UK electric vehicle and battery production potential to 2040

Summary of Project Findings
March 2020 Update

Envision AESC, Sunderland
REPORT FOCUS

Estimate the opportunity for EV and battery cell production for the UK to 2040

Define the actions that need to be taken to capture this opportunity
1.4 to 1.8 million vehicles
(UK manufactured p.a. over last decade)

81% exported

Of which 55% exported to the EU
Weighing 300 to 700kg

40% EV value is in the battery
Potential future states of the world

- UK as an EV battery leader
- Stable car manufacturing and EV transition
- No EV production in the UK
REPORT ASSUMPTIONS

Stable car manufacturing and EV transition

- Battery costs continue to decline to TCO parity in mid 2020s
- CO₂ emission standards remain on target
- Average battery capacity grows until 2030
- UK OEMs source battery demand from UK
- No battery import or export
Global EV vehicle sales
Recent developments and current trends strongly drive global EV sales with segment-, powertrain and region-specific dynamics

EV vehicles produced in the UK
Maintaining current market shares in its key markets allows UK-based EV manufacturing to capture 1.6m EVs by 2040
Demand for UK-produced batteries

Based on the UK EV production, demand for UK-produced batteries could reach 140 GWh p.a. by 2040.

Equivalent to 7 gigafactories, each producing 20 GWh per annum by 2040.
TRANSITION TO EV PRODUCTION

£12bn investment opportunity to 2040

£1.7bn investment per 20 GWh p.a. gigafactory
Manufacturers are already making future supply decisions.
Without urgent action the UK risks losing out on attracting a gigafactory
First EV battery factory in Europe

Nissan Sunderland battery factory established 2010

2 GWh p.a. capacity
EUROPEAN BATTERY PRODUCTION CAPACITY BY 2030

170 GWh p.a.
70 GWh p.a.
58 GWh p.a.
32 GWh p.a.
IN THE ABSENCE OF UK GIGAFACTORIES PRODUCING BATTERIES

2.5 million engines currently manufactured in the UK would be at risk

105,000 direct automotive jobs at risk by 2040

£9bn battery import costs to 2040 (if the UK manufactures EVs and imports EV batteries)
JOB CREATION WITH INVESTMENT

78,000 New gigafactory & battery manufacturing jobs

32,000 ICE jobs remaining

110,000 Jobs indifferent to the EV/ICE powertrain

Potential growth in workforce from 170,000 today to 220,000 in 2040
JOB CREATION WITH INVESTMENT

78,000 New gigafactory & battery manufacturing jobs

24,500 Battery supply chain
43,500 Battery manufacturing
10,000 EV manufacturing

Potential growth in workforce from 170,000 today to 220,000 in 2040
<table>
<thead>
<tr>
<th>Job example</th>
<th>ICE value chain</th>
<th>Overlap</th>
<th>EV value chain</th>
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</thead>
<tbody>
<tr>
<td>Engine calibration engineer</td>
<td></td>
<td></td>
<td>Retaining required</td>
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<tr>
<td>Circuit engineer</td>
<td></td>
<td></td>
<td>Job remains</td>
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<tr>
<td>Test engineering – electrification propulsion</td>
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<td>New job</td>
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## FACTORS INFLUENCING INVESTMENT AND SITING DECISIONS

<table>
<thead>
<tr>
<th>Factor</th>
<th>Importance to battery manufacturers</th>
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</thead>
<tbody>
<tr>
<td>Proximity to customers and suppliers</td>
<td>High</td>
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<tr>
<td>Incentives</td>
<td>High</td>
</tr>
<tr>
<td>Access to skilled labour</td>
<td>Medium</td>
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<tr>
<td>Cheap, clean energy</td>
<td>Medium</td>
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<tr>
<td>Permits and licensing</td>
<td>Medium</td>
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</tbody>
</table>
Proximity is the most important factor but it is the most difficult to influence.
THE UK HAS A LOT TO OFFER

A strong chemical industry
With some of the world’s largest companies providing battery chemicals to the Asian market
THE UK HAS A LOT TO OFFER

Leading nation for automotive productivity

With a growing localised supply chain for cell and pack manufacturing
THE UK HAS A LOT TO OFFER

Number 1 European economy for ease of doing business

Offering the most business friendly employment laws in Europe
THE UK HAS A LOT TO OFFER

Fastest decarbonisation of all G20 nations

Offering low carbon electricity to protect the environmental reputation of the cell maker and OEM
WHAT NEEDS TO HAPPEN NOW?

National and regional Government
• Appoint leader and align departments
• Identify/prepare potential locations
• De-risk business case
• Communicate UK attractiveness

Automotive manufacturers
• Establish battery sourcing agreement
• Invite cell manufacturers to establish local production
• Connect cell manufacturers to UK government

Cell manufacturers
• Establish battery supply agreement
• Engage with government and suppliers
• Evaluate business case

Other stakeholders (including academia and suppliers)
• Draft UK investment memorandum and facilitate dialogue
• Consider Special Purpose Vehicle construction to allow accelerated site identification
Thank you