

Will EV policy lead to cost-effective electrification of passenger cars?

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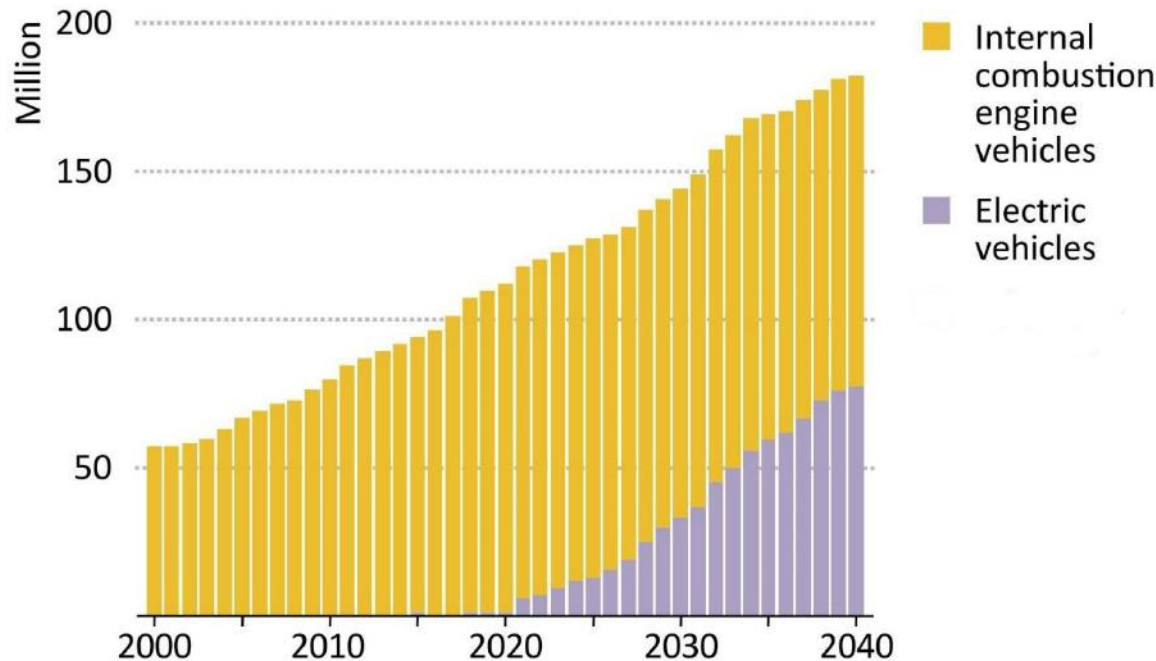
Key points

- EV policy today aims to expedite uptake, driven by GHG emission reduction and air quality targets
- EV policy has a strong influence on EV and infrastructure development paths
- Results of UK and California case studies suggest that:
 - EV policy with a strong bias towards BEVs risks leading to higher cost of electrification in the medium term (2030)
 - EV policy that sets the transition on a cost effective path needs to target not only EV types but also market segments
- Transparent meta-models can facilitate discussion of cost implications of different EV policy designs

Policy targets and EVs

- EVs are regarded as an important part of the solution to climate change and urban air quality issues
- Climate scenarios suggest that rapid uptake of EVs is needed

Global EV market shares in the 450 scenario of the IEA



Source: IEA (2015) Energy and Climate Change – WEO Special Report

EV policy focuses on rapid deployment

Emphasis on removing barriers to rapid deployment of EVs:

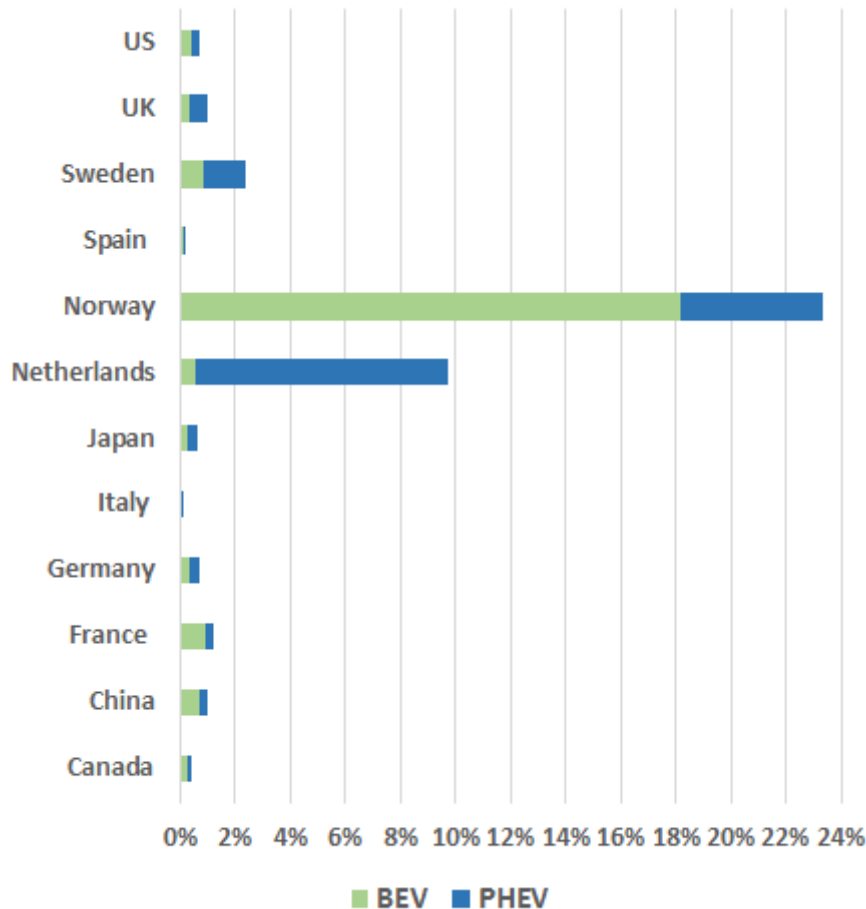
- Financial and non-financial incentives to EV adoption
- Mandates for manufacturers or stringent fuel economy standards
- Incentives and regulation on charging infrastructure build-up

But no clear vision of what an electrified passenger car system would look like, nor how cost-effective it would be. Expectation is that:

- Incentives will not be needed for very long due to rapidly falling costs and improving technology
- EVs can become near-perfect substitutes of today's ICEVs

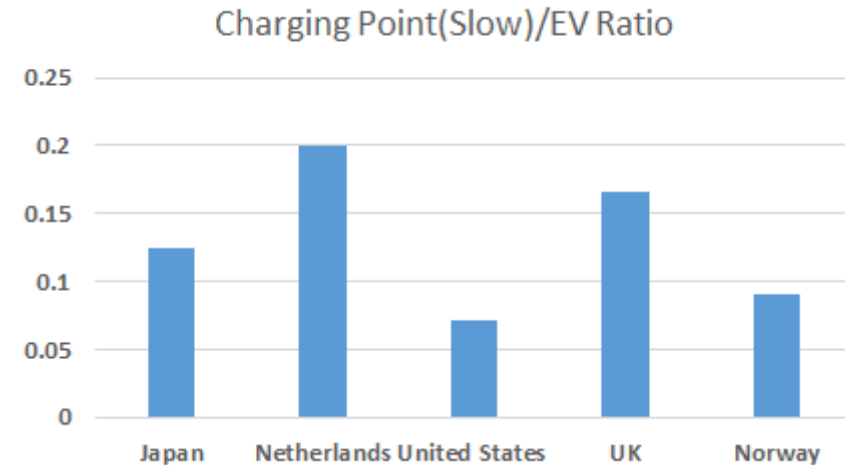
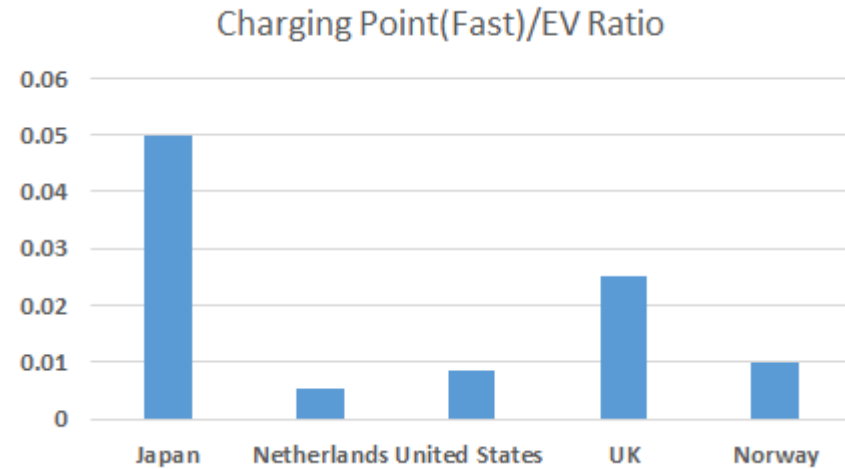
EV and EVSE deployment is shaped by policy

Market share growth of BEVs and PHEVs



Source: EVI Global EV Outlook 2016

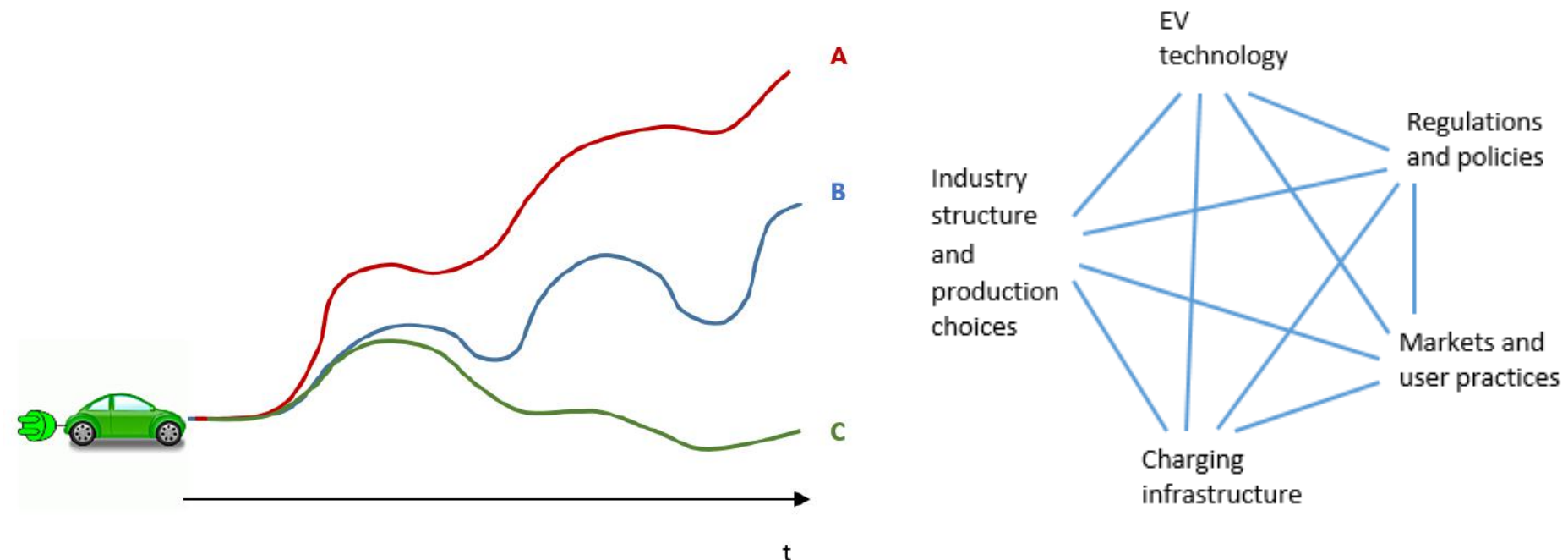
Charging point/vehicle ratio



Source: EVI Global EV Outlook 2016

Will EV policy drive cost-effective use of technology?

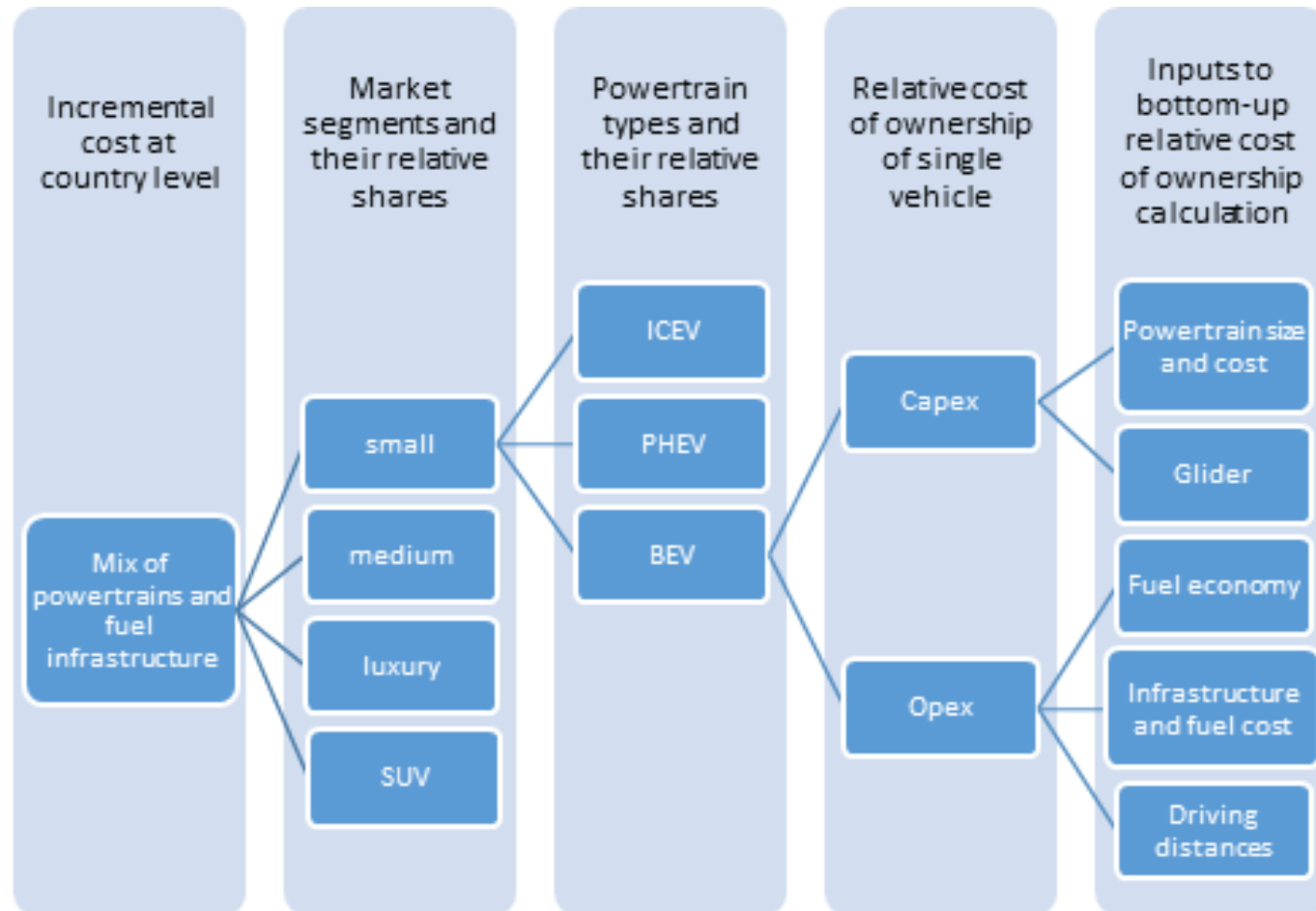
Current EV policy matters because EV technology development is likely to show path-dependence and a tendency to lock-in



Adapted from Geels (2002)

Estimating the incremental cost of future EV mixes

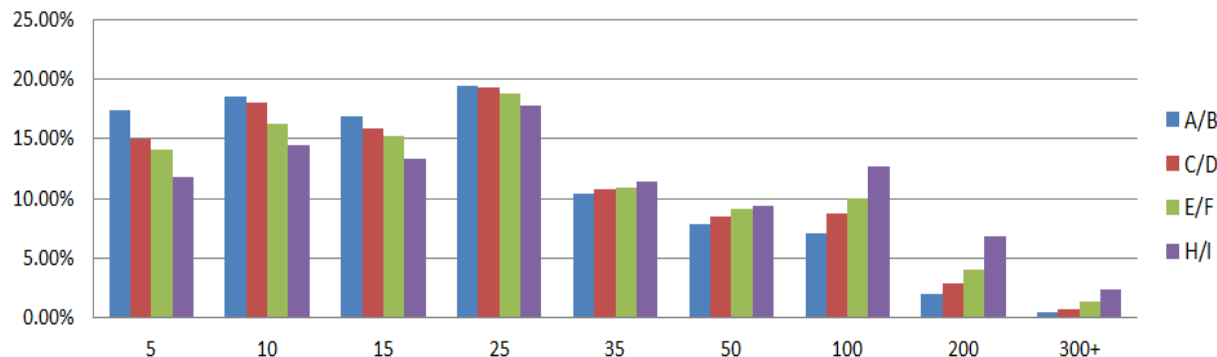
We conduct 2 case studies (the UK and California) using a bottom-up meta-model to assess the cost-effectiveness of policy-driven EV mixes



Some important differences between UK and California

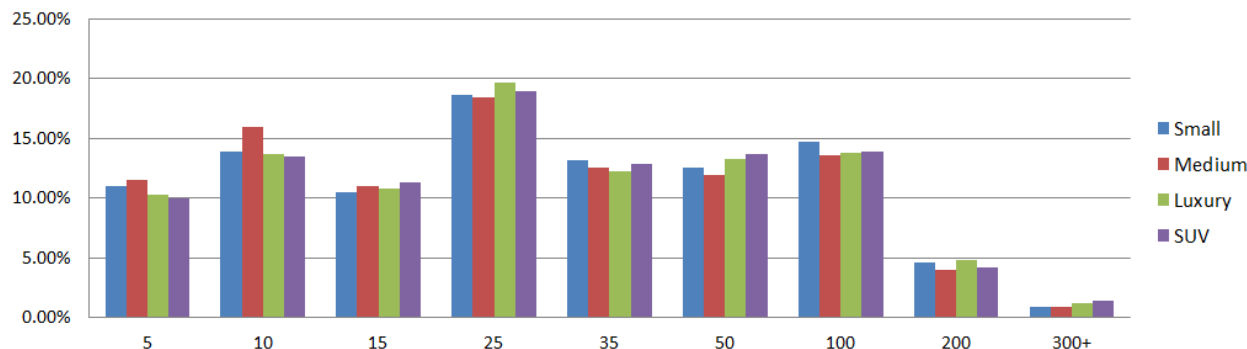
Characterisation of main market segments

Distribution of daily driving distances - UK



Segment	Weight (kg)	Power (kW)	Market share
A/B	1,050	64	40.6%
C/D	1,300	92	40.8%
E/F	1,550	135	4.8%
H/I	1,550	105	11.3%

Distribution of daily driving distances - California

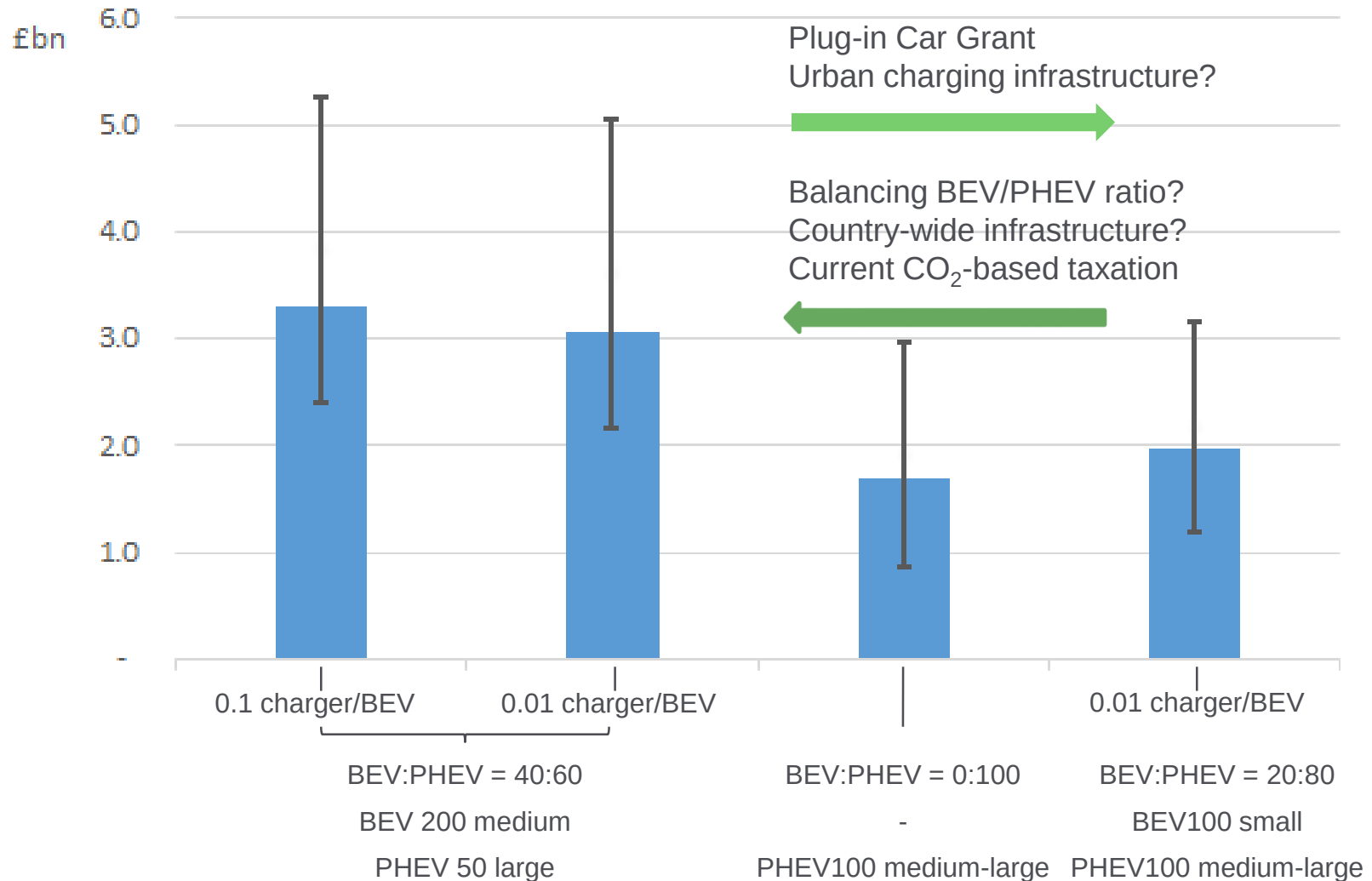


Segment	Weight (kg)	Power (kW)	Market share
Small	1,270	90	26.8%
Medium	1,475	140	31.1%
Luxury	1,735	224	10.7%
SUV	2,010	216	20.1%

Source: KAPSARC analysis of UK NTS and US NHTS

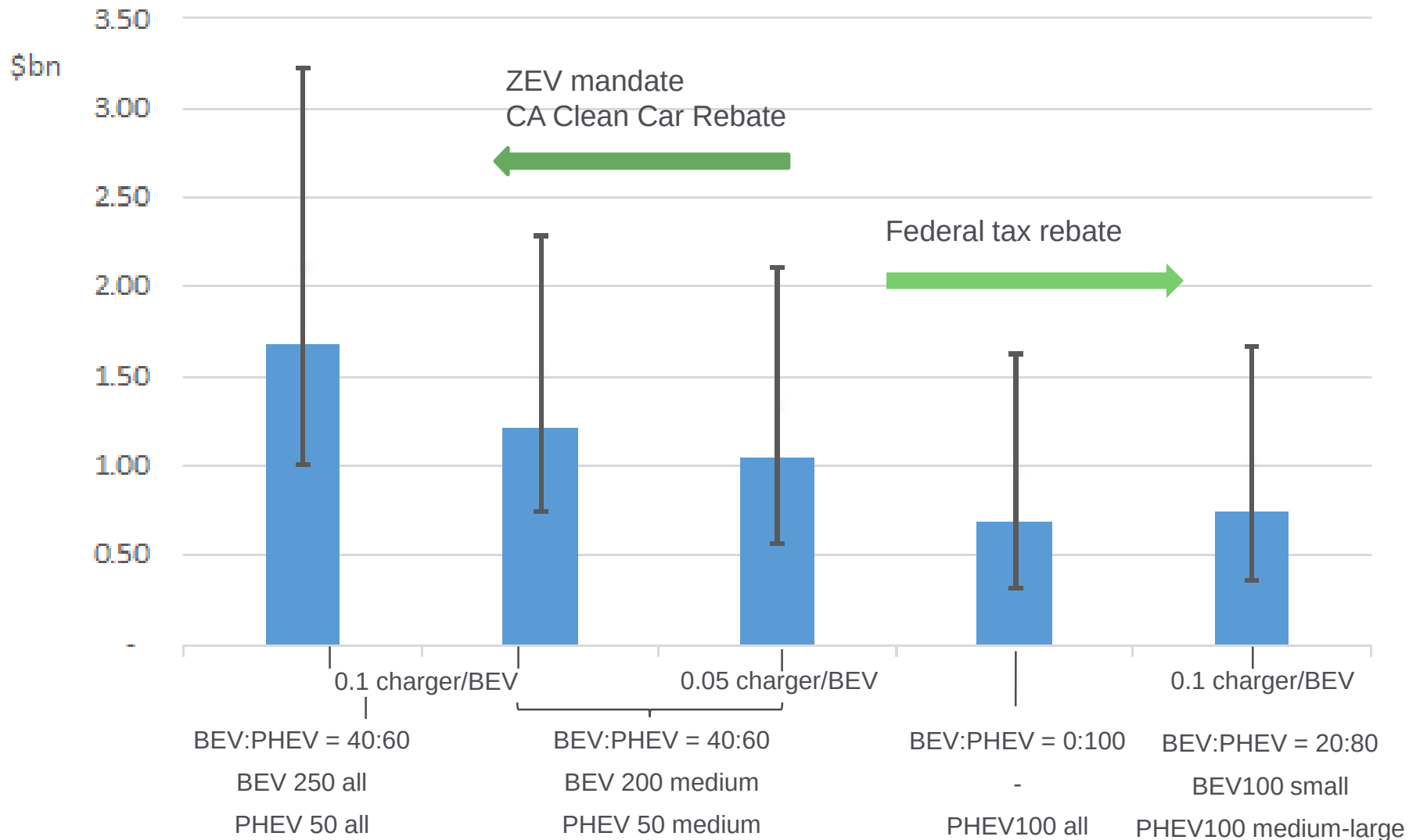
UK – Incremental user cost of key EV mixes

year 2030, 60% EV market share, ~55 gCO₂/km NEDC



California – Incremental user cost of key EV mixes

year 2025, 1.5M EVs on the road



Key insights

- EV policy aimed at accelerating electrification risks setting us on a high-cost path
 - Strongly favouring adoption of BEVs, it increases exposure to battery development risk
 - Charging infrastructure strategies, if not carefully chosen, could further contribute to this
 - As a result of which the EV transition could stall
- However EV policy that sets us on a cost-effective path is possible with careful design
 - It needs to consider not just EV types, but vehicle segments in which these fit
 - Recent policy developments broadly point in the right direction
 - But more attention is needed
- Simple meta-models may support the necessary discussion and planning