Envision AESC, Sunderland

Economics update

November Conference

Stephen Gifford, Head of Economics
November 2019

THE FARADAY INSTITUTION

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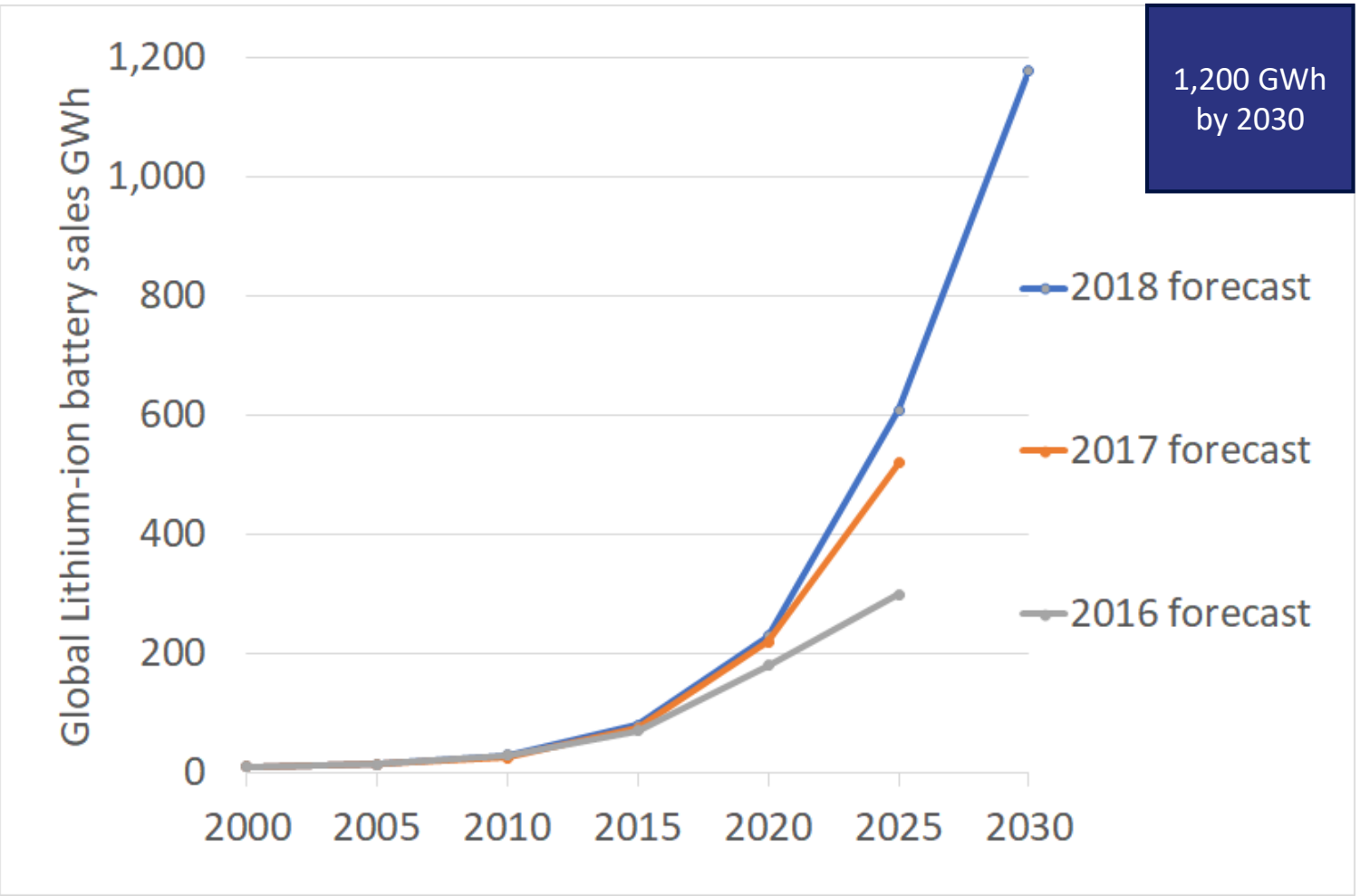
THE GLOBAL BATTERY MARKET IS GROWING FAST

- Global demand is growing faster than forecasters can forecast!
- Around 85% of demand in 2030 is from the EV market
- Energy storage and electronic devices make up the rest of the market

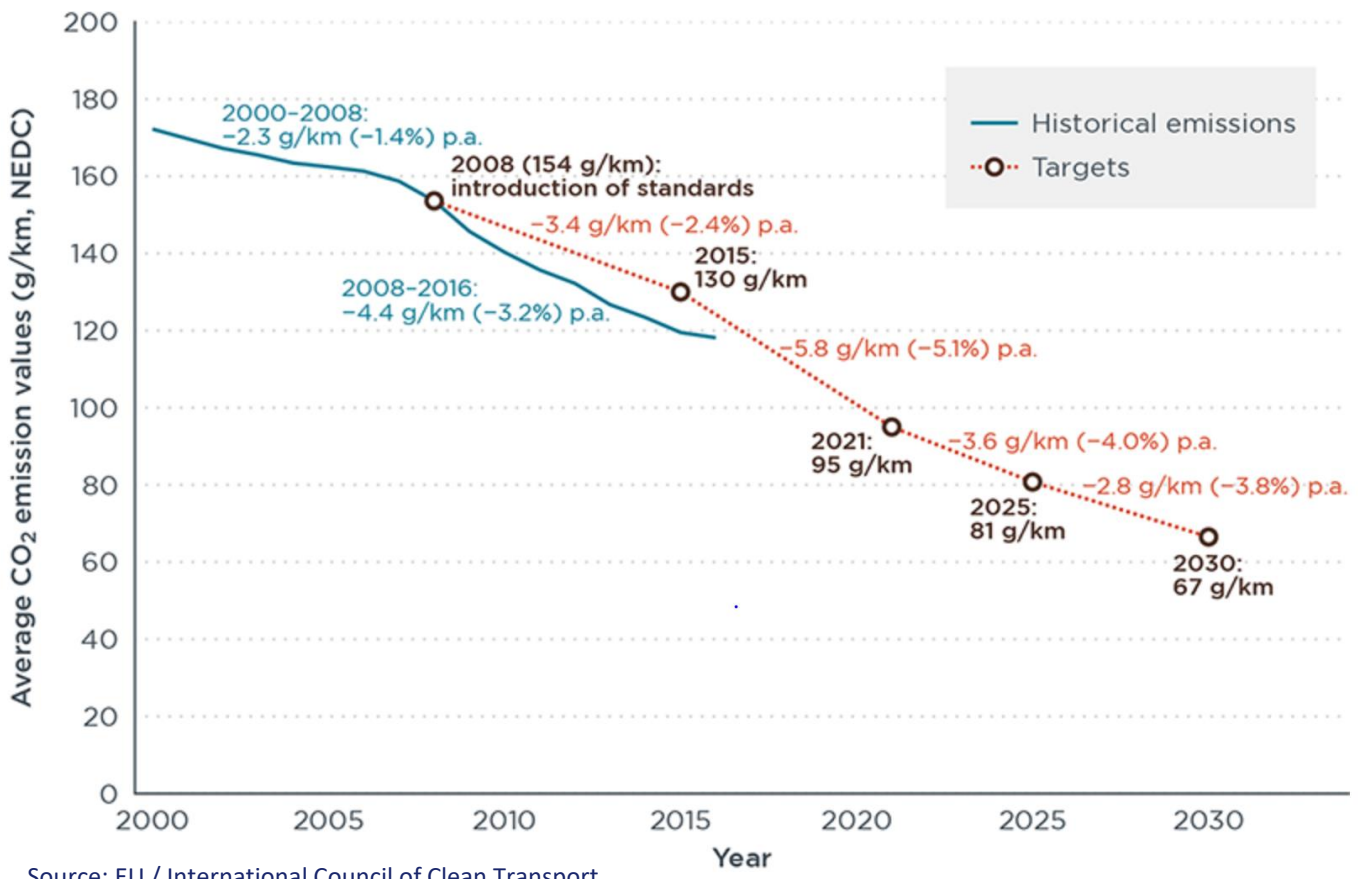


Source: Avicenne Energy

REGULATION: THE EV MARKET IS TRANSITIONING FROM A INCENTIVE-BASED MARKET TO ONE DRIVEN BY REGULATION

- New EV models will start to flood the market from 2020/21
- Production cycle times mean the likely auto market for 2020-2025 is already well known
- Design decisions are being made now on the technology for the 2030s market

Average CO2 emission level for new passenger cars in the EU

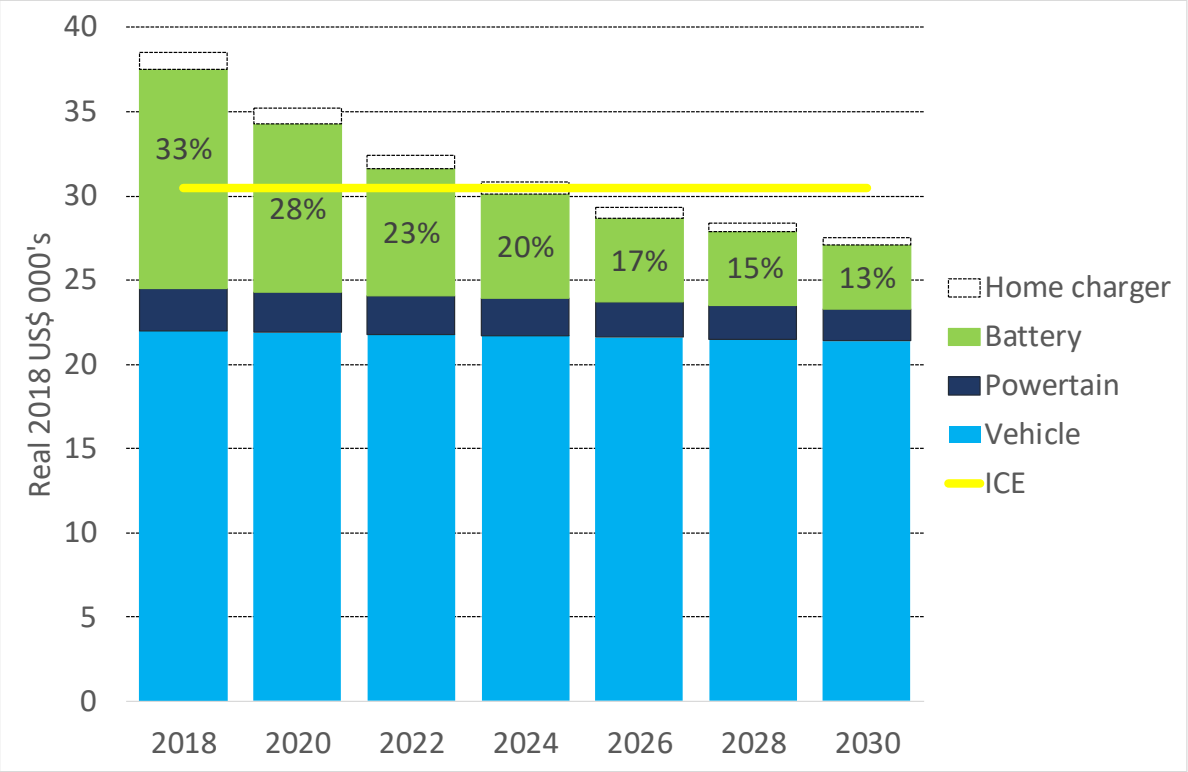


Source: EU / International Council of Clean Transport

COST: EV PURCHASE PRICE WILL REACH A TIPPING POINT IN THE EARLY 2020S

- EVs expected to reach parity in the next few years (between 2022-2024 depending on source)
- Total cost of ownership for average model already cheaper for EVs

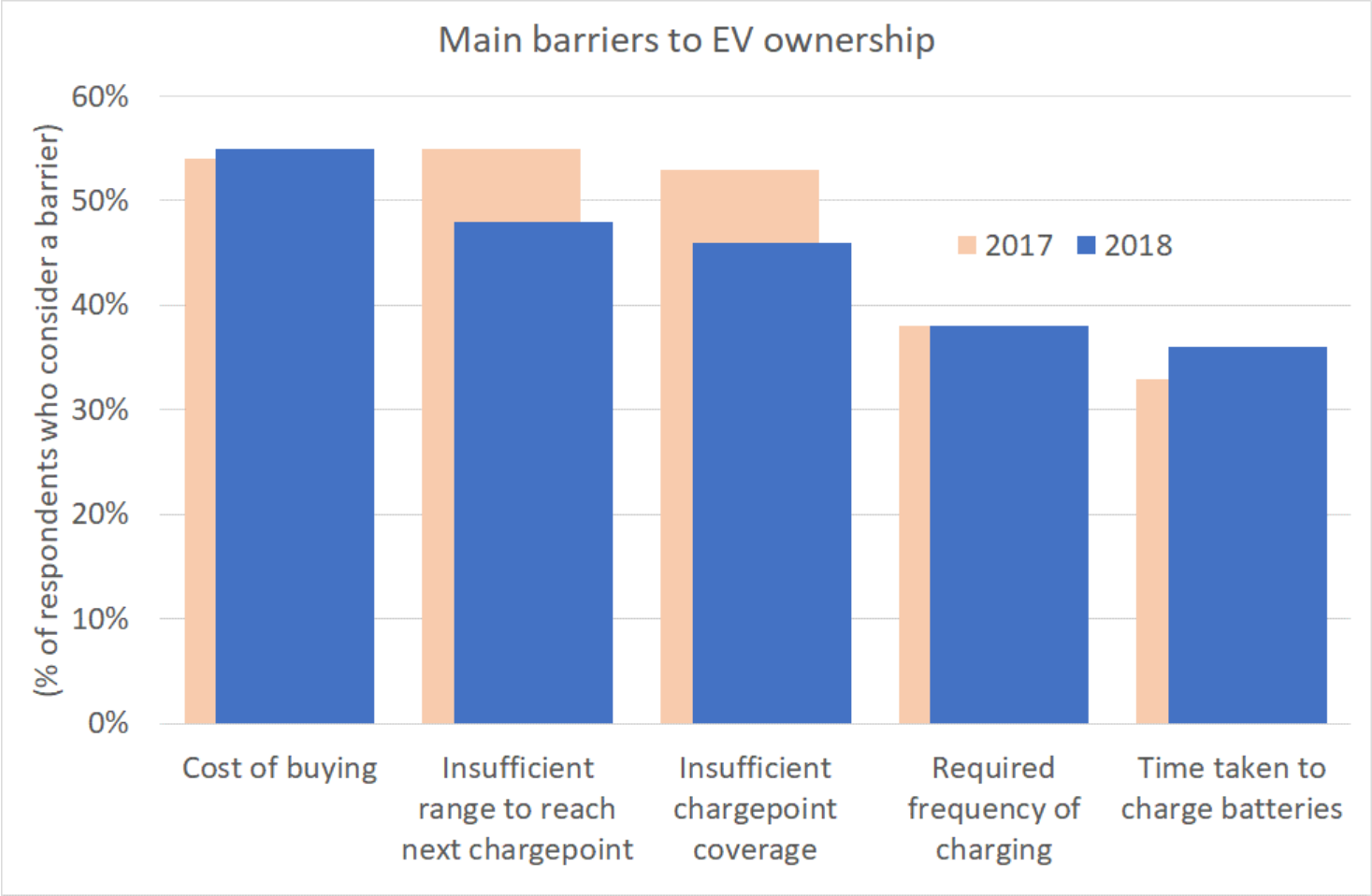
EU pre-tax retail price for medium ICE and BEV



Source: BNEF EVO2019

INFRASTRUCTURE: PERCIEVED RANGE ANXIETY AND LIMITED MOTORWAY RAPID CHARGING NETWORK IS A KEY BARRIER TO UPTAKE

- Insufficient range is a key barrier but has declined from 55% to 48% in the past year
- EV owners want improved charging times
- Non-EV owners are concerned about:[1]
  - Purchase price (83%)
  - Charging network (80%)
  - Lack of rapid charging on motorways (79%)

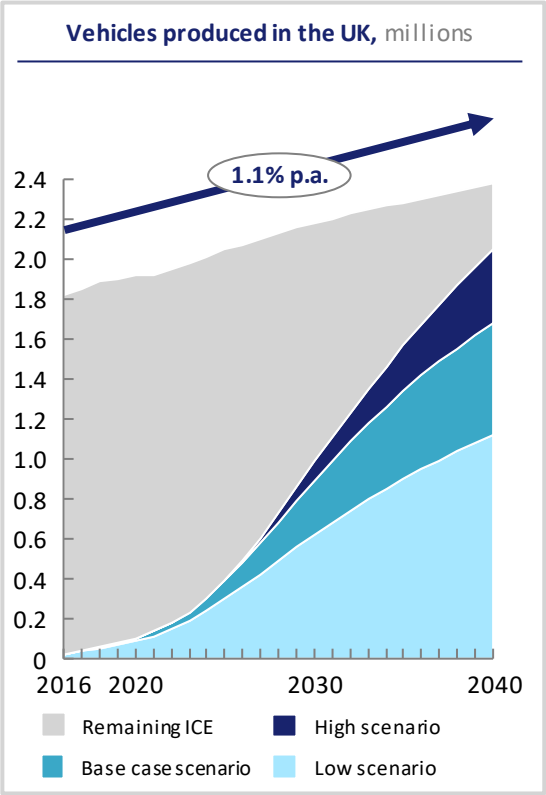


Source: [1] AA Populus Driver Poll 2018

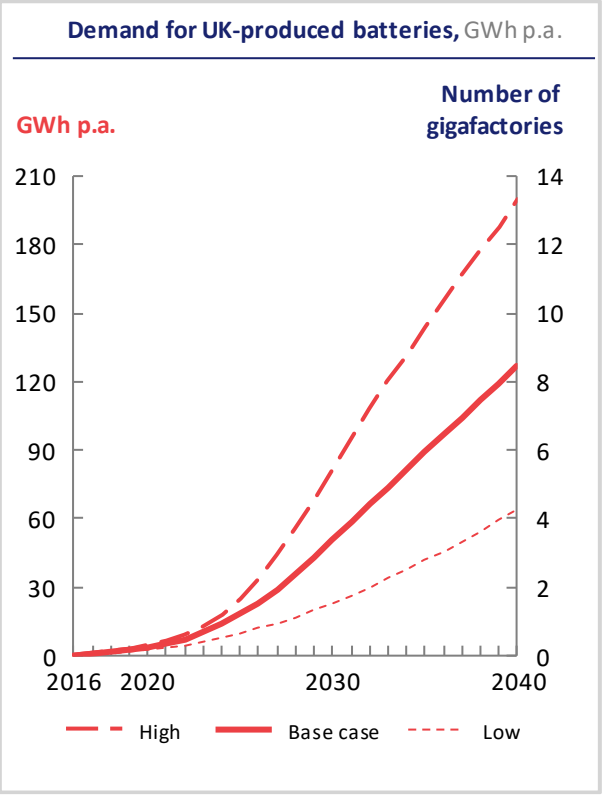
Source: Baringa – Is the UK ready for Electric Cars

GIGAFACTORIES: UK EV DEMAND SUPPORTS 8 GIGAFACTORIES IN 2040

- EV demand will support 8 Gigafactories in 2040
- UK manufacturing capacity of 60-200 GWh in 2040
- UK industry of 246,000 employees in 2040



Source: The Faraday Institution

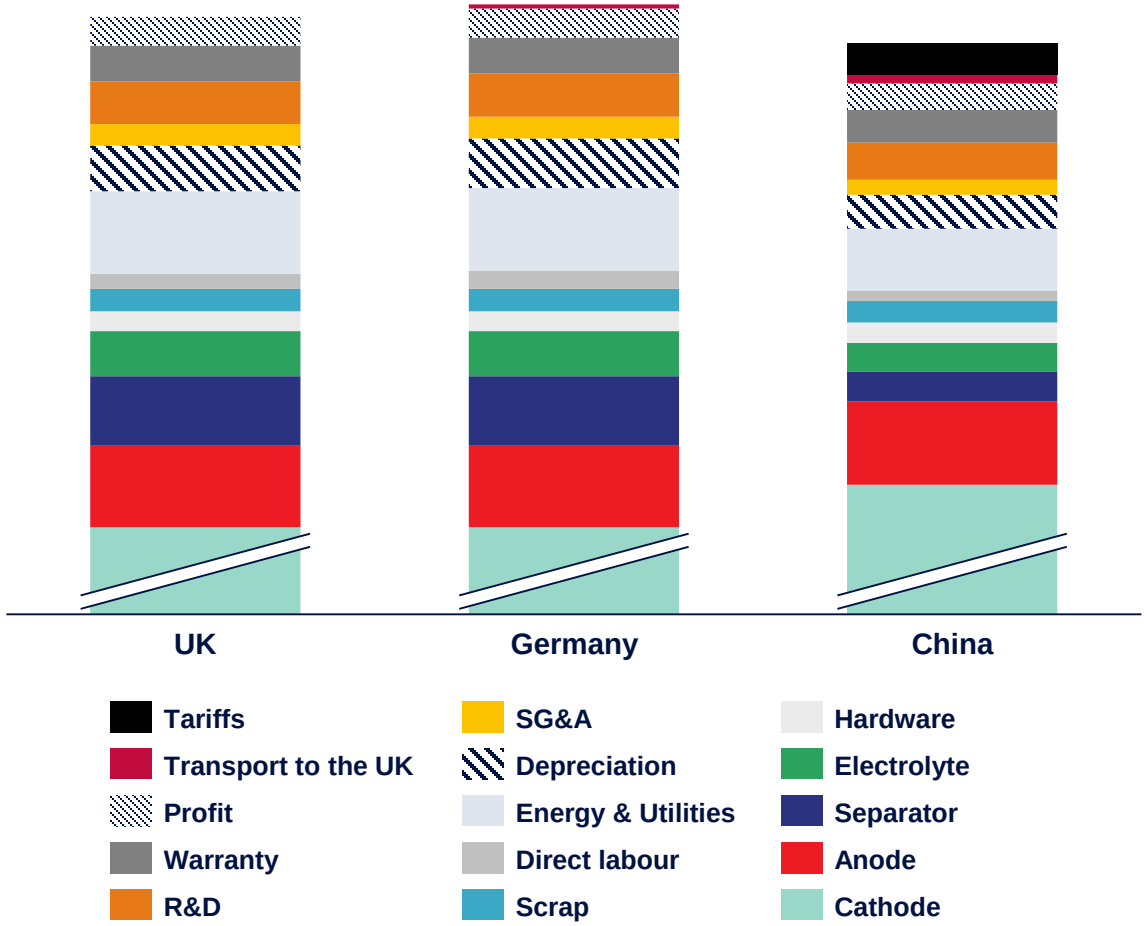


Source: The Faraday Institution

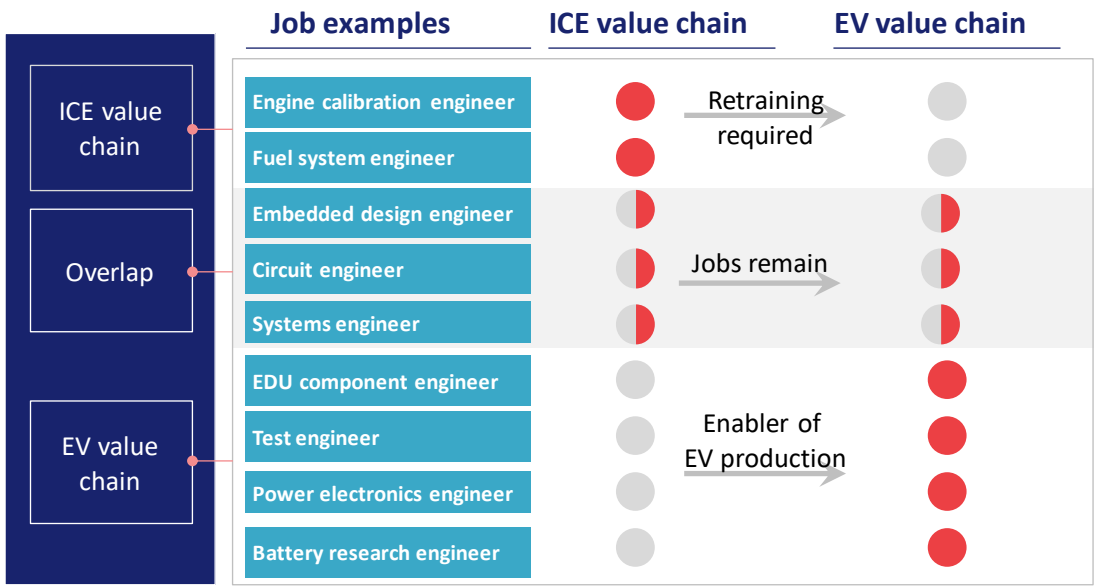
COMPETITIVENESS: UK CELL MANUFACTURING CAN COMPETE WITH EUROPE AND EVEN WITH CHINA UNDER THE RIGHT CONDITIONS

- Compared the potential costs of lithium battery cells manufactured in the UK with China & Germany
- The UK has a slight advantage over Germany, but China outperforms both
- State subsidies and a working concentrated supply chain favours China
- But with government support the UK could compete with China

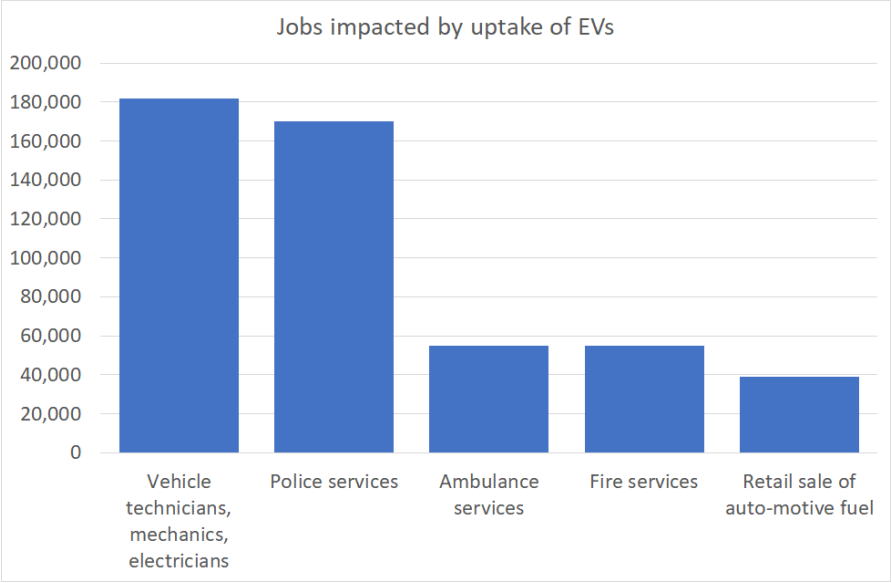
Costs of cells delivered to the UK by country of manufacture ($/kWh)



SKILLS: EXTENSIVE TRAINING AND SKILLS DEVELOPMENT REQUIRED



- 75% of the workforce for a Gigafactory and its supply chain will need experienced level 2 & 3 technicians in advanced manufacturing



- Fire, police, ambulance, and service personnel will also need new skills to handle EV accidents and repair

GOVERNMENT SUPPORT ABOUT TO EXPAND

Develop and embed the next generation of cutting-edge automotive technologies

- £1 billion fund announced
- Investment in the manufacturing of batteries (cells, modules and packs)
- Research and development into new, advanced EV technologies
- Investment in electric motors, power electronics and hydrogen fuel cells
- Builds on the £1 billion Advanced Propulsion Centre and £274 million Faraday Battery Challenge

Conservative Party/Government Press release (15 October 2019)

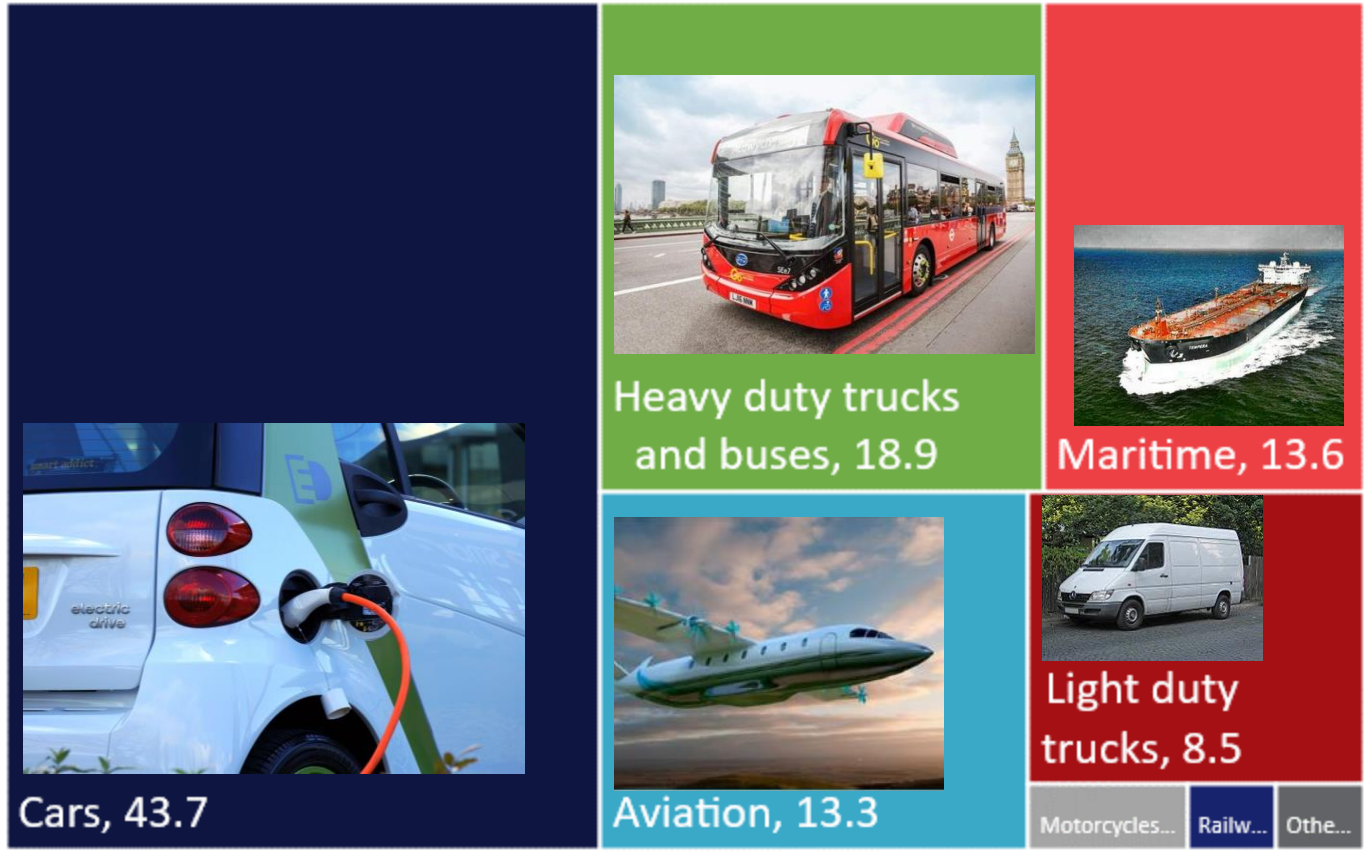
Electric Revolution & construction of three battery plants

- £2 billion announced for Gigafactories
- £500 million into four metal reprocessing plants to reprocess cobalt and rare earth minerals
- £500 million for research and development in electric, connected and autonomous car technology

Labour Party Press release (24 September 2019)

WHERE SHOULD WE FOCUS NEXT?

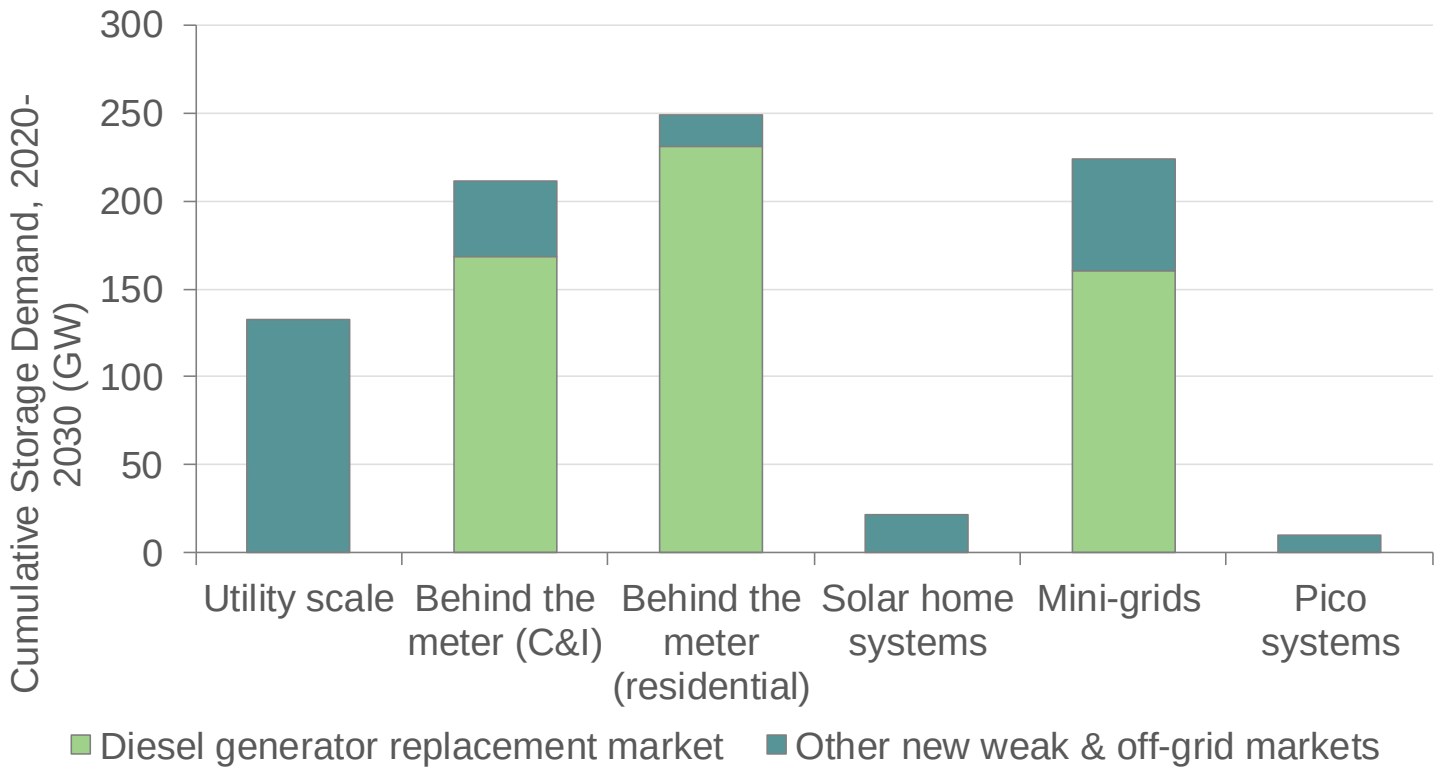
Share of transport greenhouse gases in the EU



Source: European Environment Agency

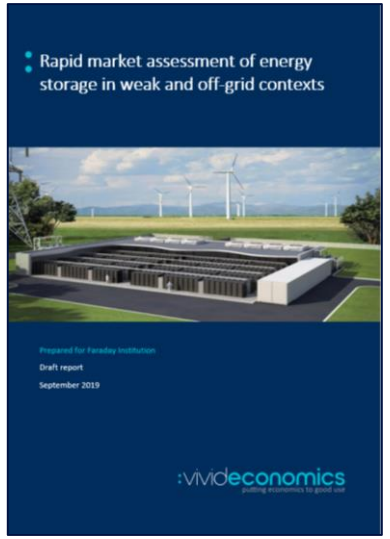
- Road transport accounts for 72% of greenhouse gas emissions from transport
- Transport is the sector with the largest emissions (27% of greenhouse gas emissions)

FALLING COSTS OF ENERGY STORAGE ARE LEADING TO INCREASED UPTAKE IN DEVELOPING COUNTRIES



Source: Vivid Economics

- Opportunity to provide cheap, clean and reliable electricity in developing countries: Market of 720 GW
- Diesel generator replacement market is particularly substantive market



Q&A

Discussion points

- Take-up of EVs in the UK
- Government intervention in the UK EV & battery industry
- Opportunities the Faraday Institution's research should focus on

Thank you

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