

Automotive Transformation

A UK Opportunity & Imperative

Ian Constance – Chief Executive Officer

Julian Hetherington - Director, Automotive Transformation

Introduction to the APC

Ian Constance- Chief Executive Officer

The current situation...



The UK has a significant automotive supply chain which needs to continue to pivot into greener technology if we are to maintain and grow skilled jobs in the UK



Meeting the UK's 2050 commitments will require continued effort to reduce the emissions of the UK transport sector



Today, transport offers the most significant opportunity to reduce UK emissions



transport as a whole accounts for 28% of UK GHG emissions



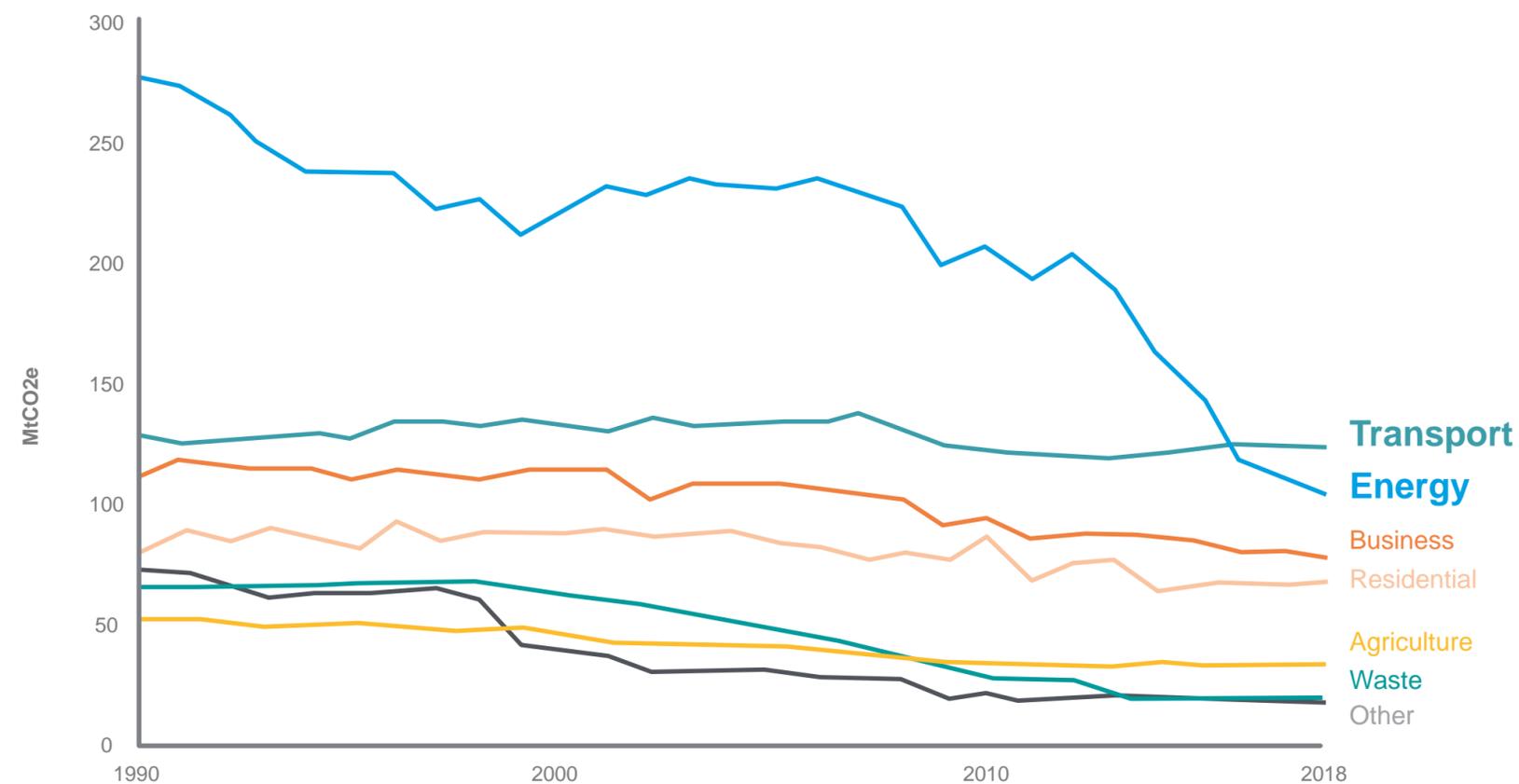
almost double the amount produced by UK homes



2034

The vehicle development cycle in the next 10 years will affect our emissions output for a nearly a quarter of a century

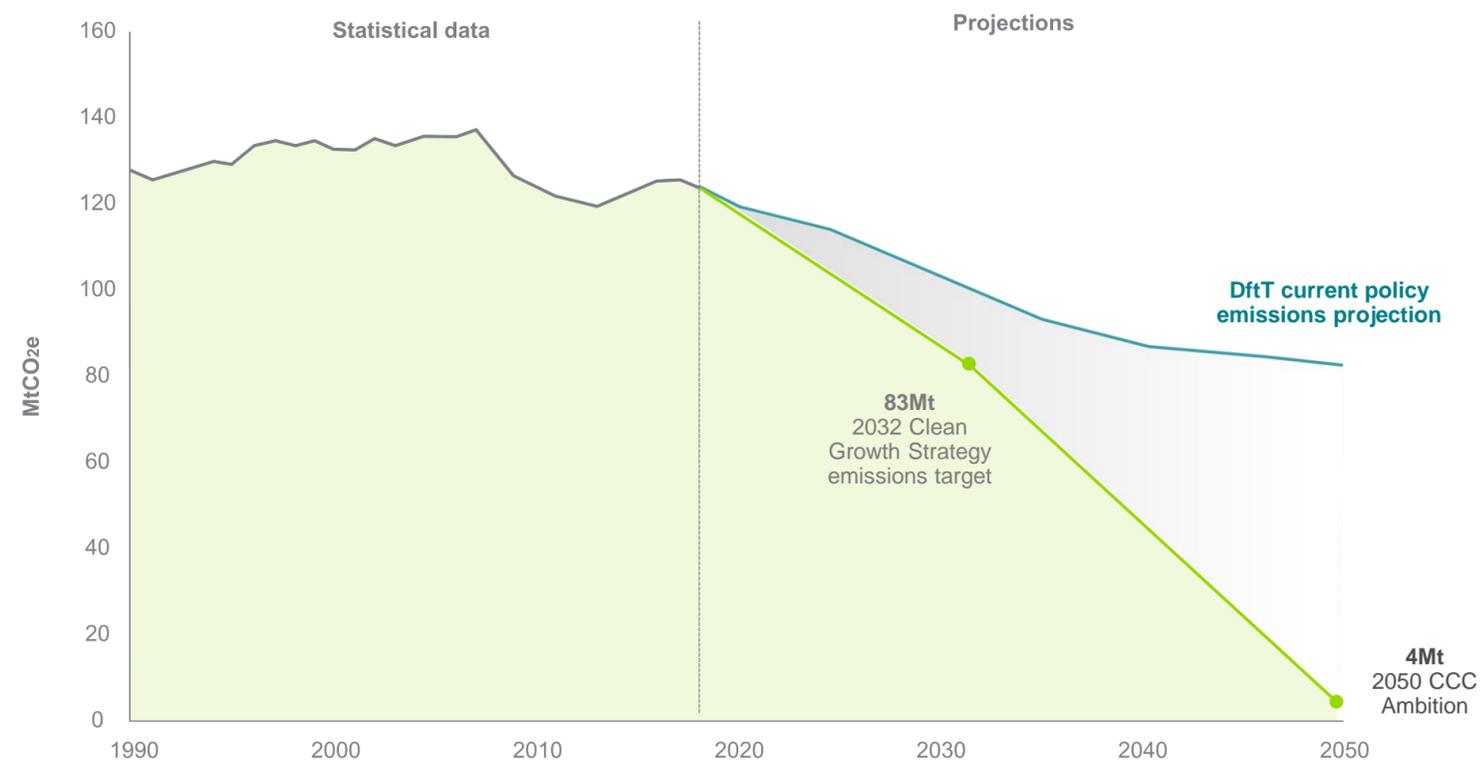
We need to act to keep up



Over the last 30 years transport has lagged behind in reducing CO2 emissions compared to energy production

The work supported through Blyth on offshore wind has helped the energy sector significantly

The pace of change required to achieve net zero is huge



If we are to achieve net zero we need to support the transition to low carbon automotive technology

SINCE 2013 THE APC HAS PLAYED A UNIQUE ROLE



Offering expertise and cutting edge knowledge

With industry experience over many years



Identifying where investment will be most effective

Mapping the future development opportunities in low carbon technologies



Creating a national network to leverage University expertise

6 Technology Spokes giving industry access to leading University facilities and academics



Building project consortia

To accelerate the development of the next generation of low carbon technologies



Ensuring match-funding support is well spent

Using a comprehensive and competitive process to identify the strongest prospects



Supporting key low carbon initiatives

Accelerating additional development in battery and autonomous vehicle technology



DELIVERING SUBSTANTIAL IMPACT



110+
low carbon
projects

290+
project partners

40,000+
Jobs created /
safeguarded

225 million+
tonnes of
CO₂ savings

1 million+
vehicles use
APC-funded technology



Automotive Transformation Fund

Julian Hetherington- Automotive
Transformation Director

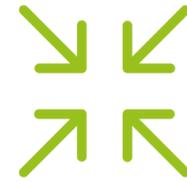
Automotive is a strategically important industry in the UK



People

59,000+
Engineering and
manufacturing apprentices

823,000+
People employed in the UK
automotive industry



UK exports

1.2m
Vehicles made in the UK

80%
Of cars made in the UK
are exported

160
Export destination
countries

~1.2m
UK-made engines exported
each year



Manufacturers

£3.75 billion
Spent annually on research
and development

- 8** Major premium and sports car manufacturers
- 6** Mainstream car manufacturers
- 4** Commercial vehicle manufacturers
- 8** Bus and coach manufacturers
- 60+** Specialist vehicle manufacturers
- 9** Engine manufacturers

The UK is committed to electrification

- Commitment to phase out vehicle emissions
- In 2019, the UK became the first major economy in the world to commit to end its contributions to global warming by 2050
- The UK will end the sale of new petrol and diesel cars and vans by 2030

- The Automotive Transformation Fund – supporting large-scale industrialisation and scale-up of electrification technologies and their associated supply chains



The Automotive Transformation Fund

- Launched in July 2020
- Secure the transformation to electrification of the UK automotive sector at pace
- Capital investment support for factory equipment, land, buildings and set-up costs
- Support for economic and technical compatibility feasibility studies leading to industrial investment

Zero Emission

Supporting industrialisation and scale-up of



Batteries



Motors and drives



Power electronics



Fuel cells



Recycling



Supply chain



Automotive Transformation Fund

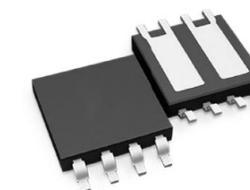
Supporting industrialisation and scale-up of:



Batteries



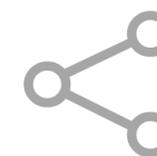
Motors &
Drives



Power Electronics



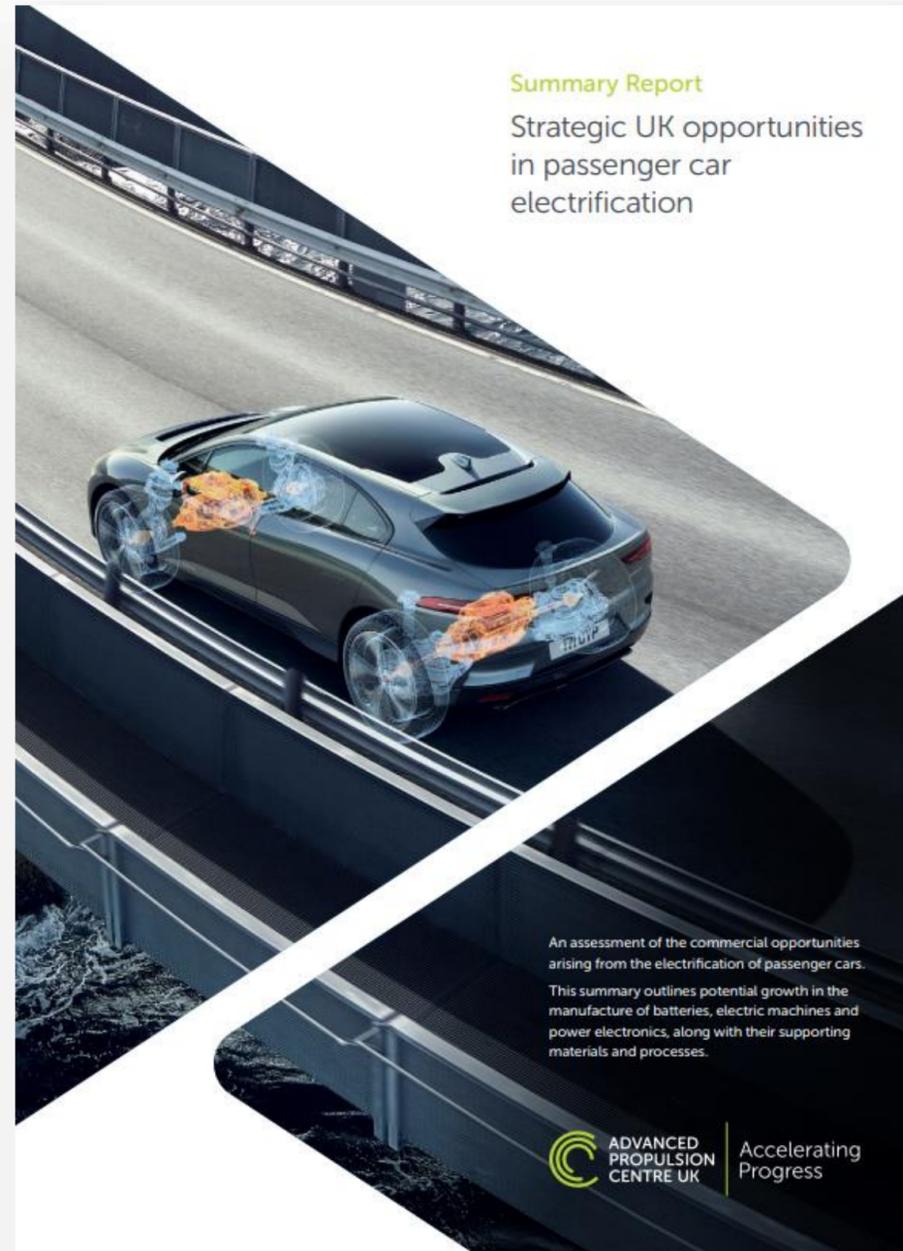
Fuel Cells



Supply Chain

Why are Gigafactories important?

Passenger car report



Area
of focus

UK opportunity for
electrification of
passenger cars

Report
timeframe

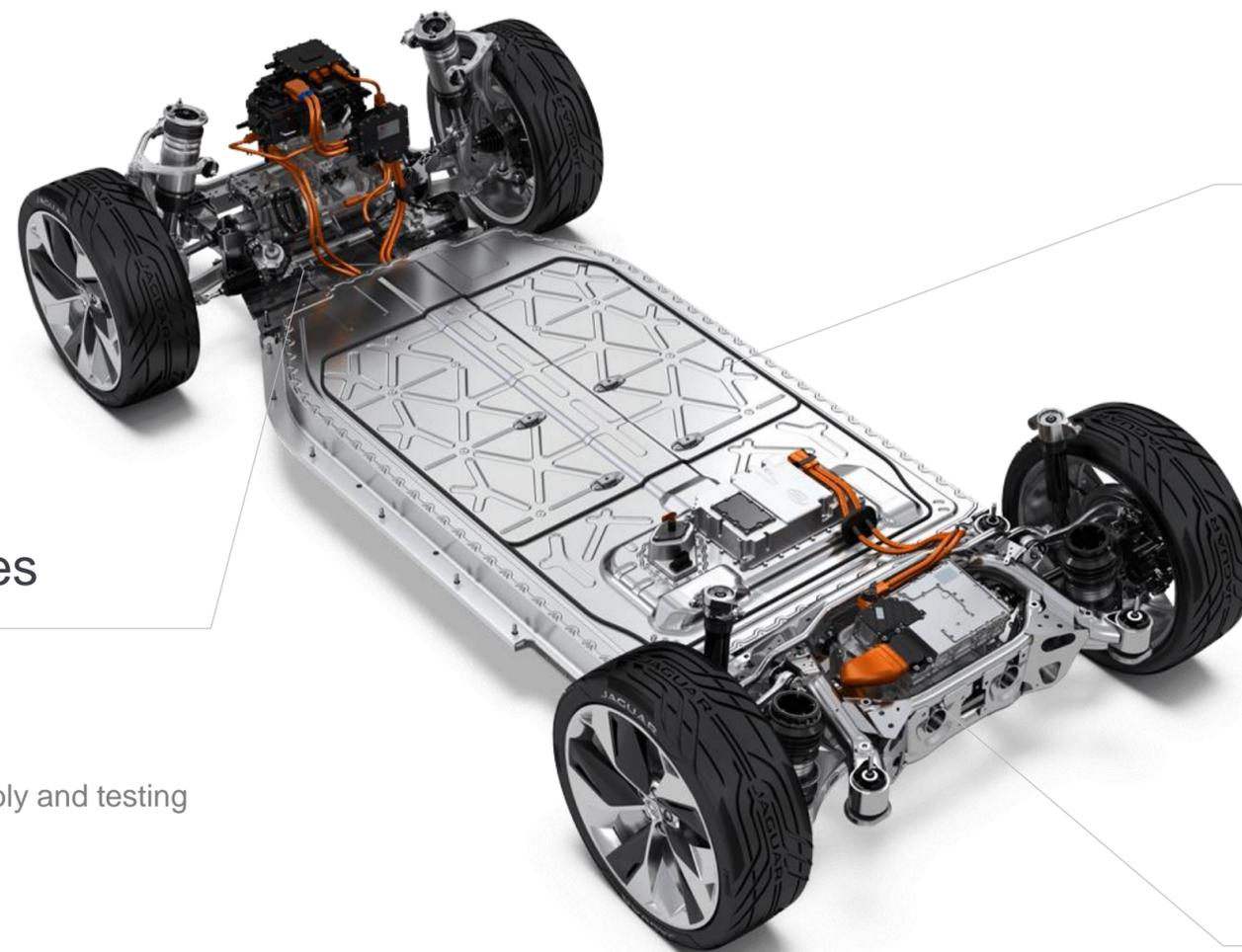
5 years

Value of
opportunity

£24bn

£24 billion represents the serviceable available market across 12 opportunities considering geographic access for UK-based manufacturers

Split into three key technology areas



£2bn

Electric machines

- Magnet manufacturing
- Electrical steel
- Electrical machine assembly and testing

£12bn
Batteries



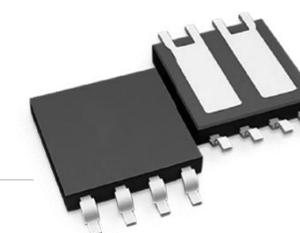
- Cathode materials refining
- Cathode manufacturing
- Anode manufacturing
- Electrolyte manufacturing
- Cell assembly
- Battery pack components



£10bn

Power electronics

- Semiconductors
- Sensors
- High-performance passive components



Automotive Sector and the UK-EU Trade & Cooperation Agreement

On December 24th the UK and the EU reached an agreement relating to trade and other matters of cooperation

“The UK-EU Trade and Cooperation Agreement”

It set out the terms for free trade and some other areas of cooperation

- The TCA contains some specific criteria for qualification of goods as ‘originating’ for EVs and their supply chains
- Bilateral cumulation for input materials (UK-EU) is allowed, but there are no trilateral cumulation provisions



To export vehicles from the UK to the EU27 tariff-free they must contain a certain level of local content

- That content may be from the UK or the EU27
- The requirements get tougher over two transitional steps in 2024 and 2027
- Localised batteries for EVs become prescribed content



Batteries represent 30-40% of the value of an EV - more than twice the value of a conventional engine

- Engines, gearbox and driveline manufacturing employ around 160,000 people in the UK – we must replace these jobs in the EV component space

Rules of Origin summary

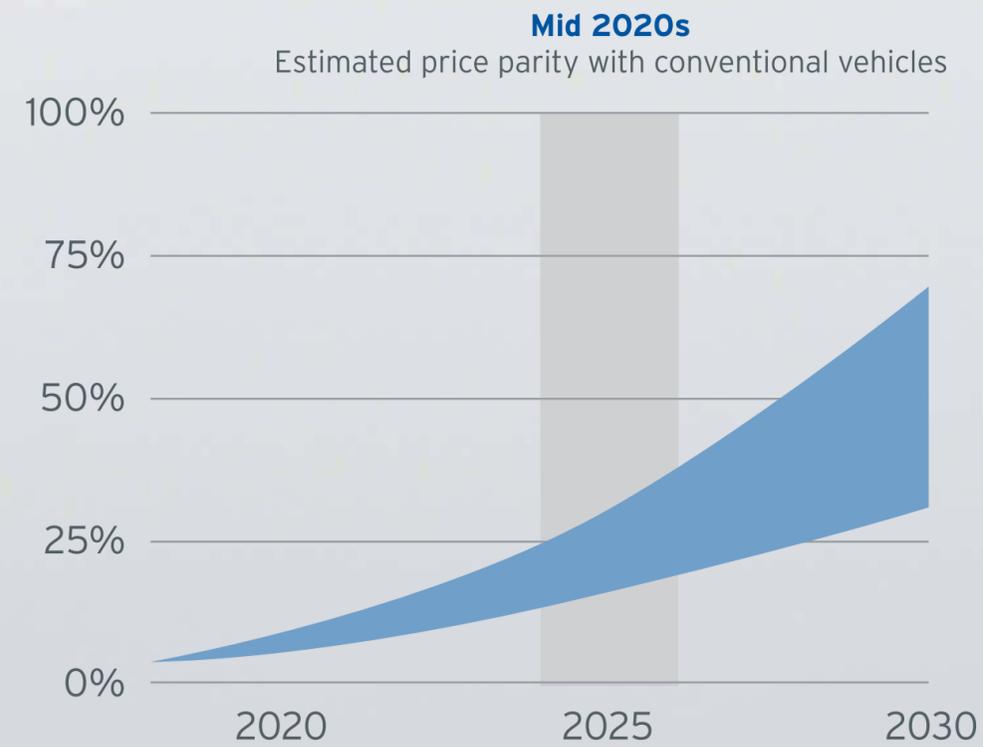
-  To export BEV/PHEV vehicles to the EU tariff-free after 2026 the batteries must be produced in the UK/EU27
-  To export BEV/PHEV vehicles tariff-free after 2023 to **achieve the local content threshold, in practical terms** the batteries must be produced in the UK/EU27
-  The UK supply chain for battery chemicals will need to be developed

	1 st January 2021 – 31 st December 2023	1 st January 2024 – 31 st December 2026	1 st January 2027 onwards
Electric battery cells	70% maximum non-originating material allowance Or Change in tariff heading	50% maximum non-originating material allowance Or Change in tariff heading except from non-originating active cathode materials	35% maximum non-originating material allowance Or Change in tariff heading except from non-originating active cathode materials
Electric battery packs	70% maximum non-originating material allowance Or Change in tariff sub-heading Or Assembly from non-originating cells or battery modules	40% maximum non-originating material allowance Or Change in tariff heading except from non-originating active cathode materials	30% maximum non-originating material allowance Or Change in tariff heading except from non-originating active cathode materials
Electric vehicles (HEVs, PHEVs, BEVs)	60% maximum non-originating material allowance	55% maximum non-originating material allowance	45% maximum non-originating material allowance + originating battery for PHEVs and BEVs

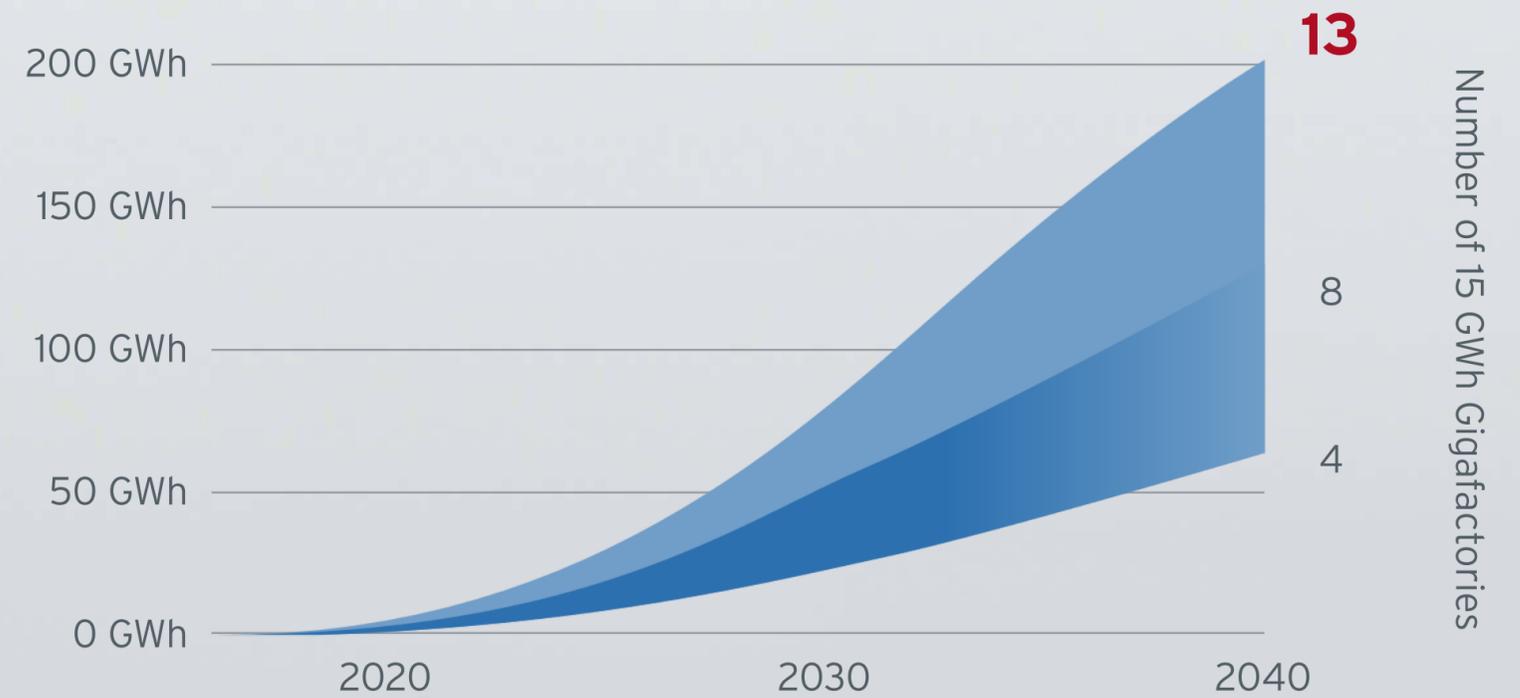
Source: BEIS ROO Public Explainer, Jan 2021

We are decarbonising and electrifying

EV demand curve from *Road to Zero*



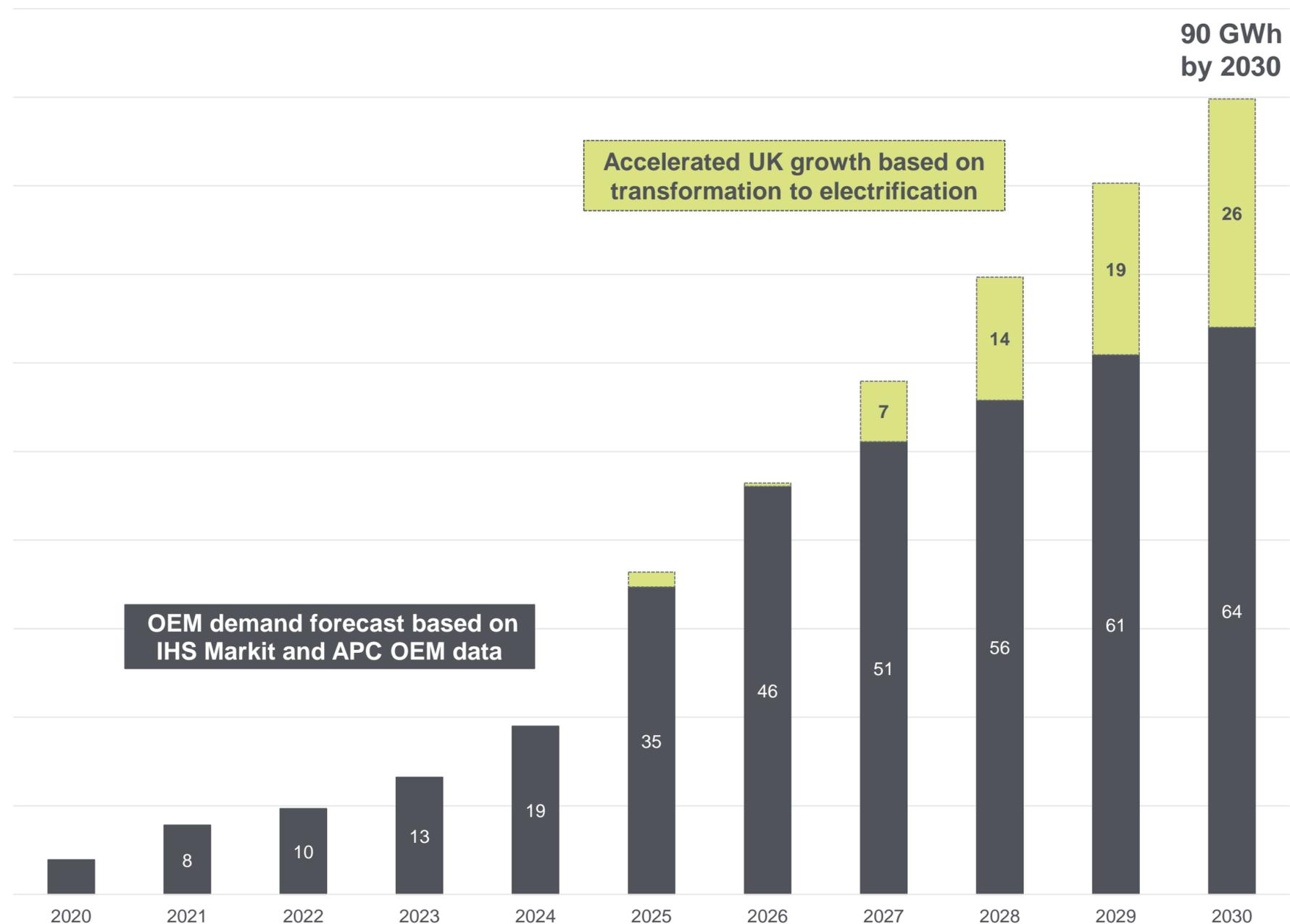
Demand for batteries in the UK



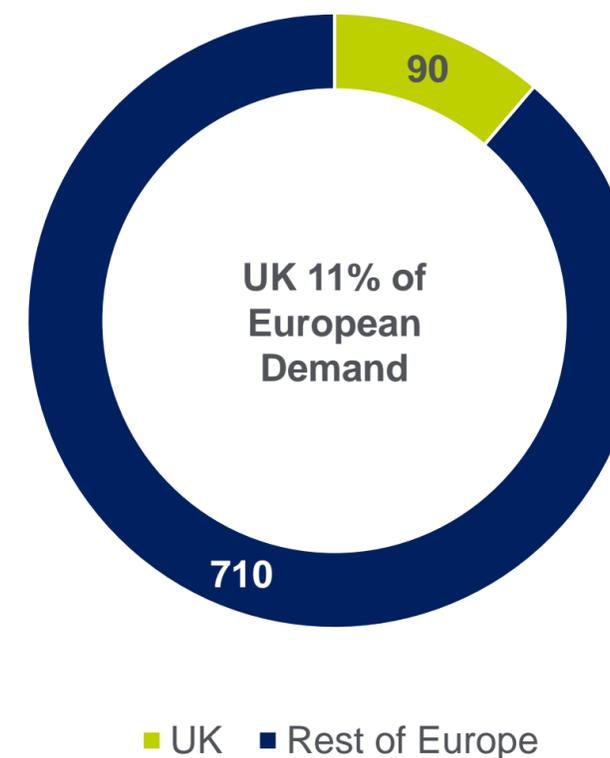
Source: UK Electric Vehicle and Battery Production Potential to 2040, Executive Summary March 2019, The Faraday Institution. Data compiled by McKinsey Energy Insights based on IHS forecasts

The APC forecast BEV battery demand from local UK OEM manufacturing to reach 90 GWh by 2030, with further supply chain opportunities ahead

UK Battery Demand (GWh p.a.)



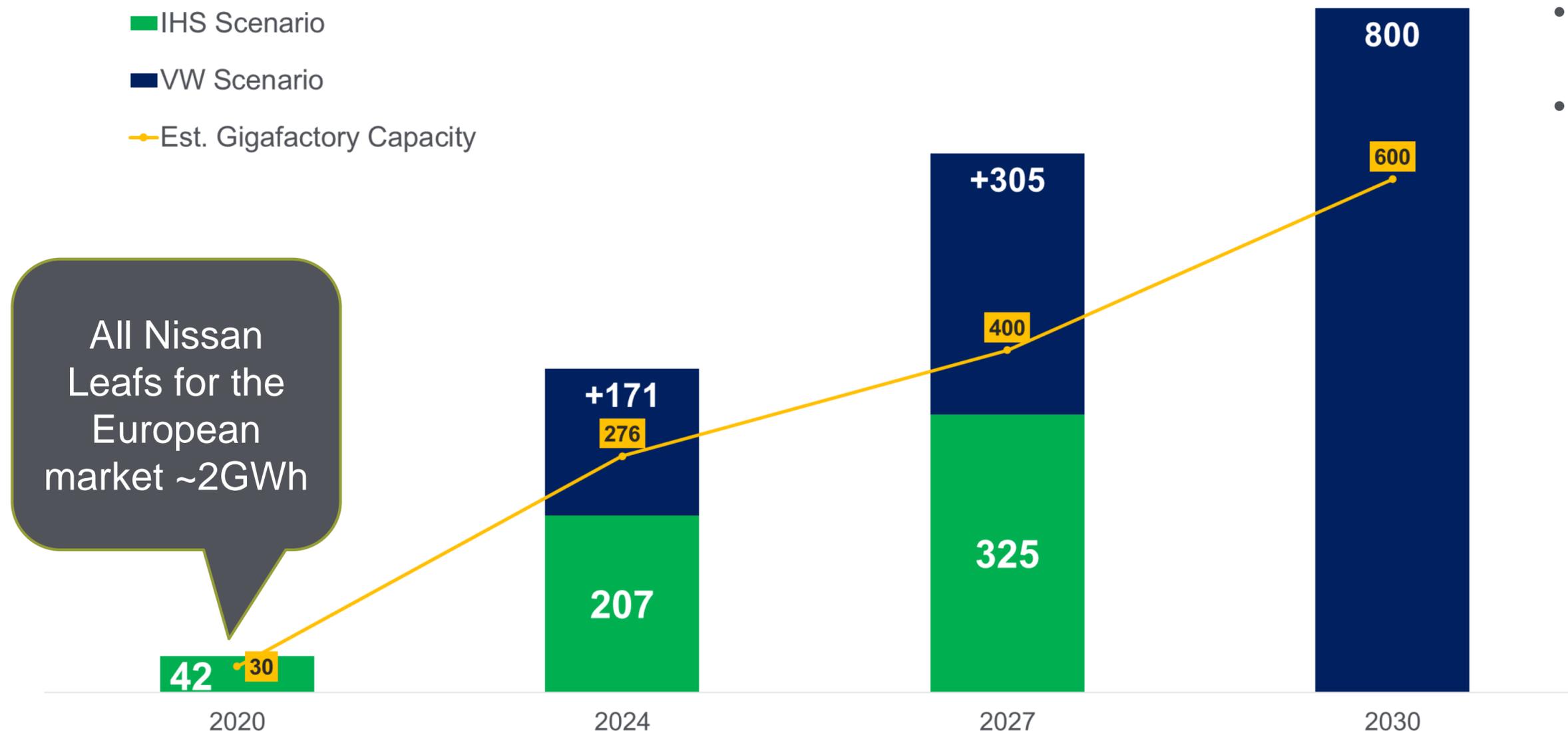
Europe GWh Demand in 2030



Source: APC analysis of OEM data & IHS AutoTechInsight forecasts (February, 2021)
Note: Includes Passenger Cars & LCVs only

We need about 20 times more than current capacity by 2030. And in Europe we are only just starting this journey to net zero.

European GWh Demand vs Gigafactory Capacity



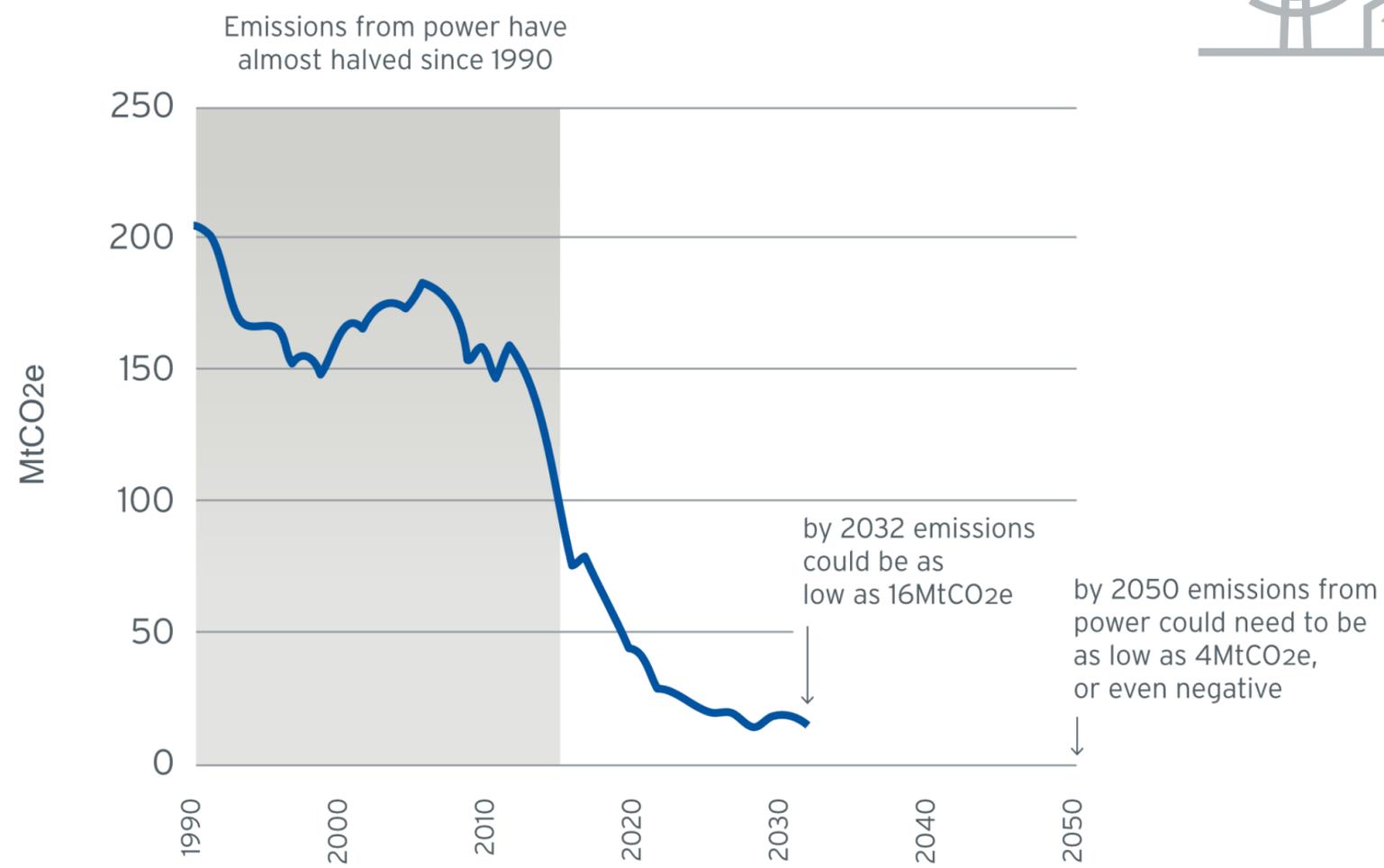
- Unprecedented demand in Europe
- Cell supply sort of keeping up with demand depending on who you believe

Please note: The new Cooperation and Trade Agreement with the EU effectively means that the whole of Europe (UK & EU27) needs to be self-sufficient for batteries

Source: APC analysis of OEM data, Benchmark Mineral Intelligence (Nov., 2020) & IHS AutoTechInsight forecasts (March, 2021)
Note: Demand data is for Passenger Cars & LCVs only

The UK leads the G20 for long-term low carbon transition

Projected power sector emissions (MtCO₂e)

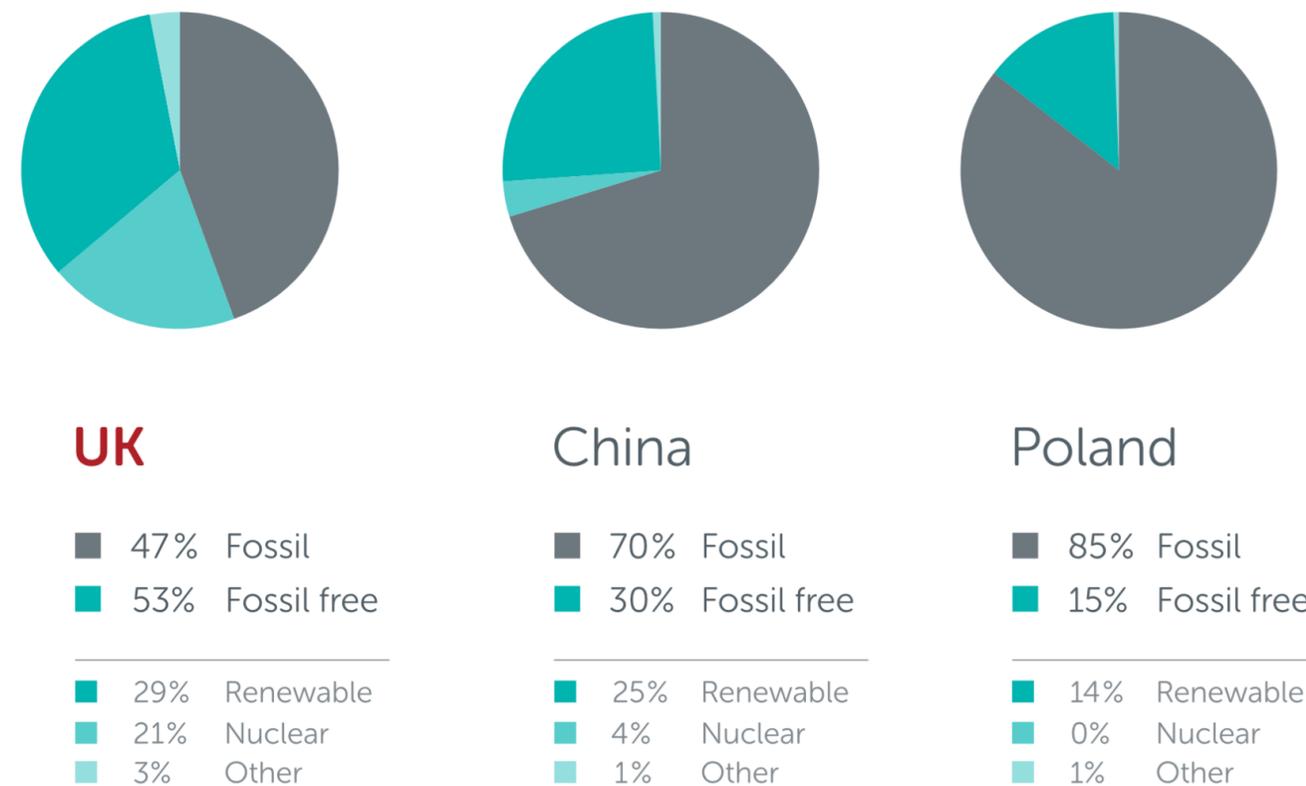


Source: PWC Low Carbon Economy Index 2018

Source: UK Gov. Clean Growth Strategy



Projected power sector emissions 2019

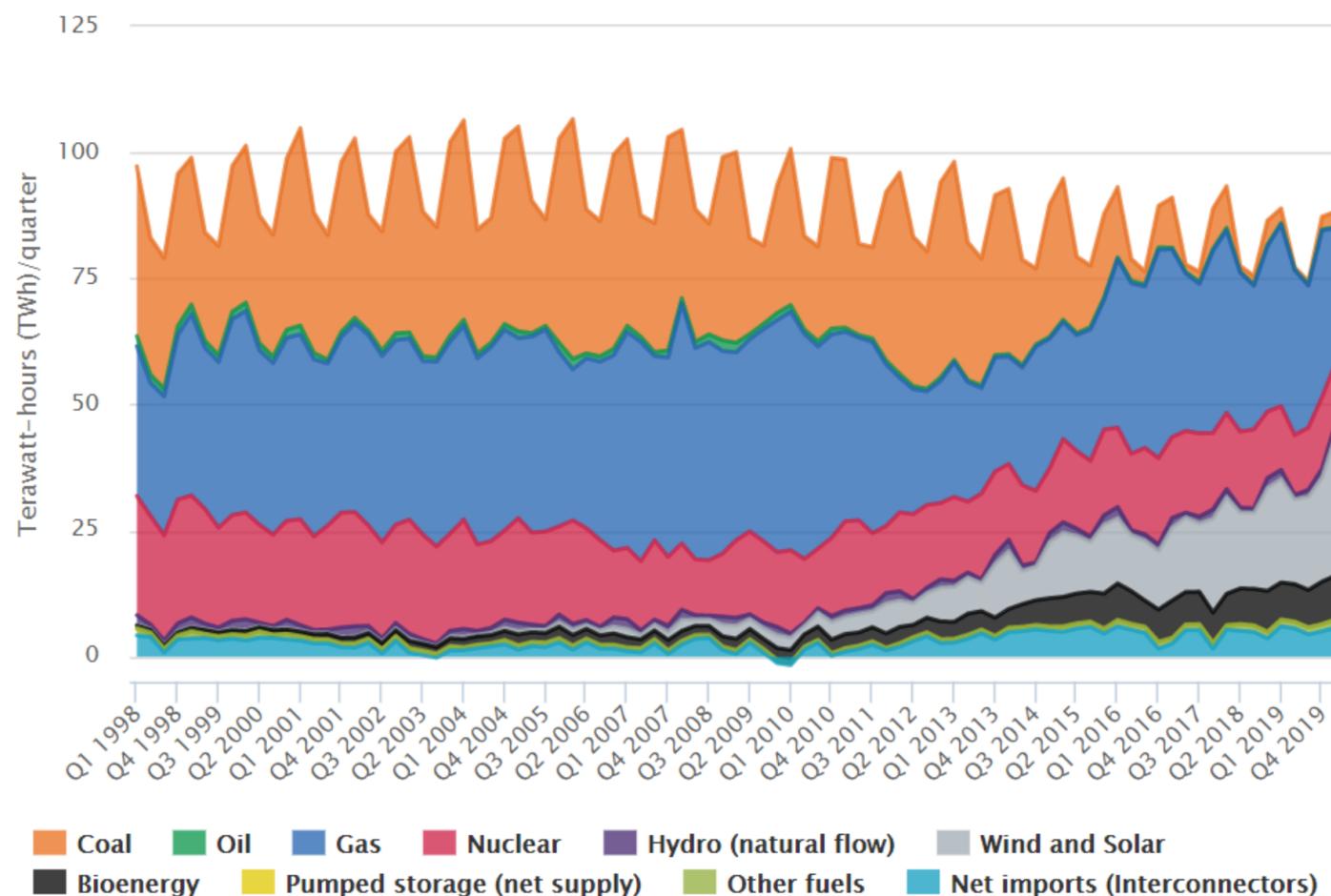


Source: Global Energy Storage and Electric Vehicles, 2019, Bernstein Research

Electricity mix and renewables

- The UK has a robust distribution grid which is rapidly decarbonising
- Blyth/Cambois, for example, can offer connection capacities of up to 480MVA
- We have significant onshore and offshore wind generation capacity, and growing
- As of 2021, coal has now virtually been phased out as a means of generation (<1%)
- ~75-80% low carbon generation (March 2021)
- Interconnectors (including with Norway in 2021 to utilise pumped hydro) guarantee stable supply into an increasingly renewable grid

Electricity generation mix by quarter and fuel source (GB)



Source: BEIS Energy trends section 5: Electricity (ET 5.1).
Information correct as of: October 2020

This chart shows quarterly totals of electricity generation by technology type for the GB National Electricity Transmission System, as well as net imports.

Cost needs to be addressed for this industry



A standard Distribution Network Operator (DNO) supply and industrial tariff sets the UK at a disadvantage



Sites such as Blyth offer the opportunity for grid-connected 'Private DNO' arrangements for high energy use industry clusters with connected renewable generation & storage

- Wind energy
- Solar PV (e.g. on large factory roof)
- Battery connected storage

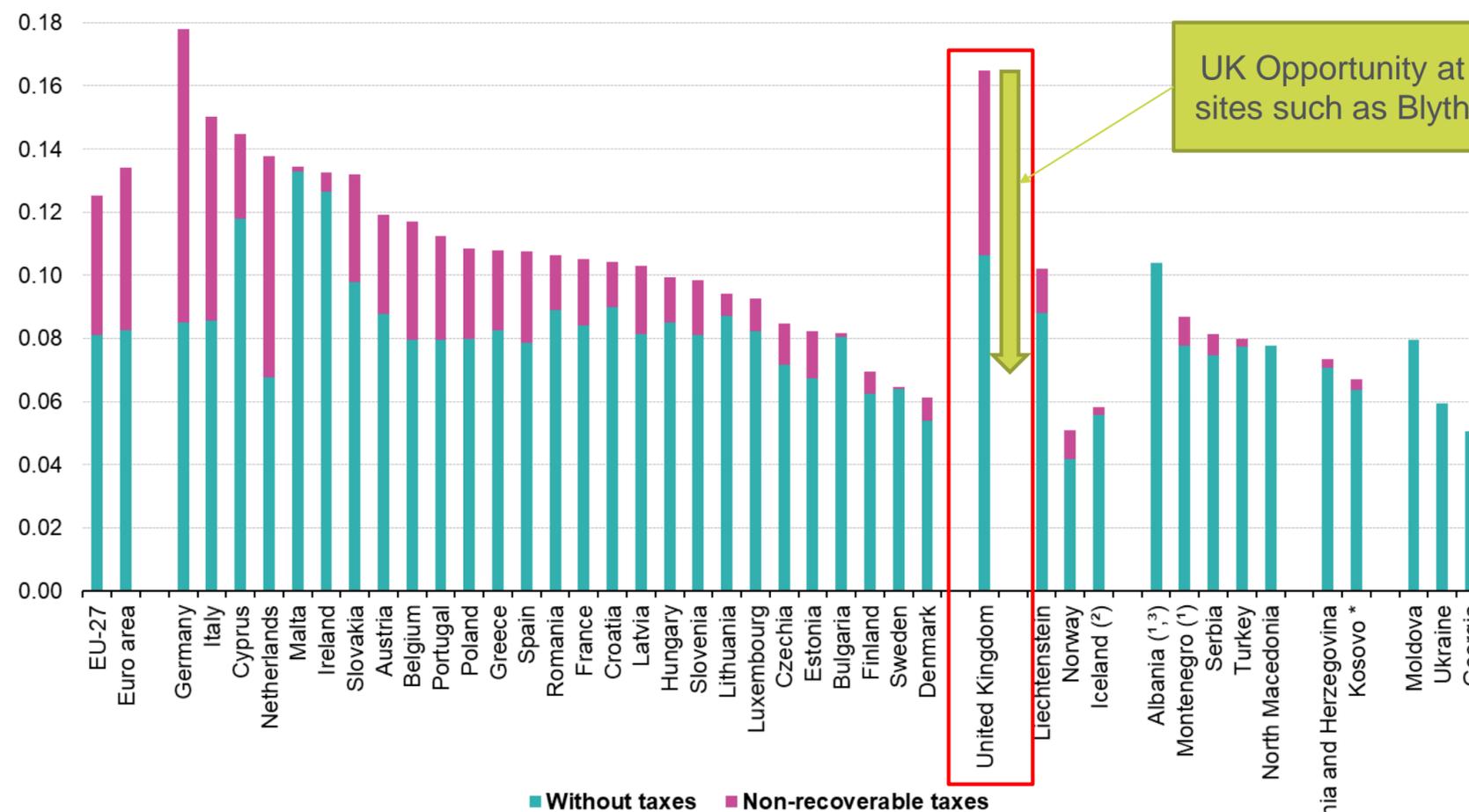


This can substantially reduce the cost of energy to more competitive levels



This is needed to avoid 'carbon leakage' – effectively exporting pollution to dirtier but cheaper countries

Electricity prices for non-household consumers, first half 2020
(EUR per kWh)



(1) 2019 Semester 1 data.

(2) 2019 Semester 2 data.

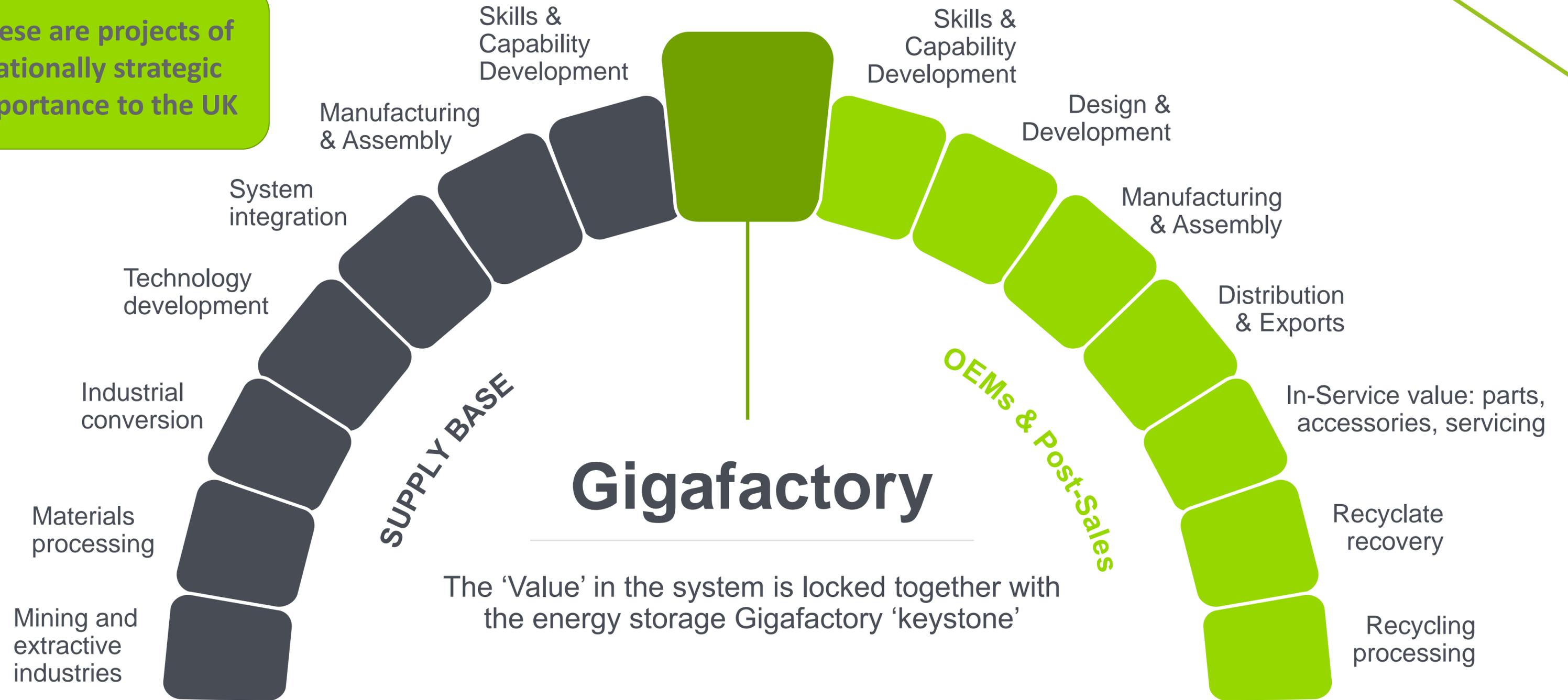
(3) estimation.

* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo Declaration of Independence.

Source: Eurostat (online data codes: nrg_pc_205)

Gigafactory value to the UK

These are projects of nationally strategic importance to the UK



How do we attract Gigafactory investments?

Scale and certainty of customer demand is necessary, but not sufficient.

Robust
demand

- Secure new vehicle investment by OEMs
- Support export competitiveness with future trading arrangements
- Deliver 'anchor' investors to start demand creation in the supply chain

Ease of
delivery

- Make large sites available in the right places
- Expedite/support planning and permitting
- Complementary plans to reduce long term cost inputs e.g. clean energy
- Support process R&D

Competitive
landscape

- Support competitive supply chain development in tandem
- Tip the scales in favour of the UK with investment support
- Focus on long term cost factors, e.g. energy, co-location, tax, financing, business rates etc.
- 'Do the right things in the right places' and ease trading arrangements where it makes sense



We need your
help to do this

Summary

- The market is moving towards electrification at an increasing rate
- The Trade & Cooperation Agreement with the EU and other FTAs is driving localisation of batteries and input materials in Europe, away from Asia
 - Today, China makes three quarters of the world's Lithium Ion batteries and produces many of the input materials
- Committed investment in battery capacity lags expected demand but the lead times are long
 - We risk supply shortages for the industry in Europe and particularly the UK
 - The UK is around 11% of the total European demand, but today we have UK capacity for just 0.2% of the European forecast demand by 2020
 - Speed and technical advances with UK-based R&D will be crucial to maintain the UK's automotive sector competitiveness
- Green energy cost and infrastructure connectivity is key
- Suitable locations for battery manufacturing in the UK in the near term are very limited – Cambois is an excellent site