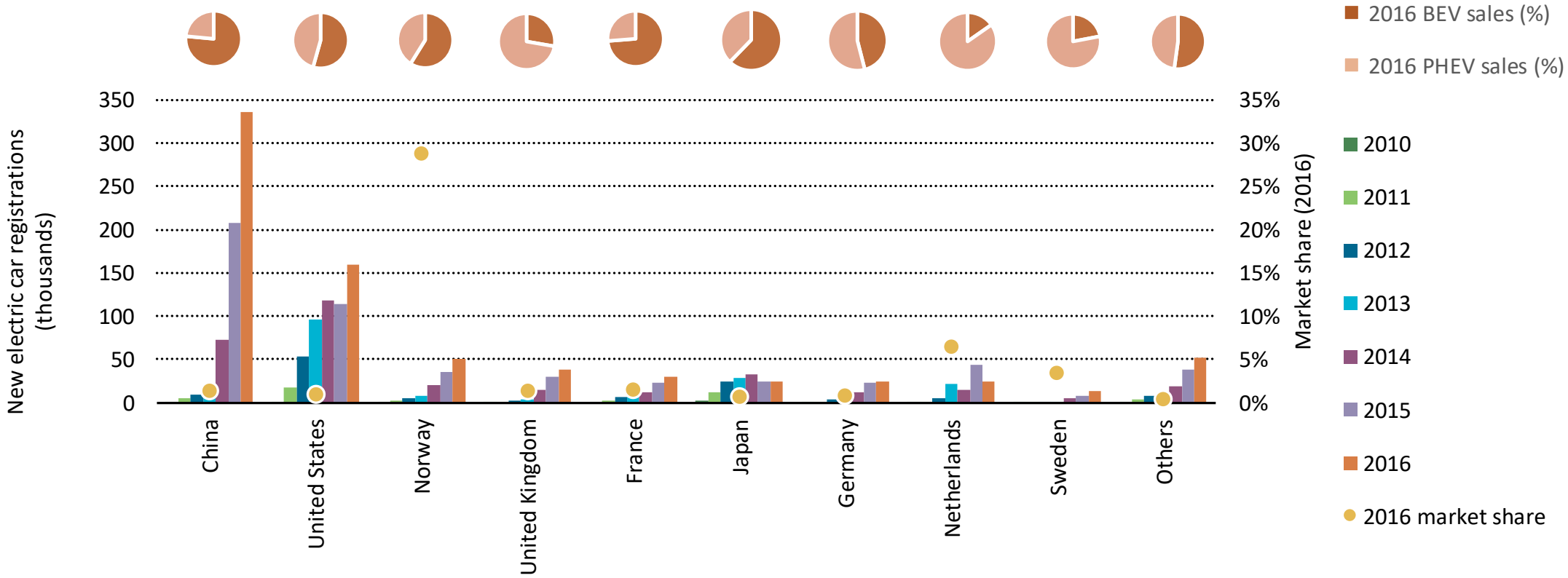
Electric mobility is breaking records, but policy support remains critical



The global electric car fleet reached 2 million units in circulation in 2016

New electric car registrations reach 750 000 units in 2016

Electric car sales, market share, and BEV and PHEV sales shares in selected countries, 2010-16



95% of global electric car sales in 2016 took place in 10 countries, and 6 countries had a market share above 1%: Norway, Netherlands, Sweden, France, United Kingdom, China

Electric car sales are correlated to changes in EV policies (1/2)

BEV and PHEV changes in incentives in a selection of countries, 2016

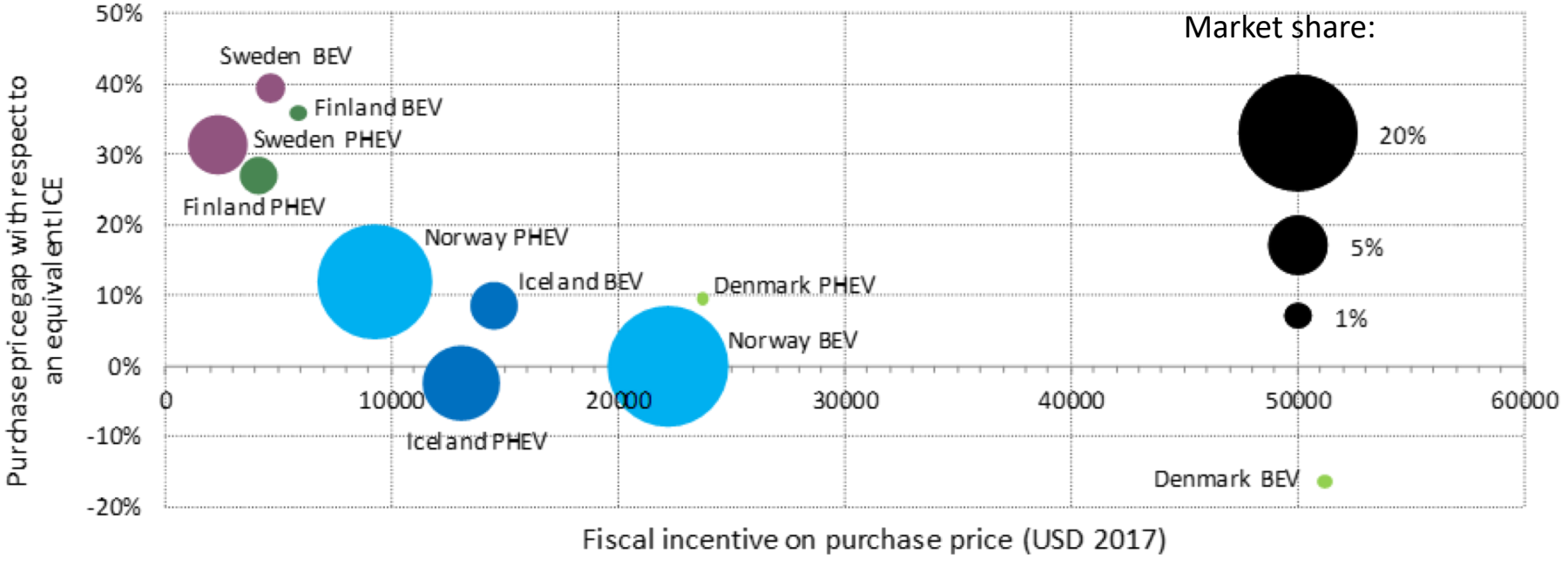
Country	2015 vs. 2016 policy developments		2015 vs. 2016 sales growth		2016 sales	
	BEV	PHEV	BEV	PHEV	BEV	PHEV
China	~		75%	30%	257 000	79 000
United States	~		22%	70%	86 731	72 885
Norway	~	↗	6%	164%	29 520	20 660
United Kingdom	~		4%	42%	10 509	27 403
France	~		26%	36%	21 758	7 749
Japan	~		48%	-34%	15 461	9 390
Germany	~		-6%	20%	11 322	13 290
Netherlands	~	↘	47%	-50%	3 737	20 740
Sweden	~	↘	0%	86%	2 951	10 464
Canada	~		19%	147%	5 220	6 360
Denmark	↘		-71%	-49%	1 218	182
South Korea	~		75%	-40%	5 099	164

Changes in electric car incentives, especially for vehicle purchase, can have an immediate and sizeable impact on electric car sales and steer the market towards either BEV or PHEV preference.

Policy insights from NEVO 2018 (2/2)

- **Strong policies** have driven this growth :
  - **reducing the purchase price** of EVs has emerged as the main factor enabling adoption
  - Lack of **continuity** in policy support has been identified as a major risk (example of Denmark)

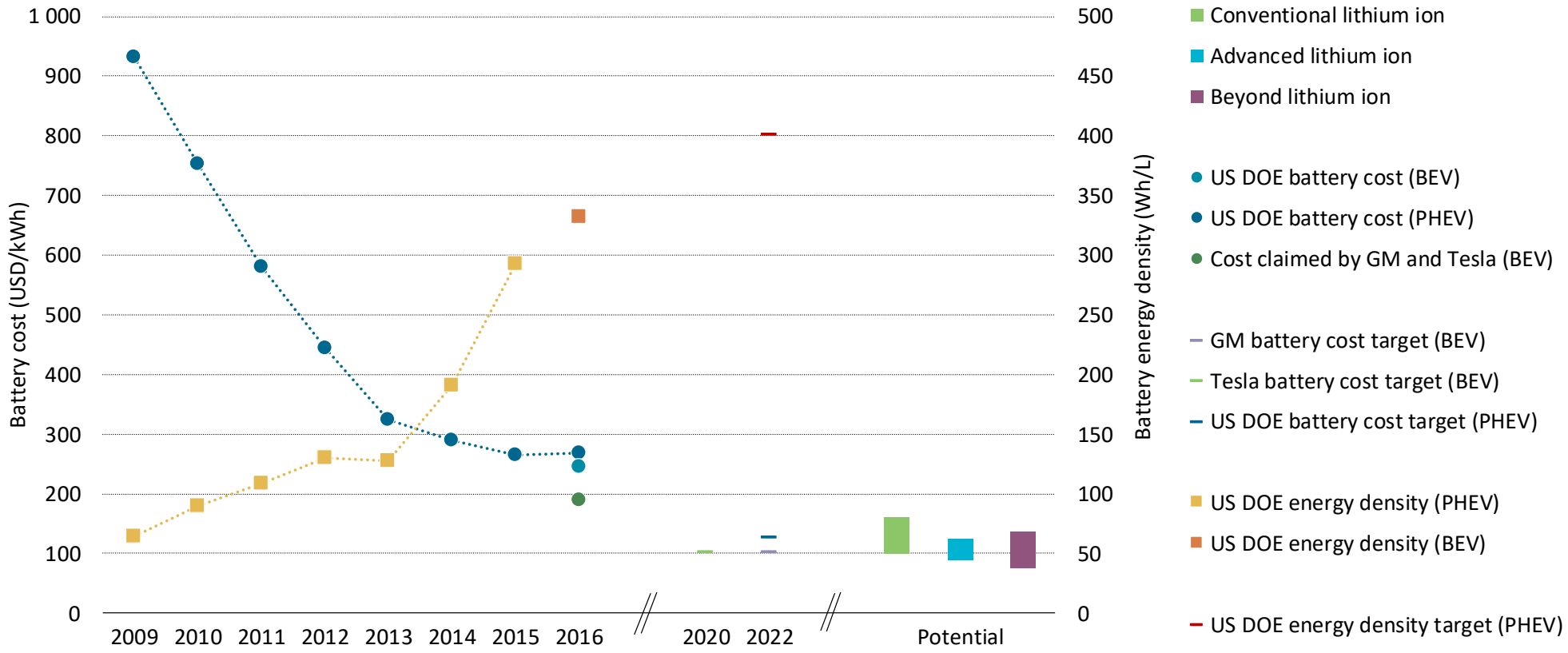
Effect of fiscal incentives on the ICE/EV price gap





Battery costs and range as key factors for the success of e-mobility

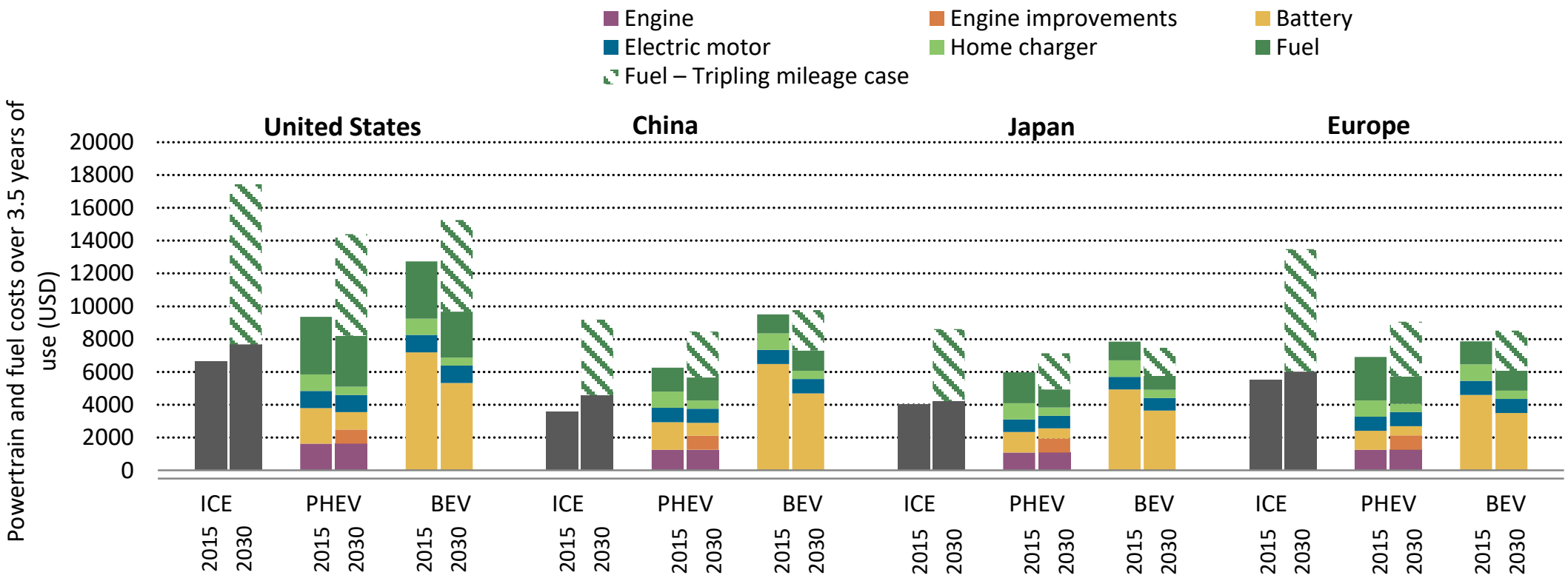
Evolution of battery energy density and cost, 2009-16, and future prospects



Battery costs and energy density progresses are expected to keep delivering positive outcomes. This will further help lowering adoption barriers.

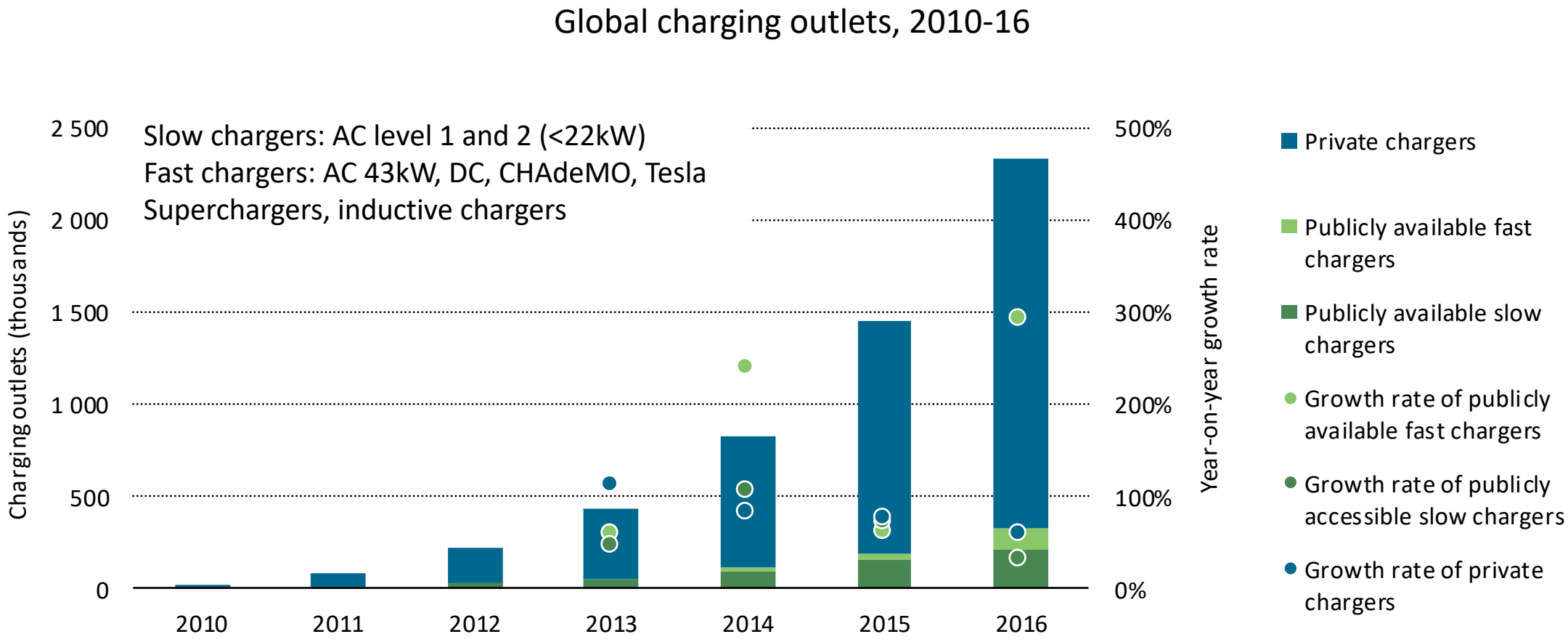
Cost-competitiveness prospects and policy needs

Comparative cost of passenger car technologies by country/region in the 2DS, 2015 and 2030



Achieving cost-competitiveness over the next decade will require policy instruments to allow market scale-up, reflect the cost of externalities of ICEs, and encourage synergies with new mobility models.

EVSE: deployment rates were higher than e-car adoption rates in 2016 (1/2)

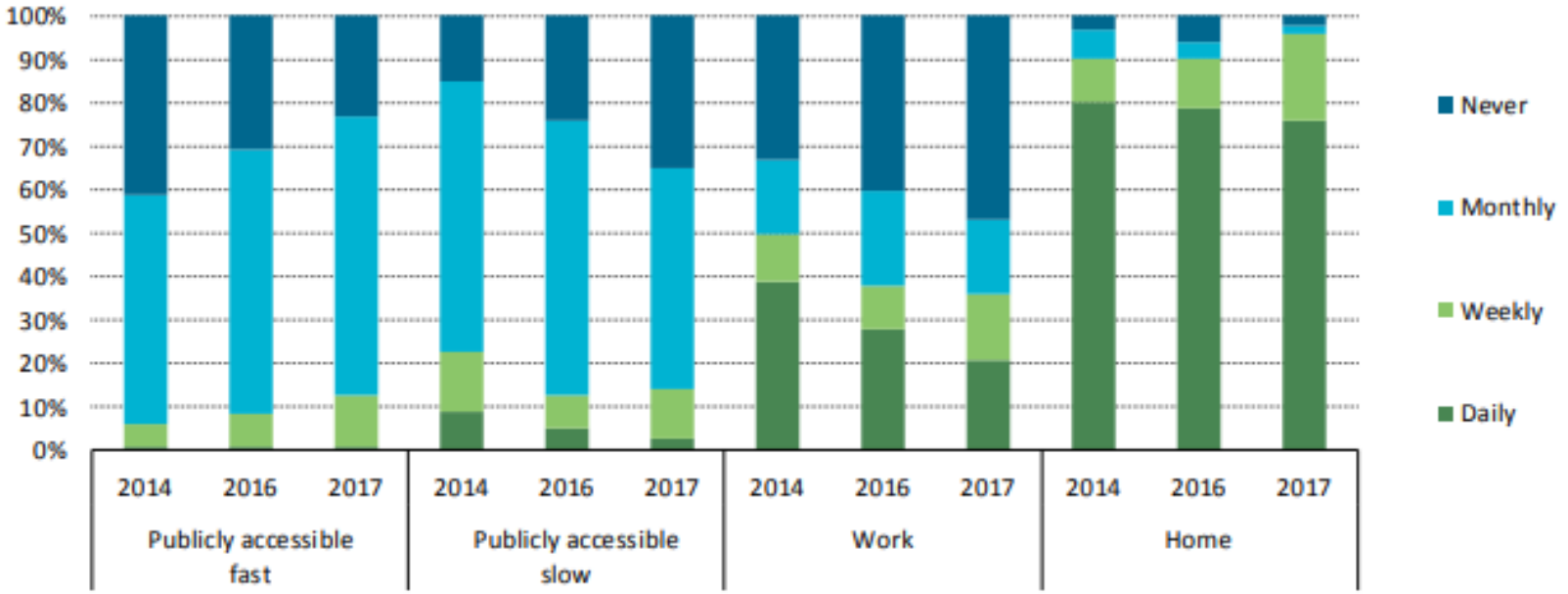


Publicly accessible infrastructure is growing to support the emerging EV market, especially publicly accessible fast chargers. This shows encouraging signs in addressing the *chicken-and-egg* issue.

EVSE: Behavioural insights from NEVO 2018 (2/2)

- **Charging infrastructure** has been implemented alongside EV deployment (2017: 1 publicly accessible charger/16 EVs):
  - **Home charging** is the most widely used by consumers
  - **More charging options** will need to be offered as the market grows. Many players are entering the EVSE market and business models are being tested
  - Delayed charging will need to be implemented to **avoid local grid disruptions** or costly and avoidable grid upgrades

Frequency of charging by EVSE category in Norway, 2014-17





E-mobility is also gaining ground in non-car modes; China leads the way







Electric 2-wheelers: > 200 million, mainly in China.
In other countries: ~200 000 in India, ~30 000 in the Netherlands, ~1 000 in the UK

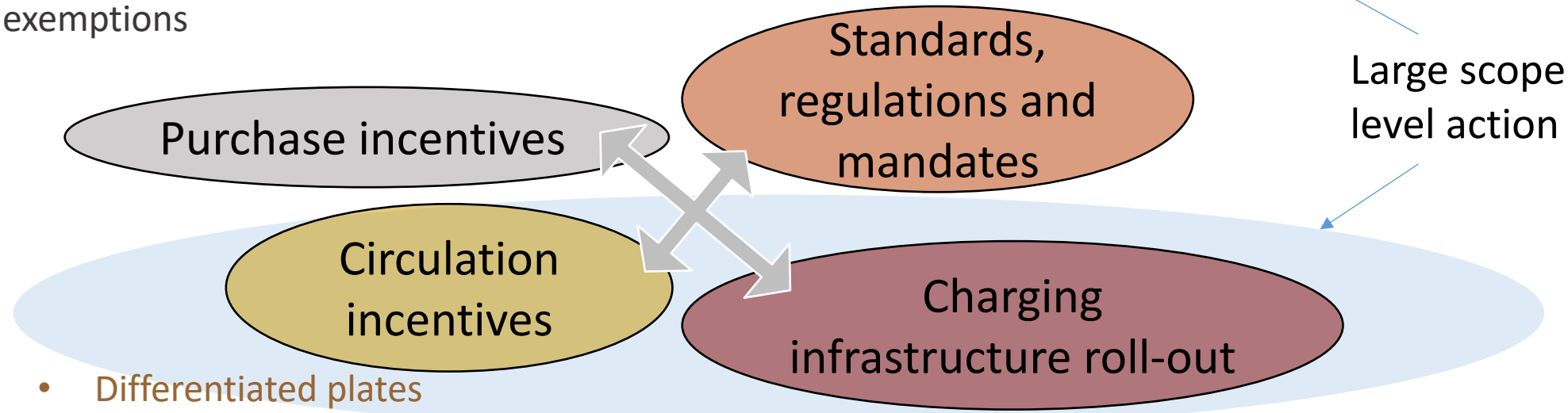
Low-Speed Electric Vehicles: ~4 million in China

Electric buses: 350 000 in China.
In Europe: deployment stage and ambitious procurement plans

EV support policies

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

- Fuel economy standards
- Fuel taxes
- Public fleets, taxi fleets initiatives
- ZEV mandates



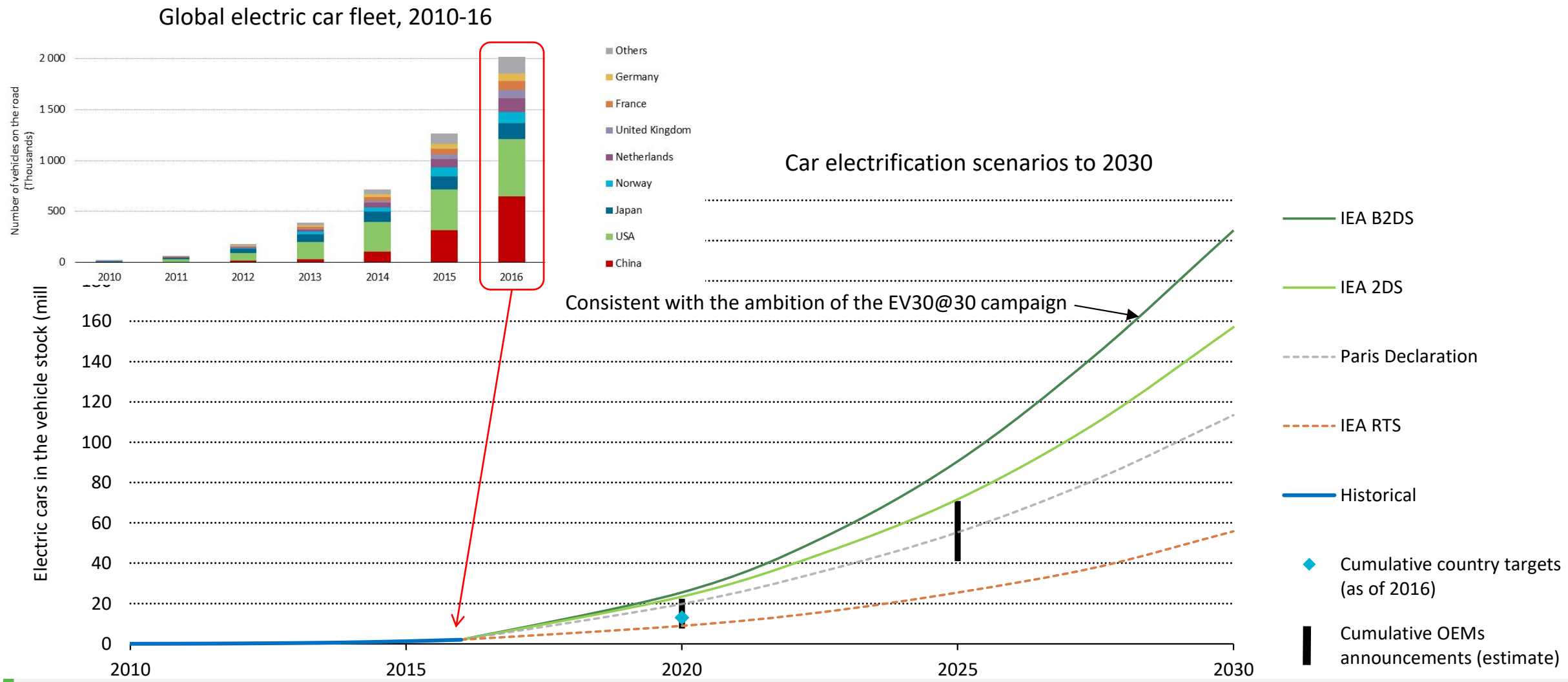
Large scope for city-level action

- 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
- …

Close monitoring of the effect of EV support policies are paramount to avoid adverse effects

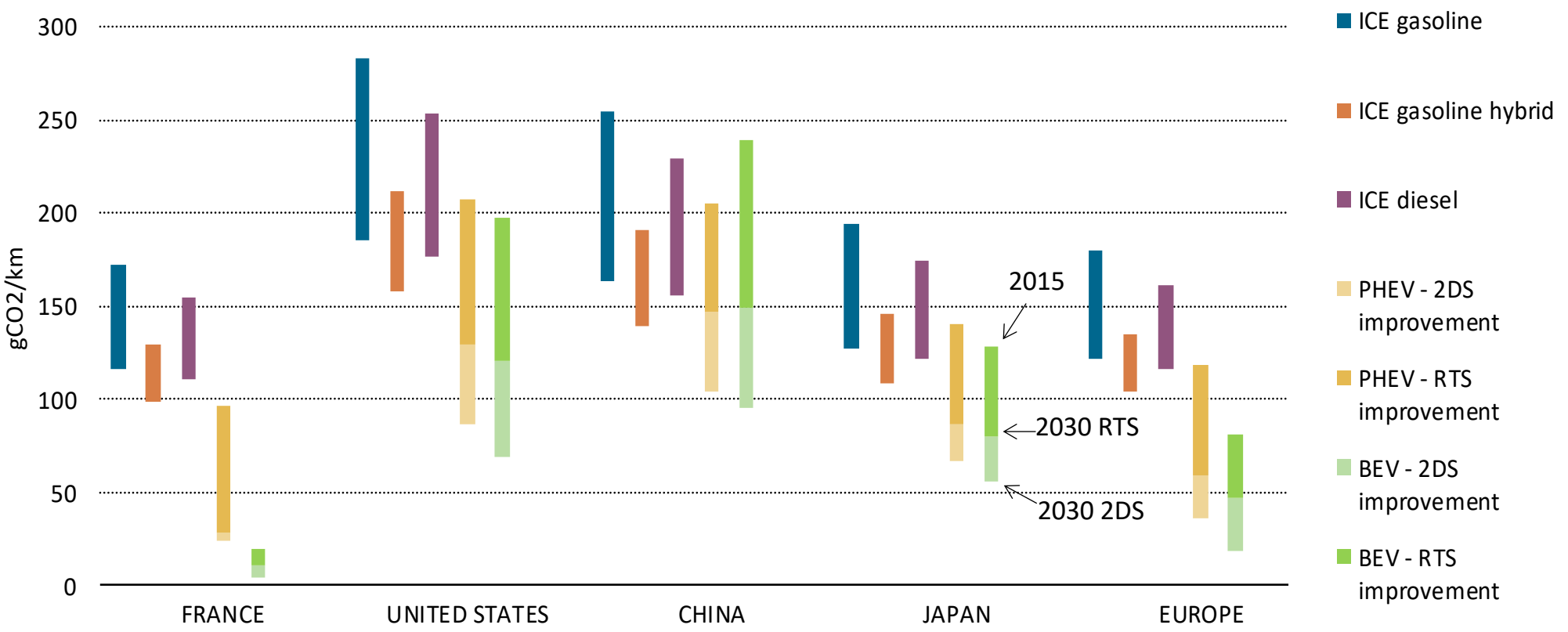
2030 outlook: Electric mobility today and tomorrow (GEVO 2017) (1/2)



The global electric car fleet reached 2 million units in circulation in 2016, and more will be needed to meet sustainability goals, as suggested by the EV30@30 target. Early action, government support and industry commitment are essential.

EVs benefit the environment and are essential to CO_2 emissions reduction

On-road WTW CO_2 emissions for various technologies by country/region, RTS and 2DS, 2015 to 2030



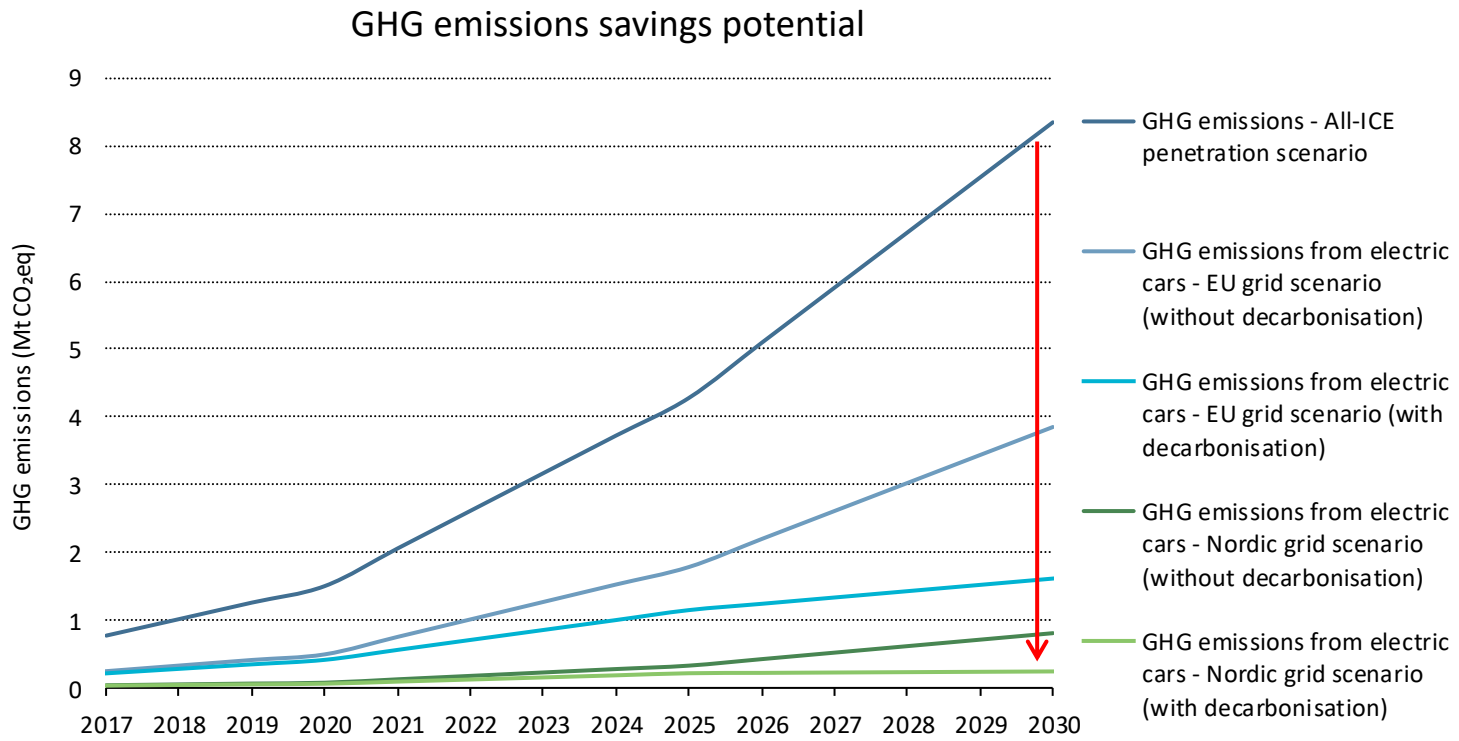
If coupled to low-carbon power, the high energy efficiency of EVs offers prospects for substantial CO_2 emissions reductions. This complements their air quality, energy security and noise reduction benefits.

2030 outlook: GHG emissions savings (NEVO 2018) (2/2)

- Nordic climate targets suggest that

4 million electric cars could hit the road by 2030:

  - They would consume 2-3% of the projected electricity demand …
  - … and have the **potential to save 8MtCO$_2$** equivalent on that year thanks to a low carbon grid



Thank you



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