

Q2 2022 Automotive industry demand forecast

September 2022





ADVANCED
PROPULSION
CENTRE UK

Accelerating
Progress

This demand forecast covers

Markets Global; European; UK

Vehicles Light duty vehicles (LDVs)
Heavy goods vehicles (HGVs)  

Materials Lithium; Cathode Active Material (CAM);
Battery foils; Electrolyte and Separator Material

Our process

The data in these demand graphs is based on APC insight from our close relationship with UK OEMs on xEV production, APC Automotive Council PEMD traction specifications coupled with powertrain split forecasts from IHS Markit, Rho Motion & BNEF used to guide the 2030 demand forecast. All forecasts refer to light duty vehicles unless heavy goods vehicles are specifically mentioned.

Quarterly updates

Any developments in the sector will change and influence these forecasts and therefore APC will update these on a quarterly basis in line with the impacts of those announcements.




Disclaimer

These forecasts provide an estimate of electrified powertrain demand and are by no means an accurate statement of future markets and industry intentions. The data should be used in good faith and the APC UK cannot be held liable for any inaccuracies in the data, views expressed or underlying assumptions



Q2 2022 – Summary

Summary – Changes to projected demand by region

Q2 2022

 <p>Global demand update</p>	<ul style="list-style-type: none">• The outlook for global automotive battery demand in 2030 is revised upwards to over 2,900 GWh (+4%) mainly due to revised pack size assumptions	<p>page 8</p>
 <p>European demand update</p>	<ul style="list-style-type: none">• European 2025 BEV production share for passenger cars and vans revised downwards to 25% (-1%)• European 2030 BEV production share for passenger cars and vans revised upwards to 63% (+1%) mainly driven by higher BEV share in van production	<p>page 20</p>
 <p>UK demand update</p>	<ul style="list-style-type: none">• UK 2025 BEV production share for passenger cars and vans revised upwards to 30% (+2%)• UK 2030 BEV production share for passenger cars and vans revised upwards to 74% (+1%) in light of significant updates from UK-based vehicle manufacturers <p>This accounts for higher BEV production than previously forecast At least 96 GWh-worth of batteries needed by 2030</p>	<p>page 20</p>

Q2 2022

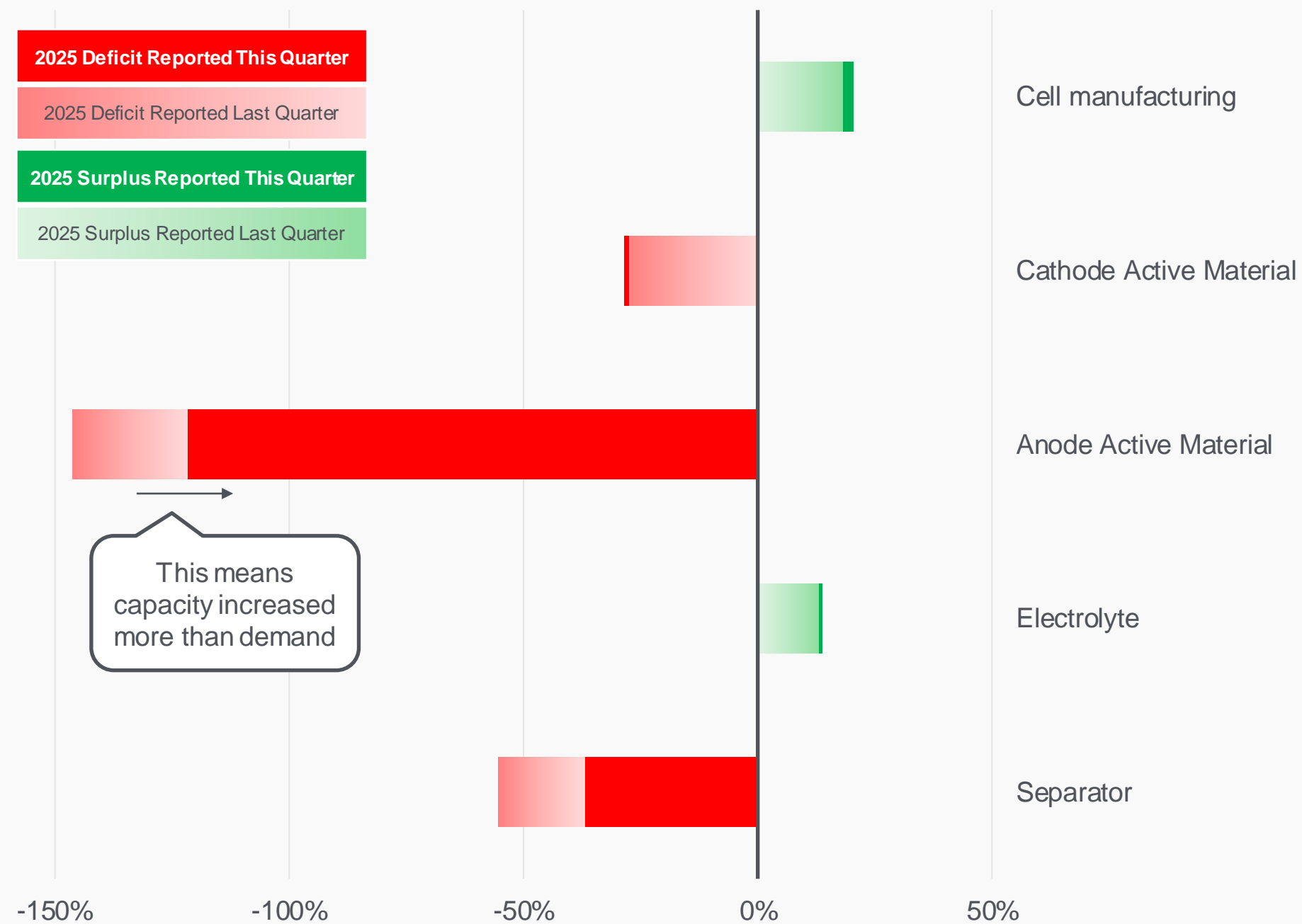
 <p>Sustainable Lithium demand scenarios</p>	<p>Limited lithium supply could mean vehicle manufacturers make fewer BEVs and opt for next-generation battery chemistries</p> <ul style="list-style-type: none"> • Potential demand side responses from vehicle producers could help reduce the 2030 deficit by around 40% <p>Modelled mitigating strategies</p> <ul style="list-style-type: none"> • Manufacturing BEVs with smaller batteries • Substitute lithium out by adopting sodium-ion in certain vehicle segments • Shifting BEV production to FCEVs as well as PHEVs and range extender vehicles 	<p>pages 13-18</p>
 <p>Impact on battery electric vehicle segments*</p>	<ul style="list-style-type: none"> • C & D segment BEV manufacturers have the highest potential to influence Li demand • However, limited scope to model a reduction in C & D segment BEV battery size due to baseline APC assumptions already significantly lower than other forecasters • Partial D segment powertrain shift from BEV to PHEV could lead to a major reduction in Lithium demand but is unlikely considering zero-emission vehicle mandates for 2030 • A & B segment vehicle manufacturers more likely to use battery chemistry as a way to reduce dependency on lithium-ion batteries • E & F segment vehicle (e.g. SUVs) manufacturers are more likely to reduce Lithium exposure by producing vehicles with different powertrains such as FCEV and PHEV, which require less lithium than fully-electric vehicles 	<p>page 16</p>

Summary – Supply chain activity

Q2 2022 notes

- The graph refers to Europe’s capability to supply battery cells and sub-components that arise from local vehicle production.
- It assumes Europe is a self-sustaining bloc with no imports or exports

2025 European¹ Capacity vs Demand Balances



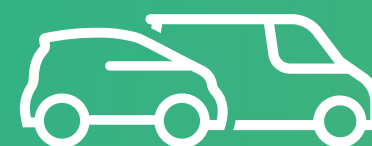
Status of regional capacity* v demand balance in 2025	Value** (%)	UK Supply Chain Status
Still OK: higher probability projects likely to be sufficient in supporting existing capacity meet demand	18%	Gigafactory plans to supply 90 GWh by 2030 mostly secured for UK vehicle production plants
Improvement slowing: Umicore announce supply agreement with ACC	46%	Required to be made in the UK from 2027 for UK cells to qualify as local and to avoid EV tariffs in the EU
Improving: Mitsubishi Chemical and Tokai Carbon announce plans to produce anode material in Europe	9%	Expected to be the next ‘big thing’ after CAM. Access to low-cost renewable energy is key to manufacturing competitiveness
Still on track: announced investments likely to be sufficient for capacity	8%	Value in today’s liquid electrolyte is relatively low, but solid state electrolytes are a key investment consideration
Improving: W-Scope announce large Hungarian plant for 2024	7%	Significant opportunities to localise in UK even though typically manufactured in Eastern Europe

Source: APC internal analysis, BNEF forecasts (Accessed: 19.08.2022)
1) Europe region includes non-EU countries such as Turkey

*Risk-weighted capacity based on APC internal assessment of announced and under construction projects
**Value in terms of cost contribution to total cell cost based on an NMC811 cell

Q2 2022 – Demand Update

The following section includes battery demand from both light duty vehicles (LDVs) and heavy goods vehicles (HGVs)

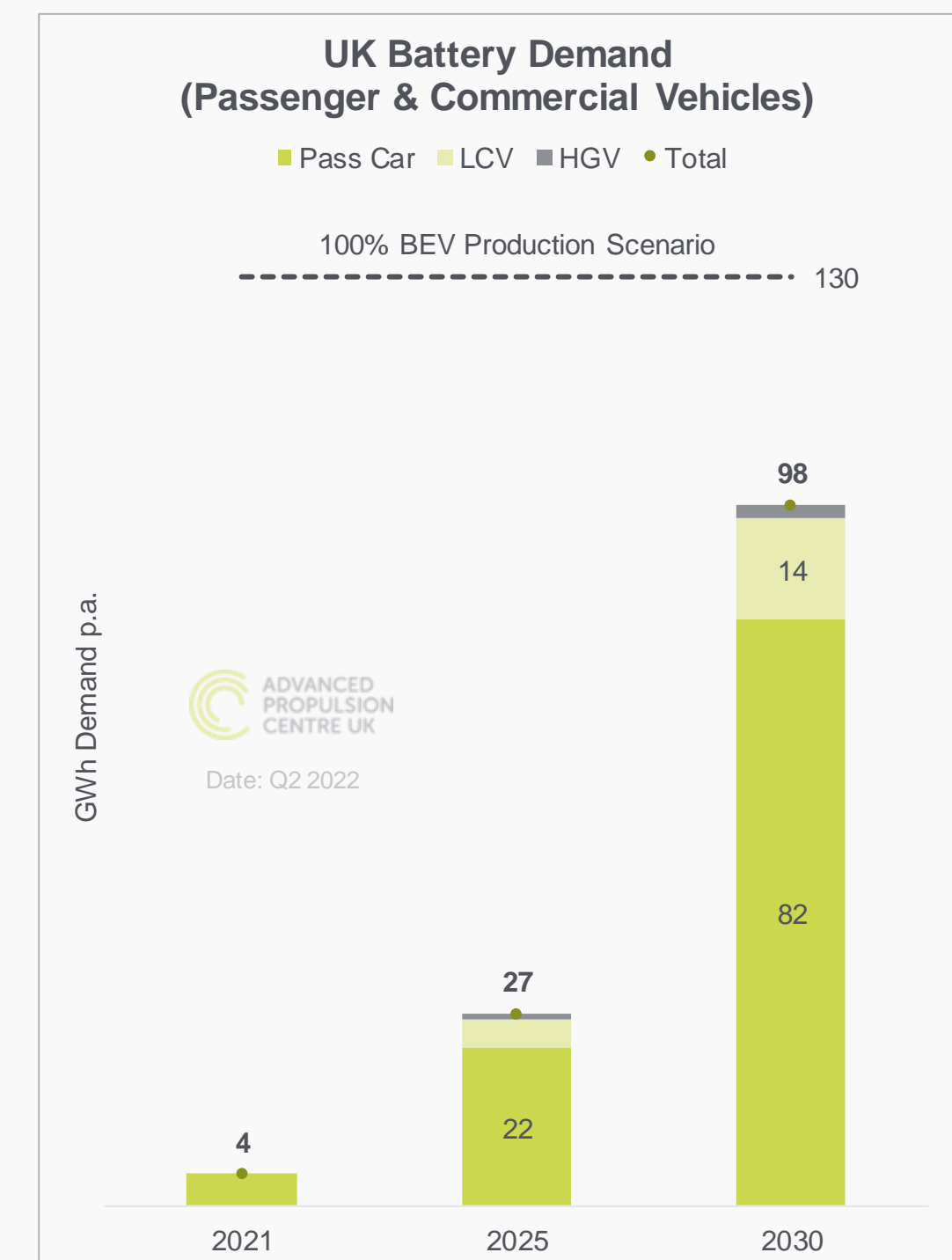
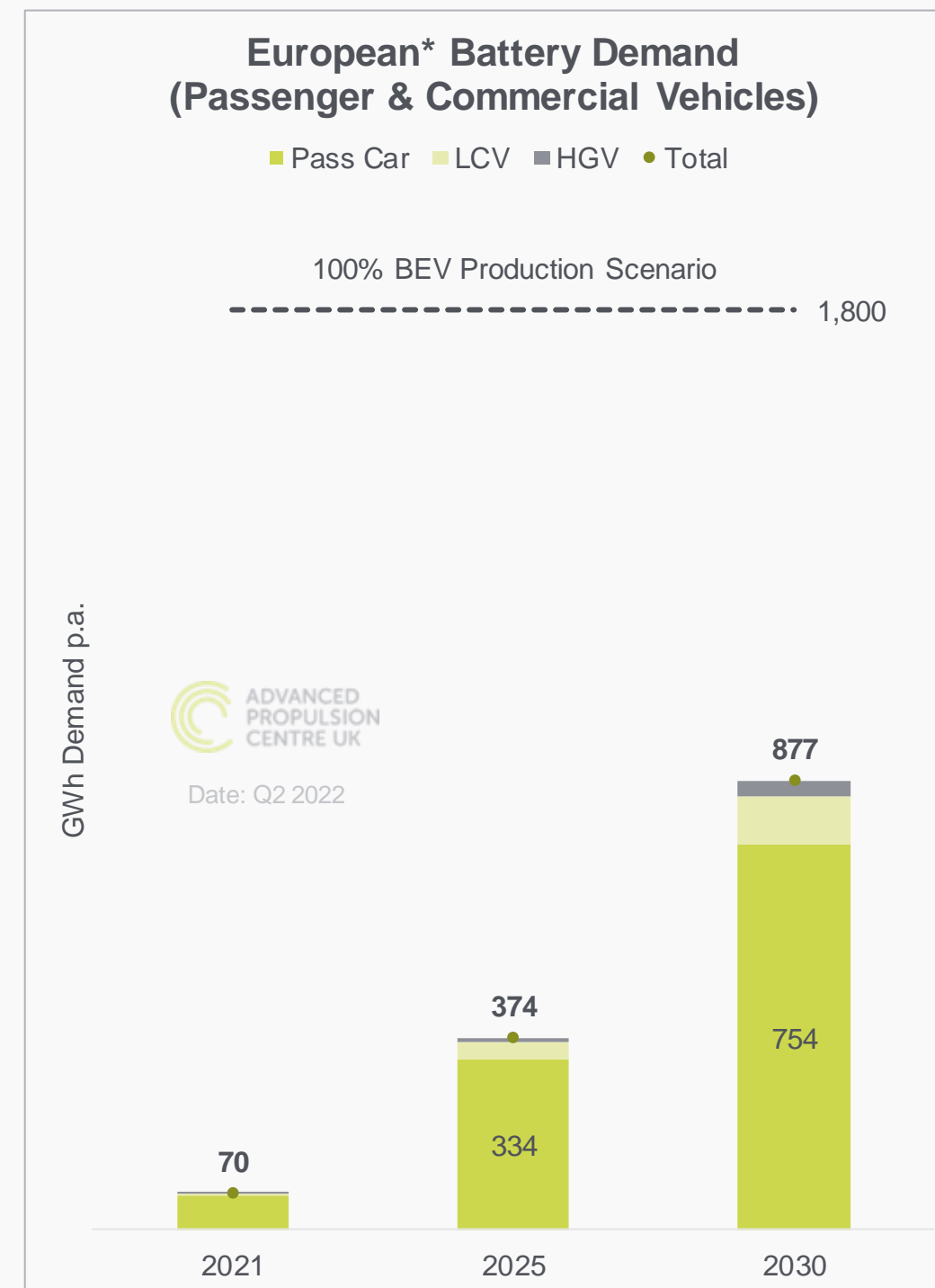
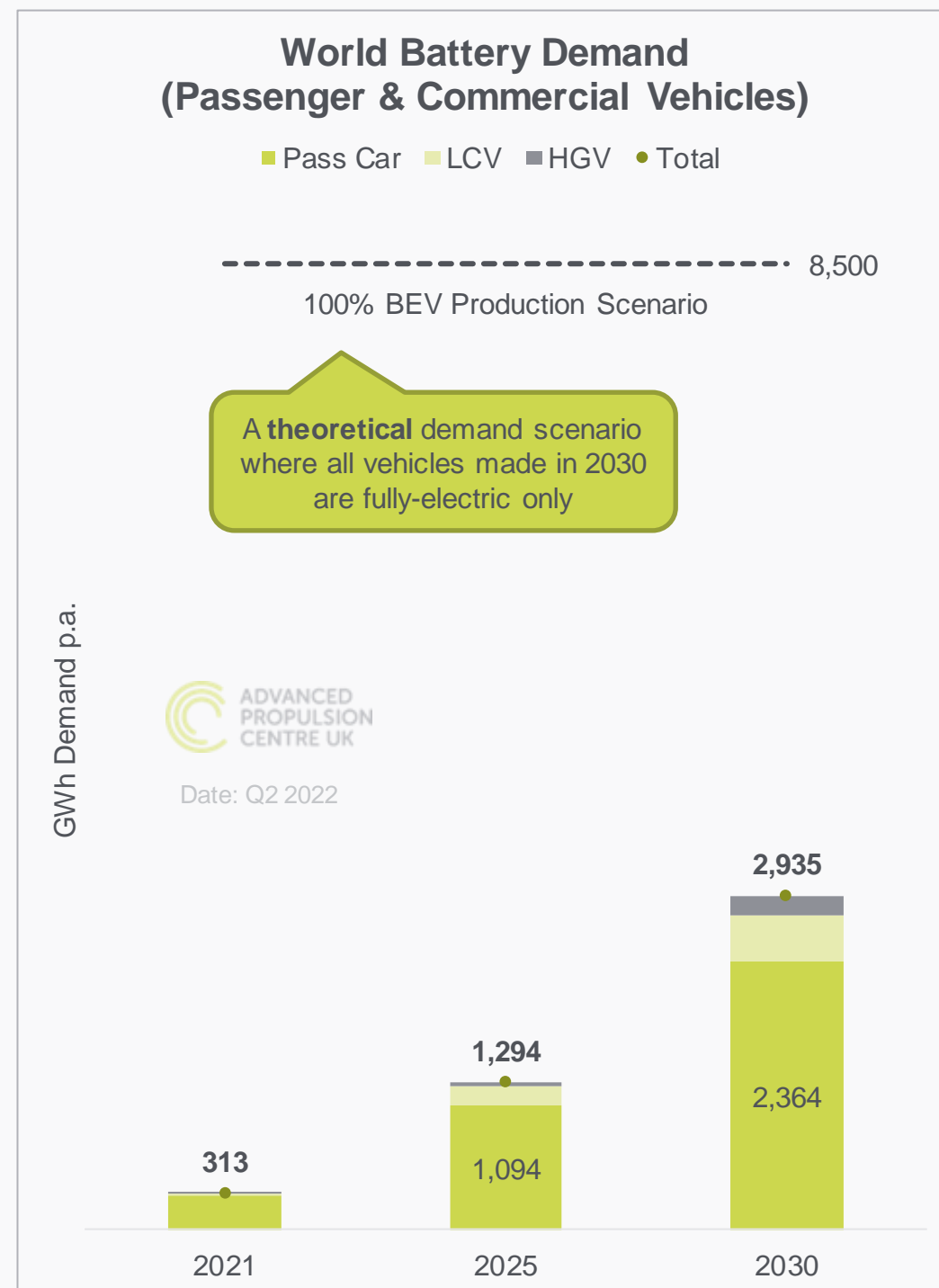


Battery demand forecast

LDVs and HGVs

Q2 2022 notes

- World battery demand forecast to exceed 2,900 GWh by 2030, (more than double the forecast for 2025)
- Europe to account for ~1/3 of this demand

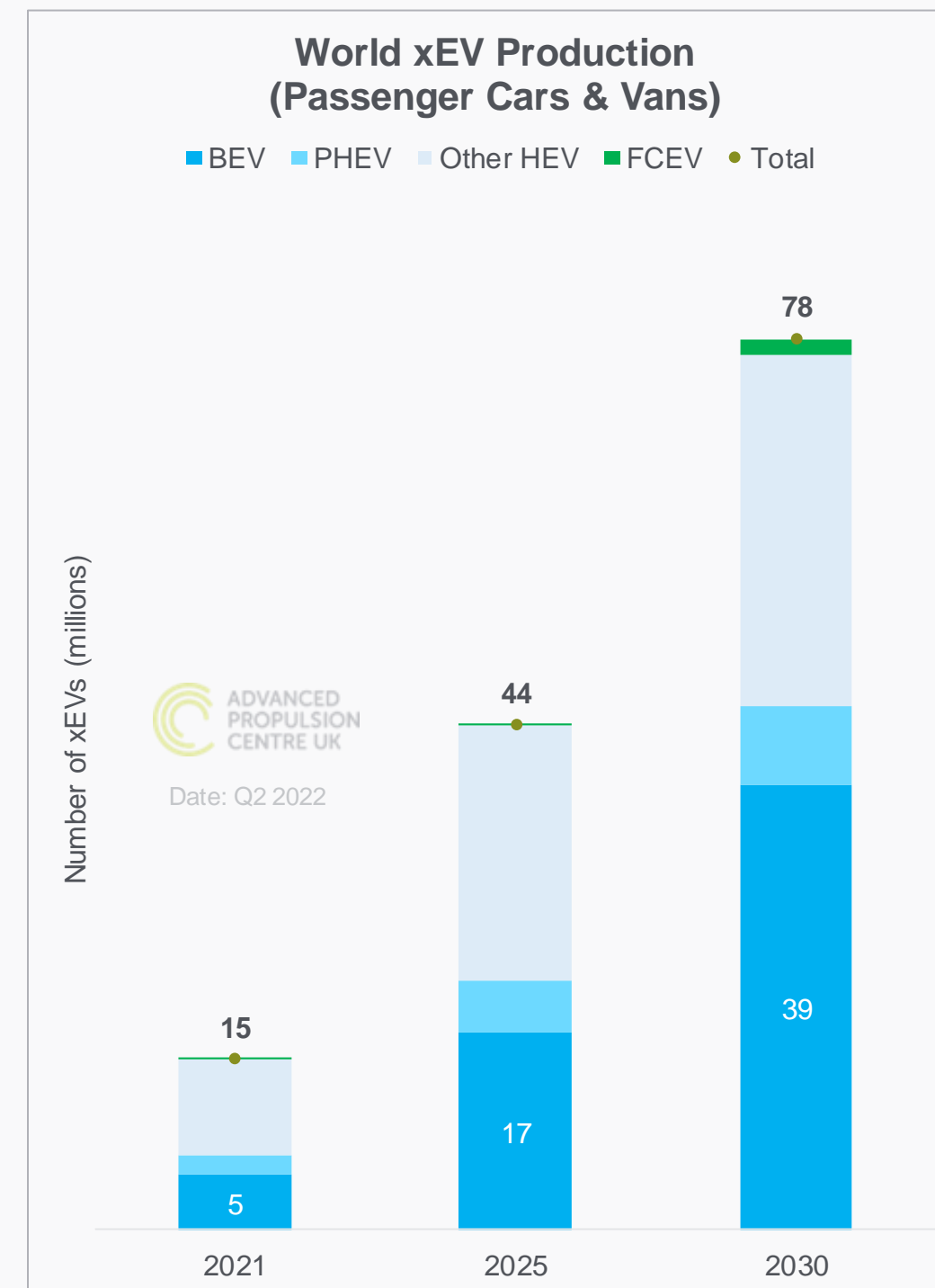
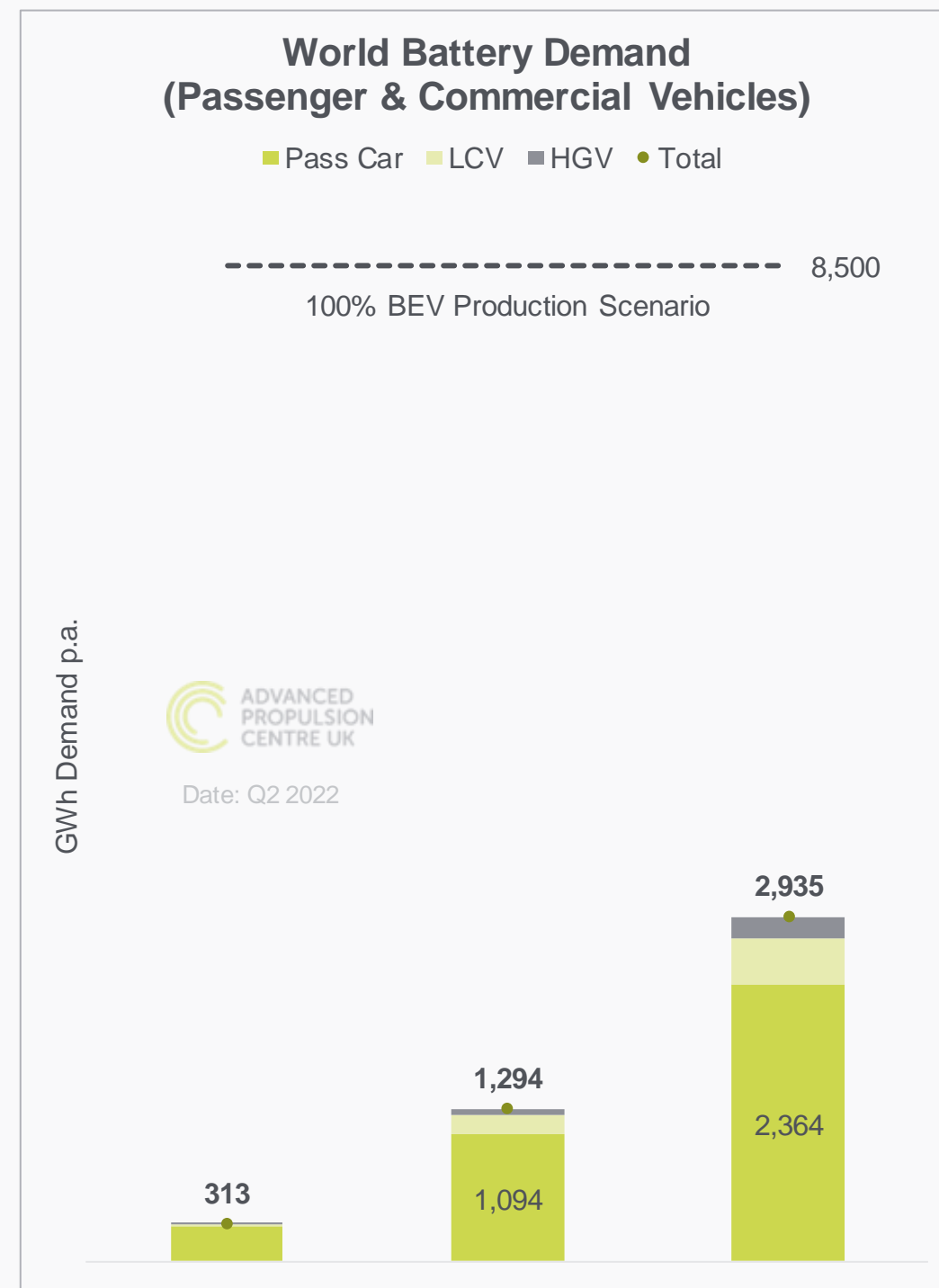


World xEV Production

Passenger Cars and Vans

Q2 2022 notes

- World vehicle production would require more than 2,900 GWh of batteries, with 39 million battery-electric cars and vans produced globally by 2030

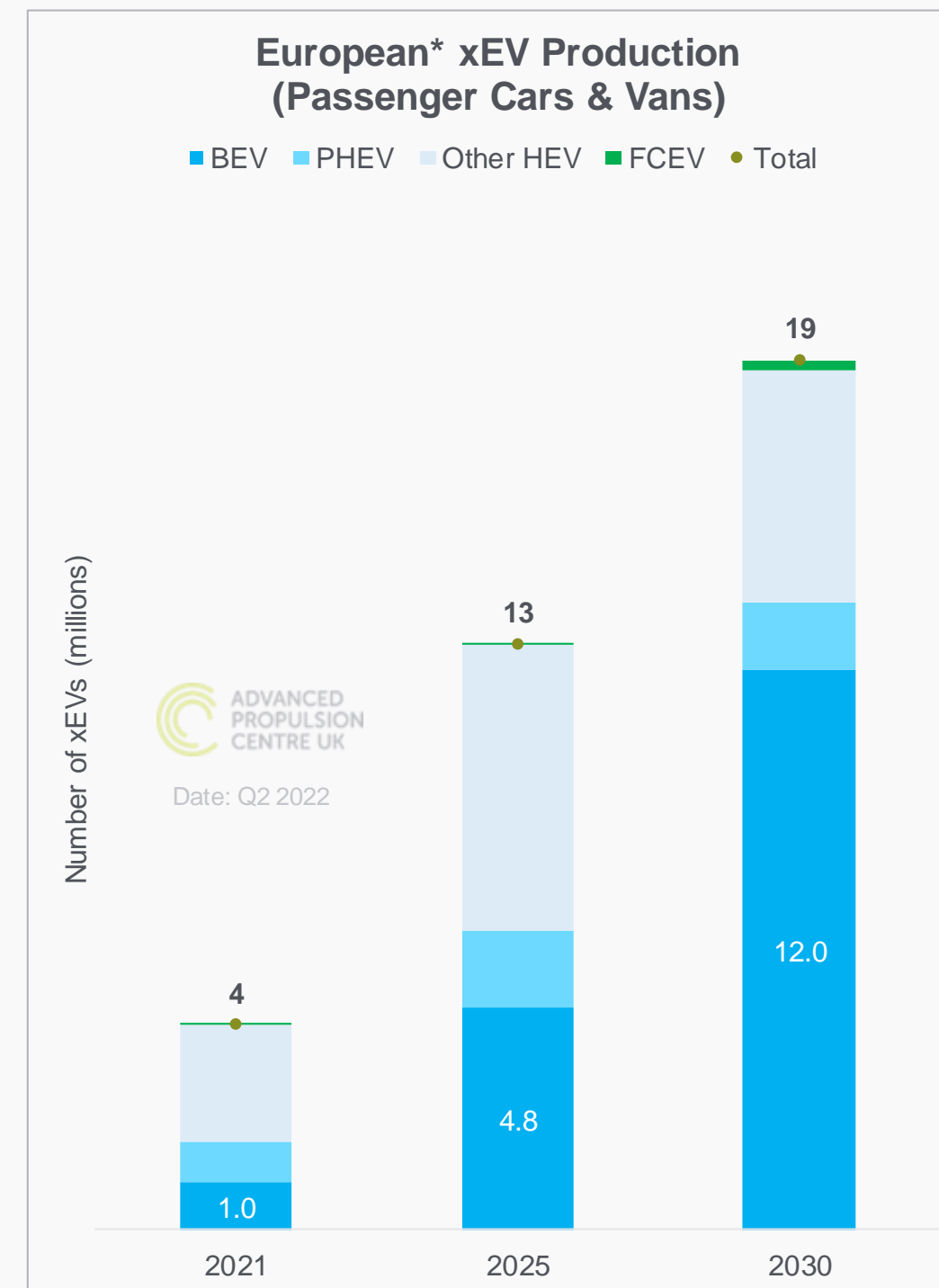
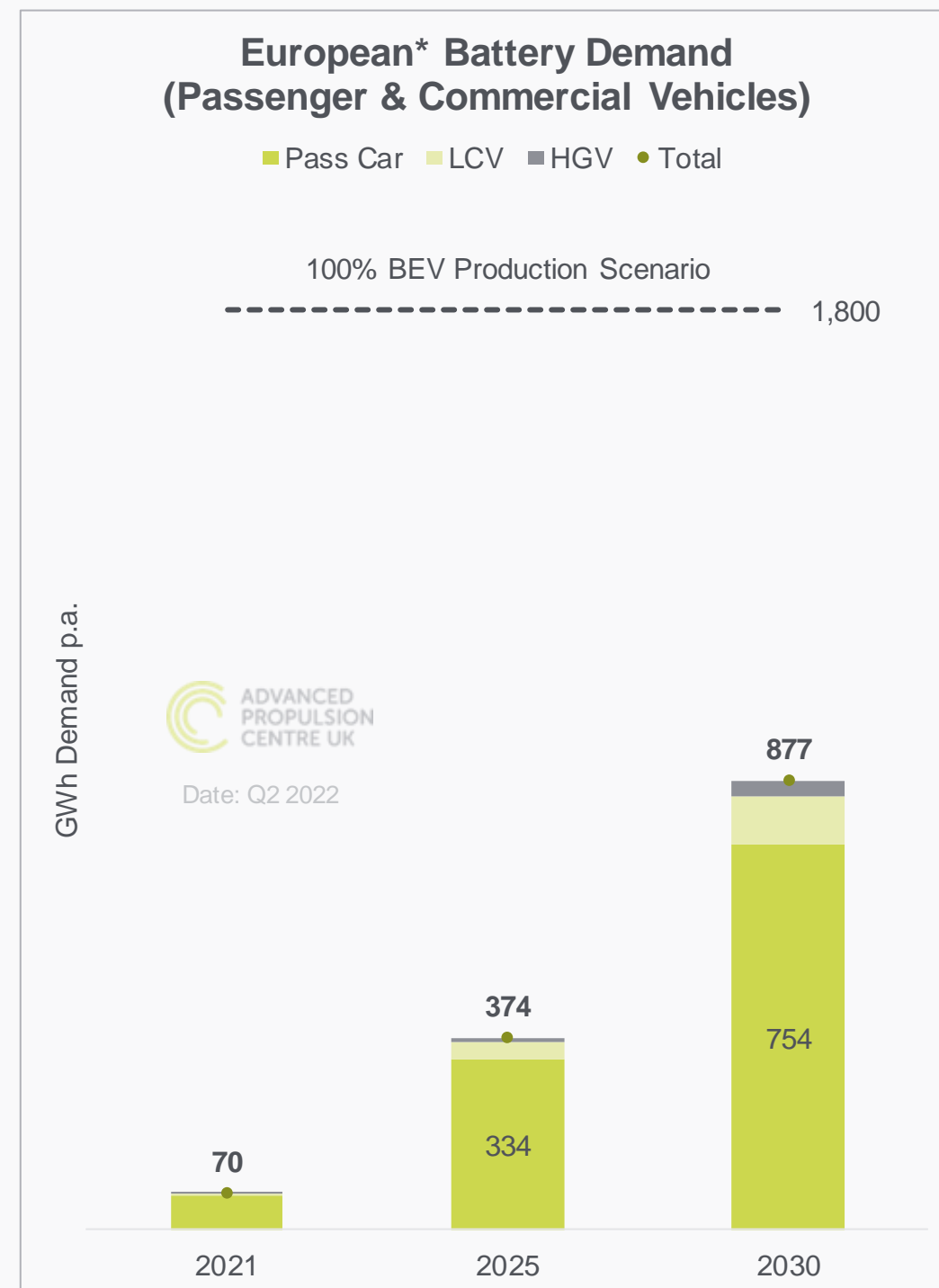


European xEV Production

Passenger Cars and Vans

Q2 2022 notes

- European vehicle production will require 877 GWh of batteries, with more than 12 million battery-electric cars and vans produced in the region by 2030

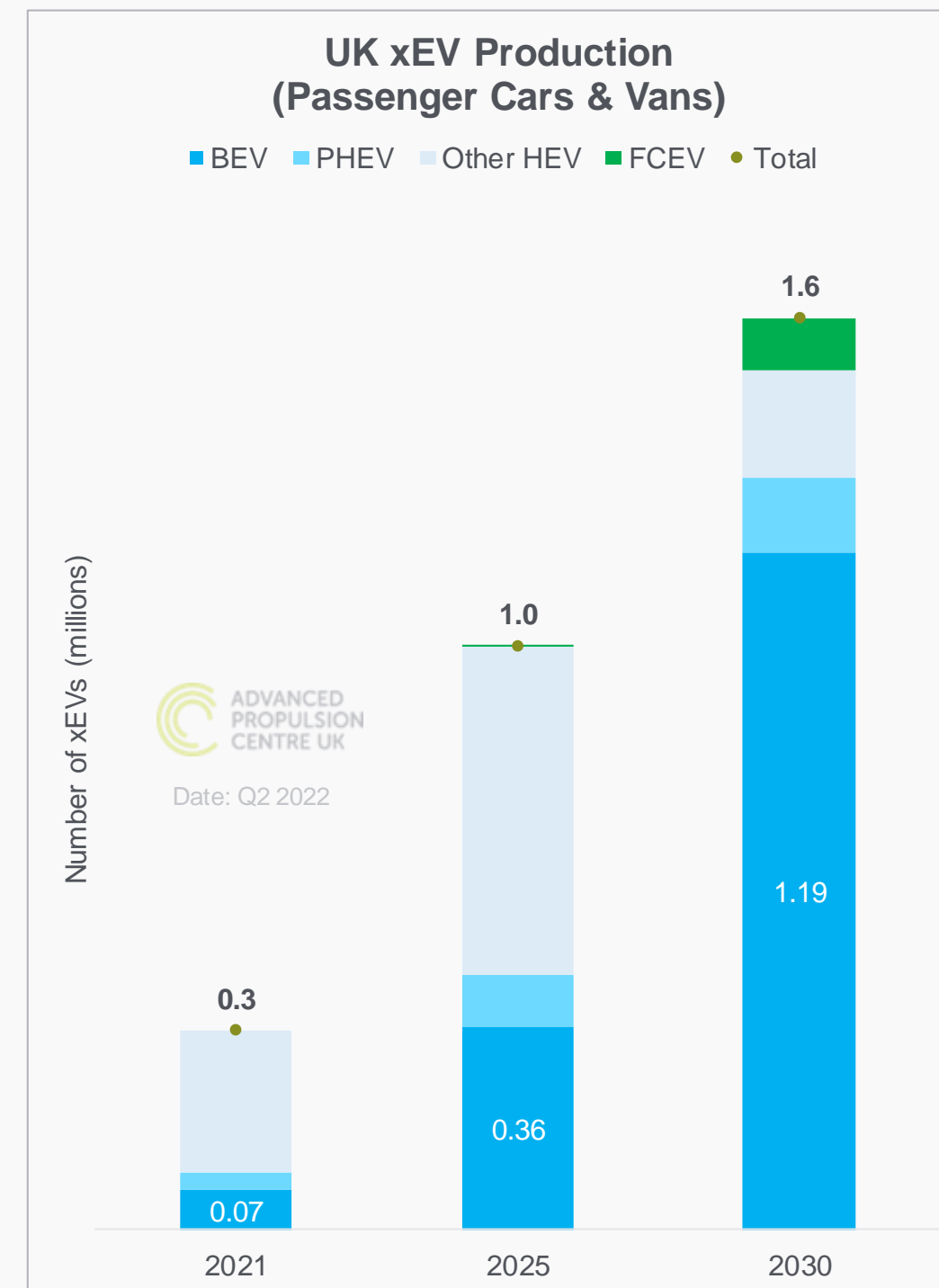
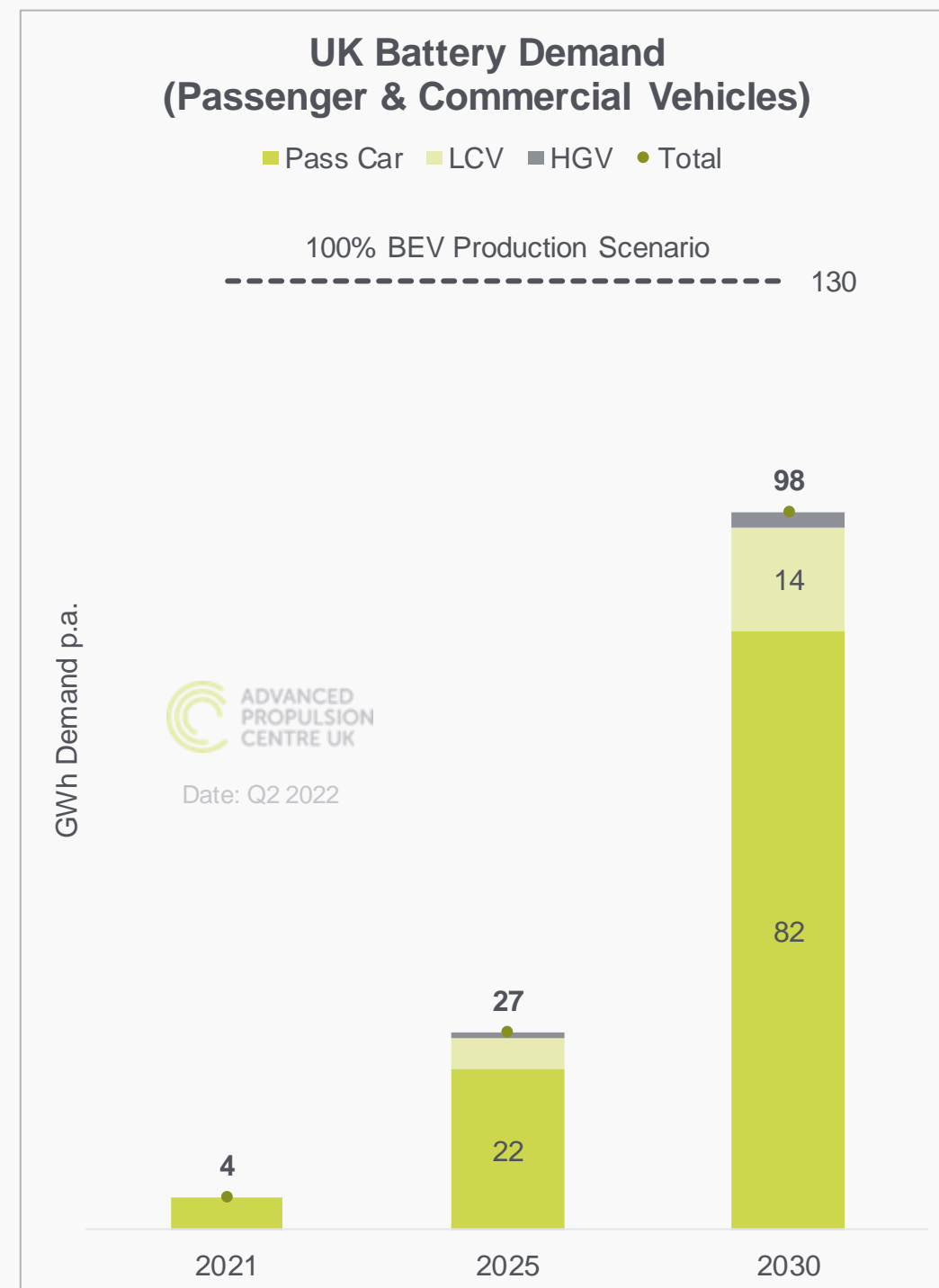


UK xEV Production

Passenger Cars and Vans

Q2 2022 notes

- UK vehicle production will require 98 GWh of batteries, with more than 1 million battery-electric cars and vans produced by 2030



Q2 2022 – Trend Update

In the previous demand report the APC identified five solutions that could address a potential Lithium shortage in 2030

Increase lithium supply

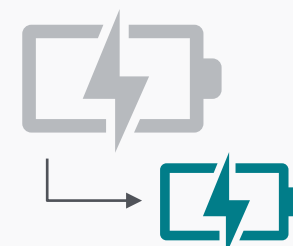


Investment incentives in sustainable Li extraction



Recycle Li from various sources

Decrease lithium demand



Manufacturing smaller & modular batteries



Moving from Li-ion to Sodium-ion batteries



Shifting production to other powertrains

This trend update focuses on modelling the potential demand side responses that could be carried out by vehicle manufacturers

Explaining our background assumptions used in modelling the potential demand side responses to a Lithium shortage in 2030

Relative to APC Q2 2022 Baseline Forecast

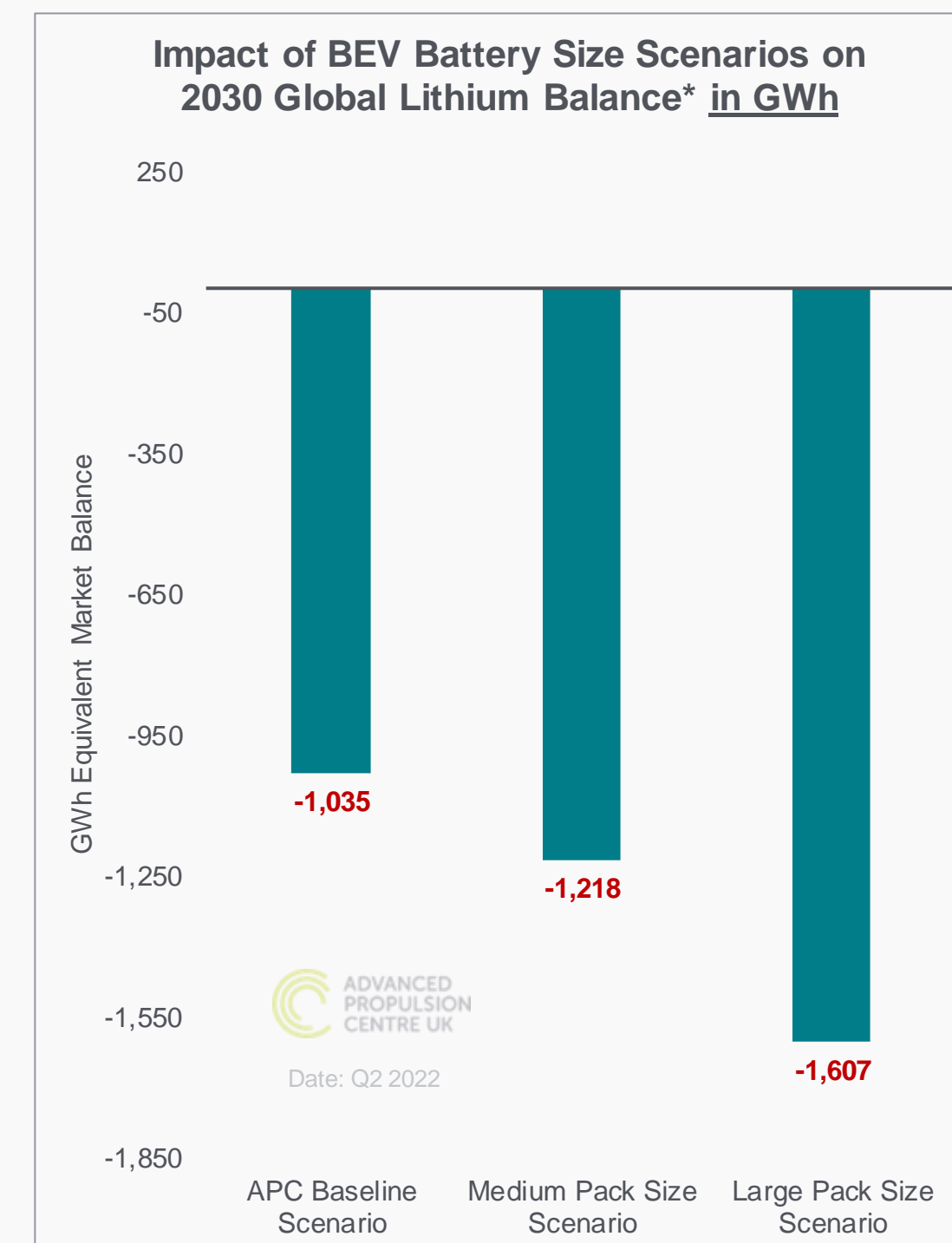
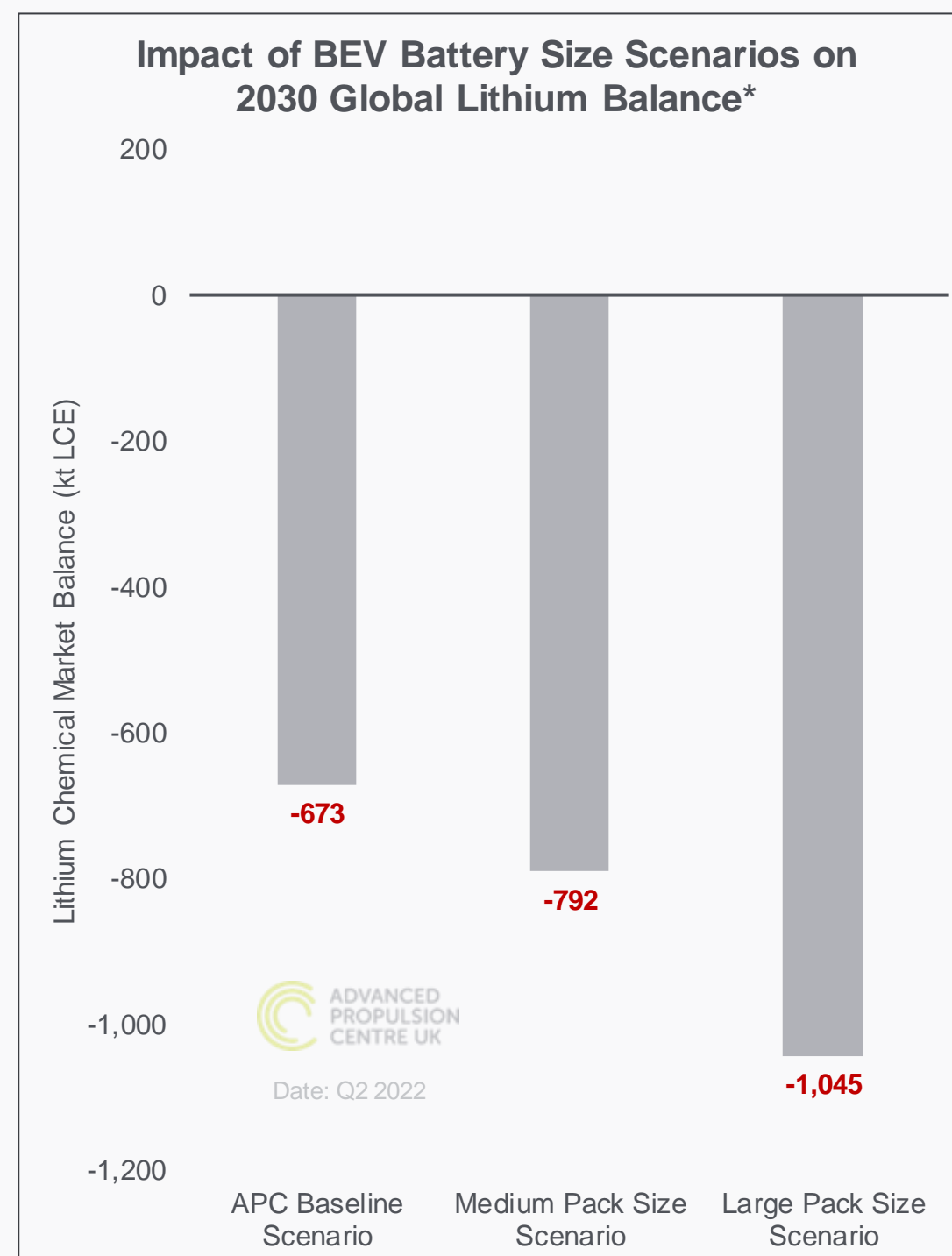
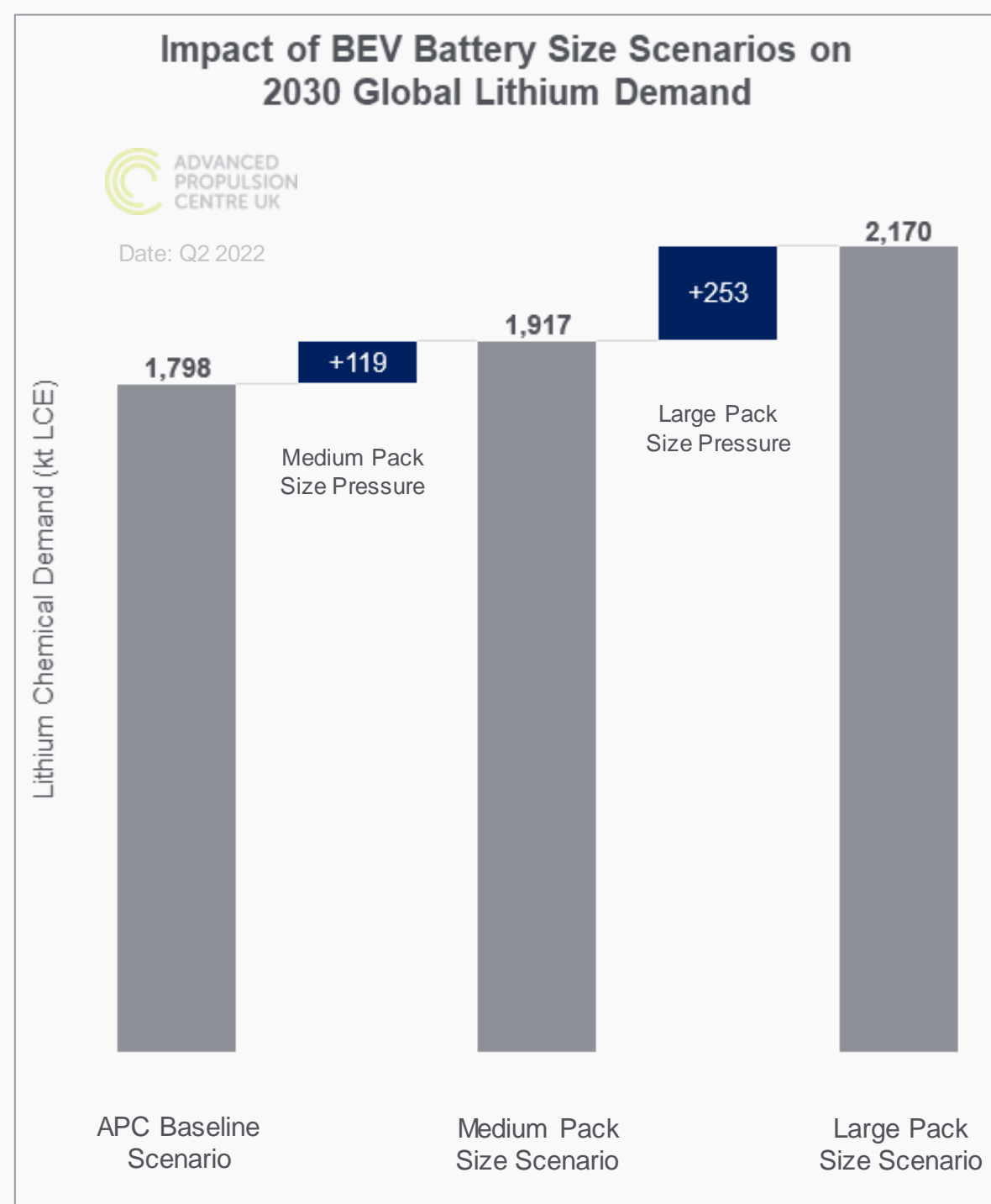
2030 Parameter	Constant	Variable	Rationale for being constant / variable
Total global production of cars and vans	●		Vehicle manufacturers want to meet internal vehicle production and sales targets
Global car and van production by segment	●		Vehicle type portfolio not compromised by potential Lithium mitigation strategy
Global car and van production by powertrain		●	Vehicle manufacturers choose to shift some production to vehicles with smaller batteries
Average battery size (kWh) by segment for all xEVs		●	Modelled powertrain shifts influence average battery size (kWh) in each segment
Global BEV production by segment		●	Modelled powertrain shifts reduce BEV production in larger vehicle segments D – F
Average battery size (kWh) by BEV segment	●		APC baseline assumptions for BEV battery sizes already conservative relative to other forecasters

Impact of bigger batteries on Lithium demand

Lithium Demand Scenario (2030)	APC Baseline	Med. Pack Size	Large Pack Size
Global average BEV pack size	65 kWh	70 kWh	80 kWh

Q2 2022 notes

- Potential Lithium deficit in 2030 could be much wider than the APC forecast of 1 TWh if light duty BEV production continues to gravitate toward larger batteries
- Average BEV battery sizes vary significantly by region and country of production



Other potential demand side pathways in mitigating the Lithium shortage in 2030

Q2 2022 notes

- Summary of modelled demand side responses by car and van segment to address the potential Lithium shortage in 2030

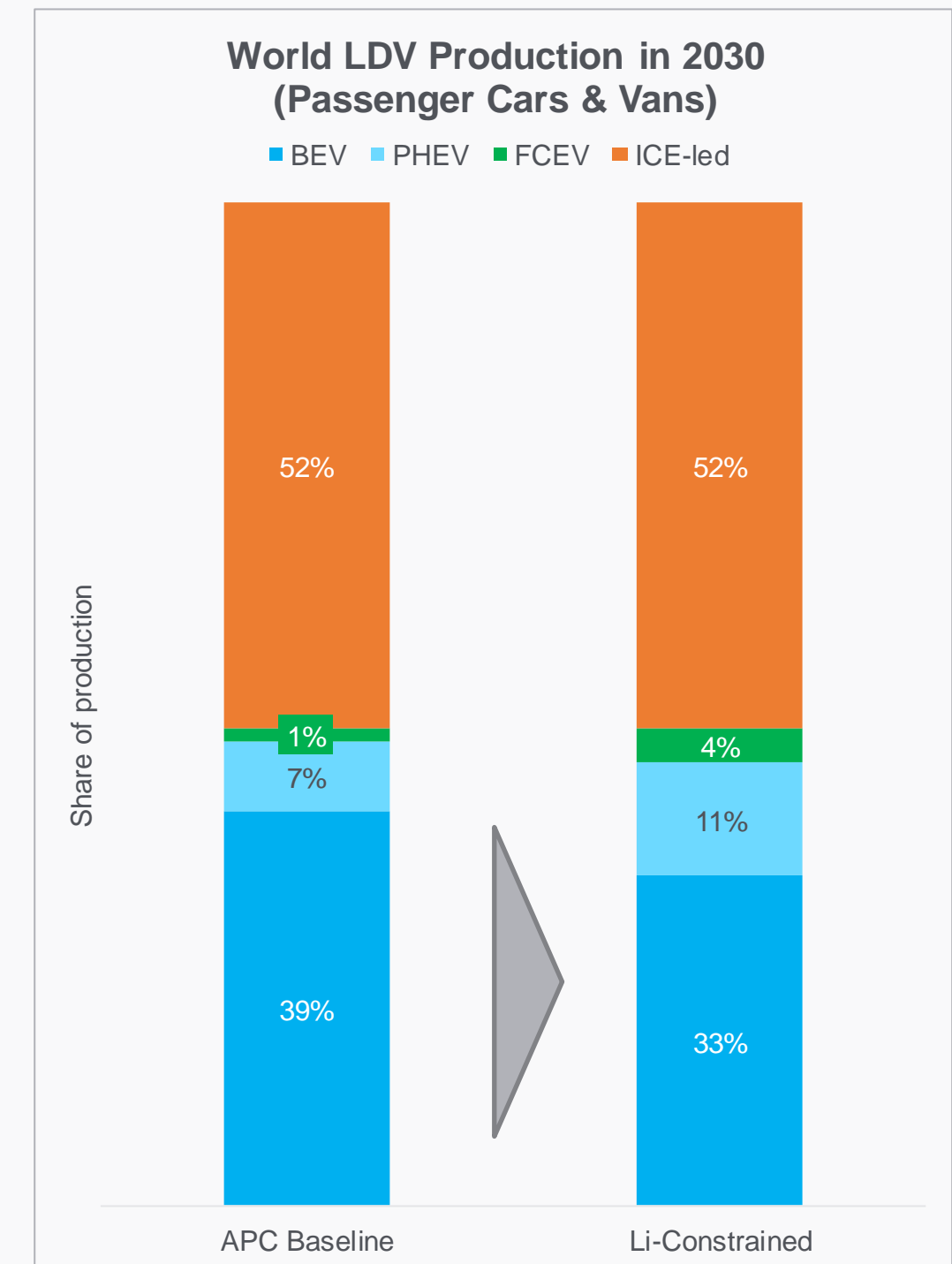
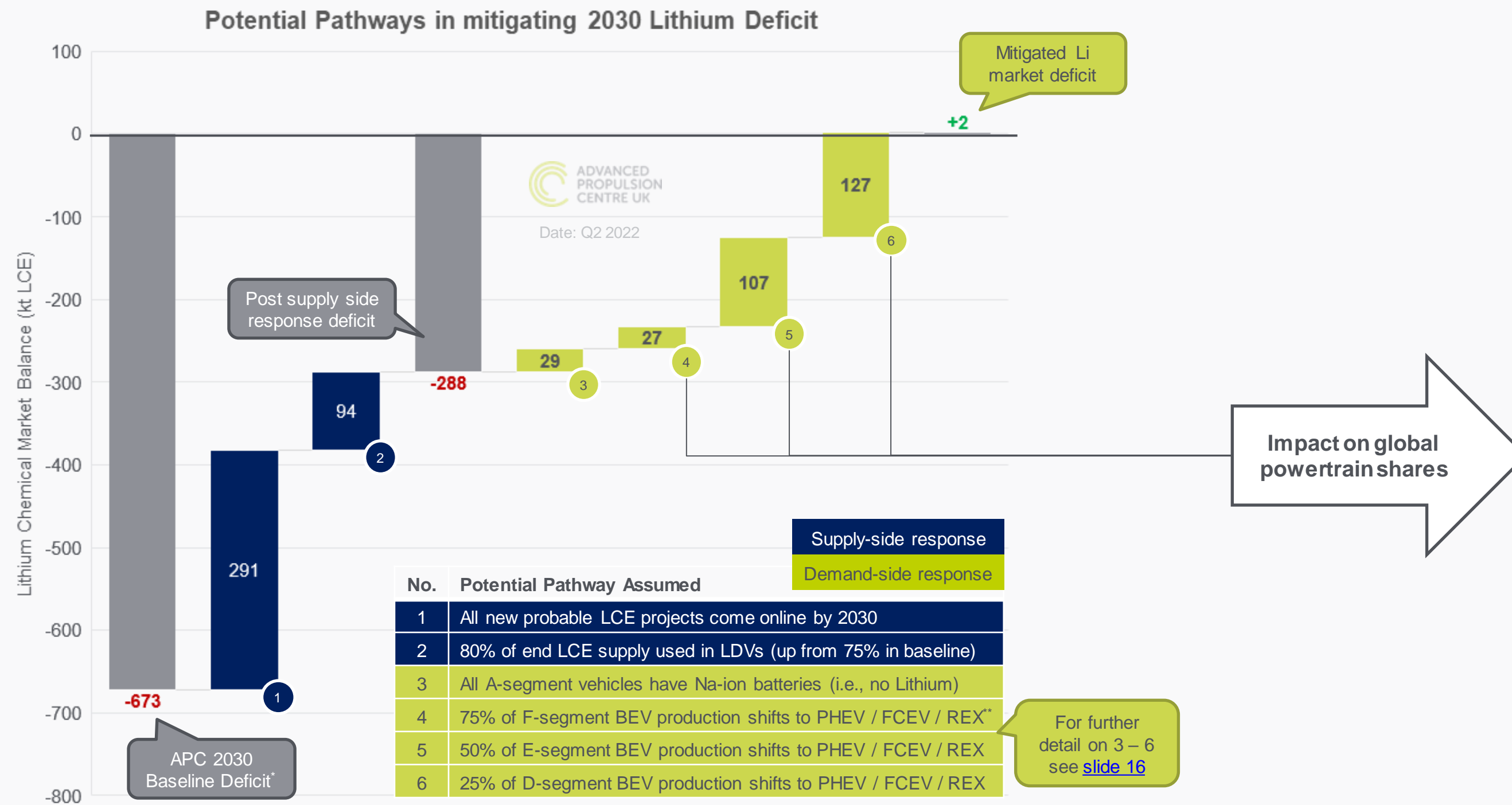
BEV car & van segment	% of 2030 global BEV production	Existing vehicle model examples	Constrained Lithium response scenarios	Rationale
A	4%	 	Sodium-ion batteries (Na-ion) are commercialised and manufactured at scale for the automotive sector, achieving 100% penetration in A-segment BEVs. Therefore, we model a complete replacement of Li-ion batteries in this segment by 2030 3	Na-ion batteries use sodium instead of lithium in the cathode or anode. CATL recently announced Na-ion cell production for 2023. The acquisition of Faradion by Reliance Industries has also bolstered the credibility of Na-ion as a potential automotive solution. However, no major OEM has publicly committed to using Na-ion yet
B	14%	 	No scenario modelled beyond APC baseline assumptions for 2030 production, weighted average battery pack size and powertrain shares	Current APC baseline assumption for weighted pack size (40 kWh) already significantly below the trend of some forecasters such as IHS Markit, so no realistic potential to reduce this assumption
C	33%	 	No scenario modelled beyond APC baseline assumptions for 2030 production, weighted average battery pack size and powertrain shares	Current APC baseline assumption for weighted pack size (60 kWh) already significantly below the trend of some forecasters such as IHS Markit, so no realistic potential to reduce this assumption
D	36%	 	25% of D-segment BEV production shifts: <ul style="list-style-type: none"> 20% PHEV with a 20 kWh pack for car & 25 kWh for van 5% FCEV & REX* with a 3 kWh pack for car & 5 kWh for van (25 kWh pack assumed for a range extender van) 6	Assuming OEMs want to sell vehicles without compromising their respective total production levels, a Lithium shortage would drive a move towards vehicles with powertrains that require smaller batteries and less lithium. In this segment, car manufacturers would likely opt for PHEV manufacture over FCEVs due to existing platform packaging constraints
E	12%	 	50% of forecast E-segment BEV production shifts: <ul style="list-style-type: none"> 30% PHEV with a 28 kWh pack for car & 25 kWh for van 20% FCEV & REX* with a 3 kWh pack for car & 5 kWh for van (30 kWh pack assumed for a range extender van) 5	The same theory applies as in the D-segment explanation above, however, in this segment the balance between PHEV and FCEV would be closer as the platform dimensions start to suit the integration of zero-emission powertrains such as FCEV and range extenders
F / HVAN	2%	 	75% of F-segment BEV production shifts: <ul style="list-style-type: none"> 25% PHEV with a 25 kWh pack for van (no shift in car) 50% FCEV & REX* with a 5 kWh pack for a fuel cell van and 60 kWh pack for a range extender van 4	In this segment we only assume a shift in powertrain for the large HVAN segment (car F-segment equivalent) due to the very low production volume expected in car. FCEV & REX powertrains are assumed to be cost competitive with BEV by 2030, also meeting the required range and payload requirements for this van segment

Scenario ref. number X

Potential pathways in mitigating the Lithium shortage in 2030

Q2 2022 notes

- Potential Lithium deficit in 2030 could be mitigated in part by shifting some BEV production with larger batteries to vehicles with smaller ones such as FCEVs



Summary of the relative impact for each of the identified five solutions to a potential Lithium shortage in 2030

Increase lithium supply

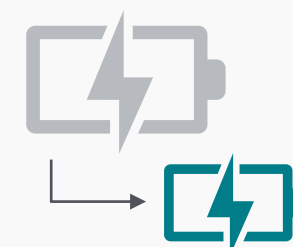


Investment incentives in sustainable Li extraction



Recycle Li from various sources

Decrease lithium demand



Manufacturing smaller & modular batteries



Moving from Li-ion to Sodium-ion batteries



Shifting production to other powertrains

Relative impact

High

Low

High

Low

High

Summary

Li shortage 40% better if all probable extraction projects come online by 2030

Significant supply from BEV end of life retirements likely to come later than 2030

APC Baseline 2030 Li shortage 55% better than in 'Large Pack Size Scenario'

Na-ion in smaller BEVs that account for < 5% of battery electric cars and vans

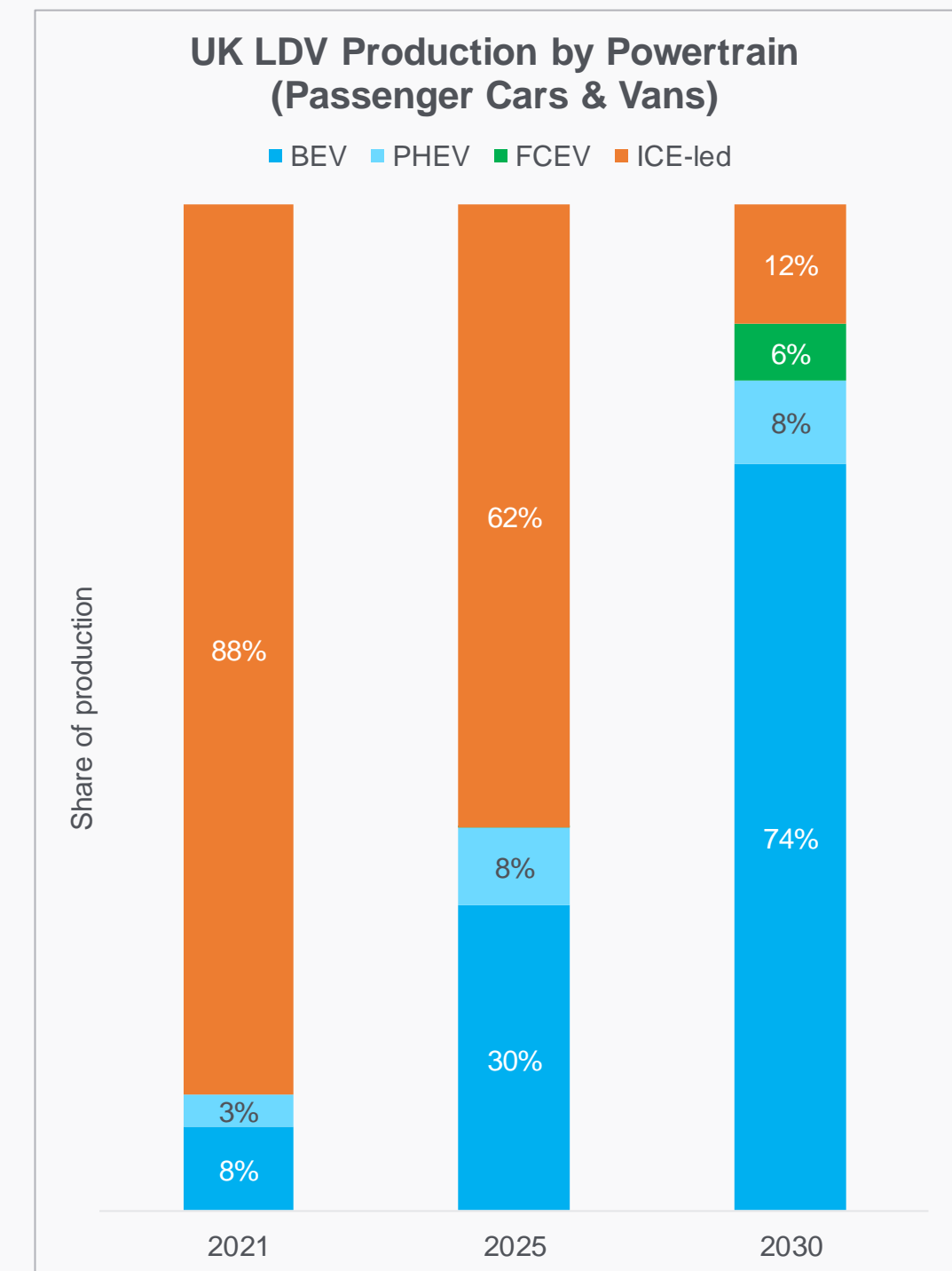
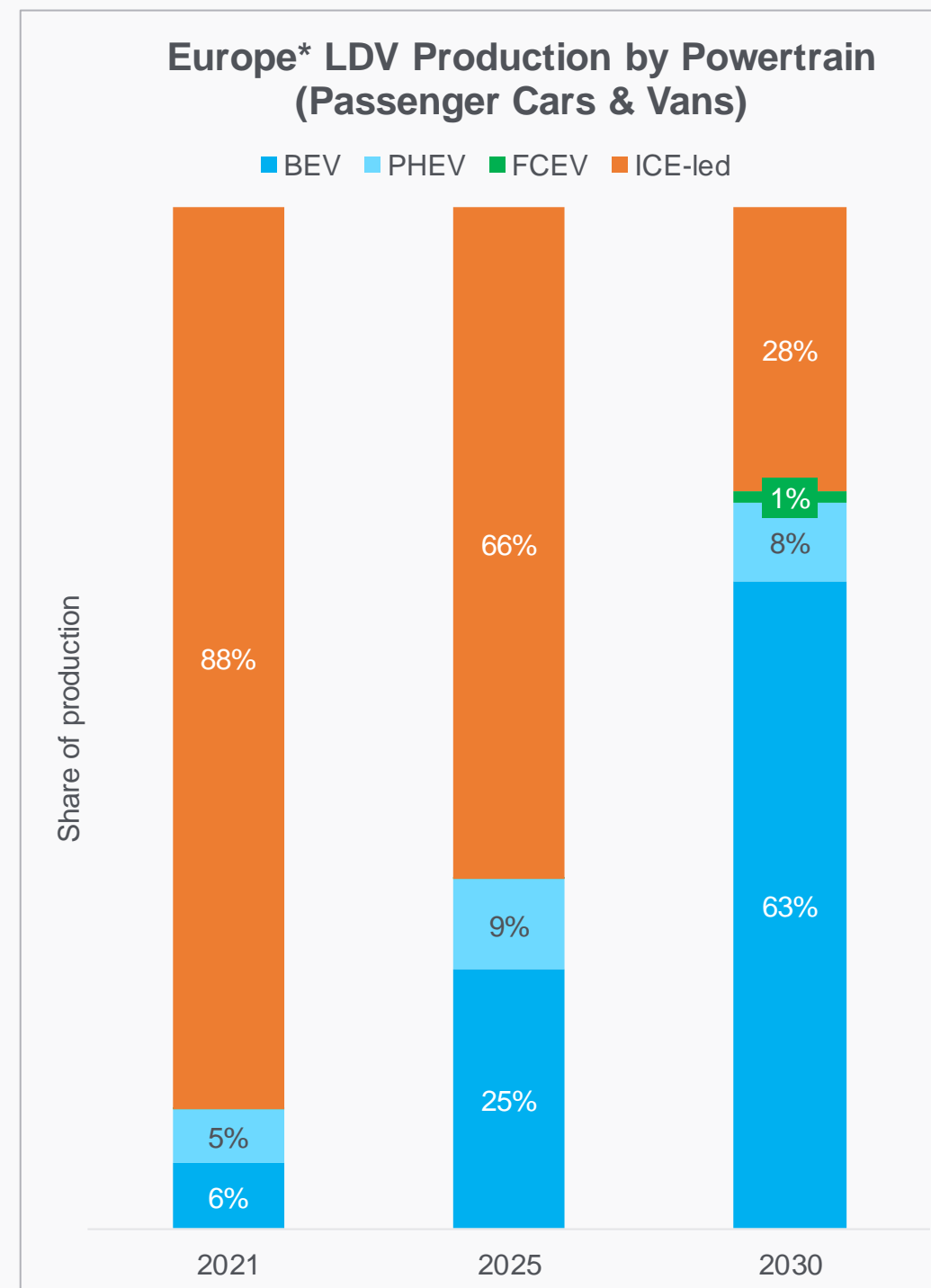
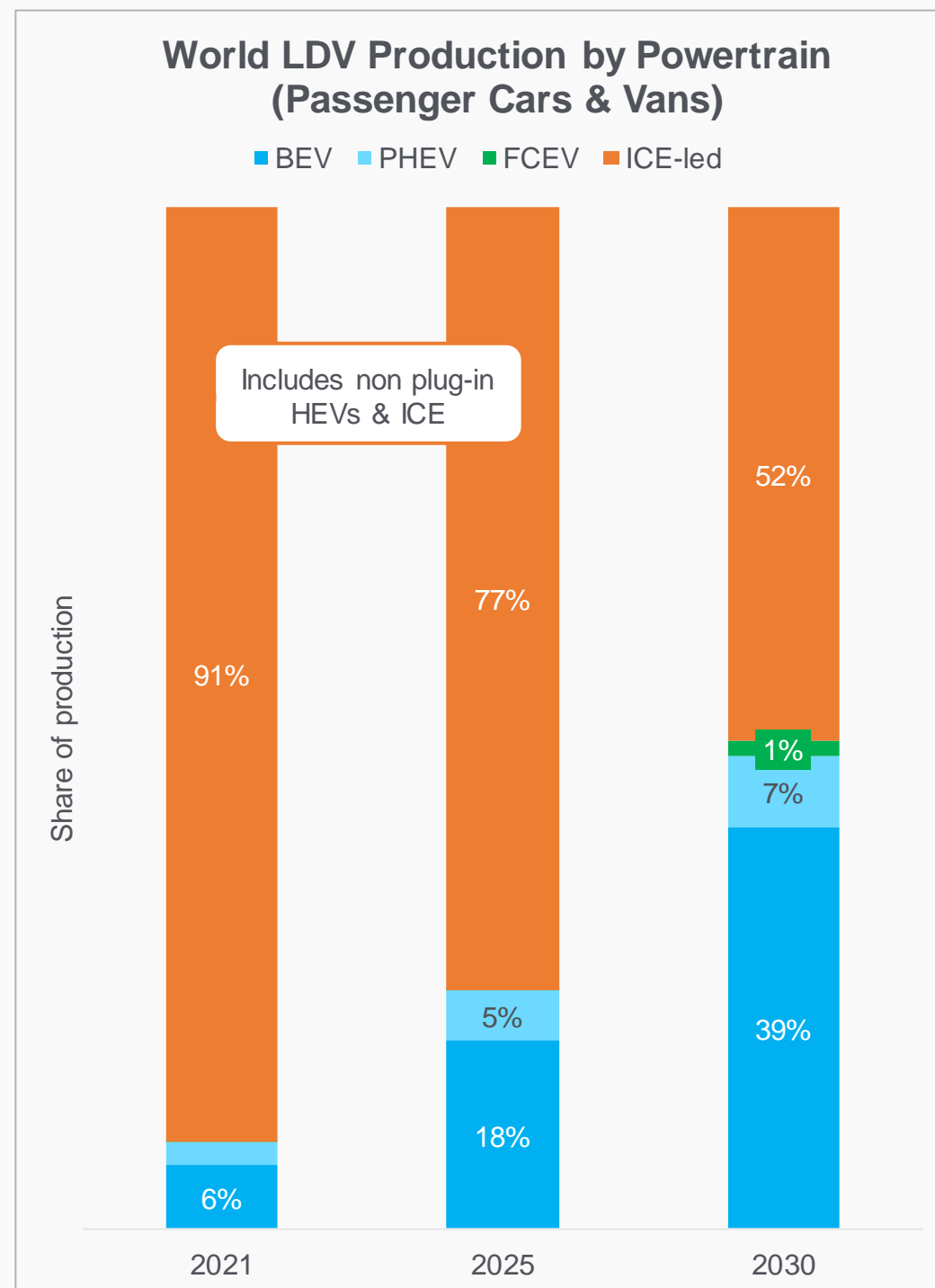
Can enable a 40% improvement in Li market balance for cars and vans

Q2 2022 – Electrified Components data

Forecasts for LDV production by powertrain

Q2 2022 notes

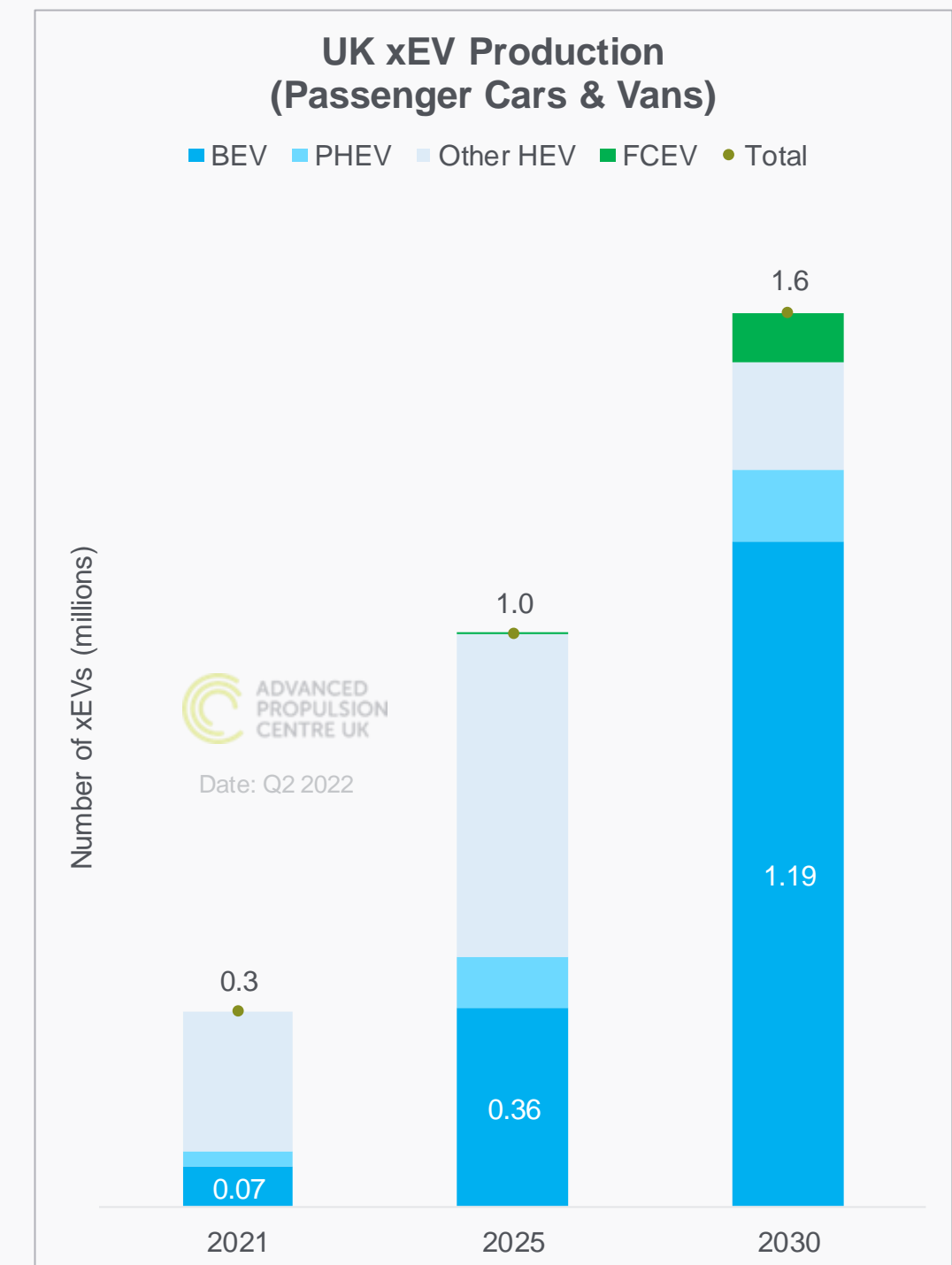
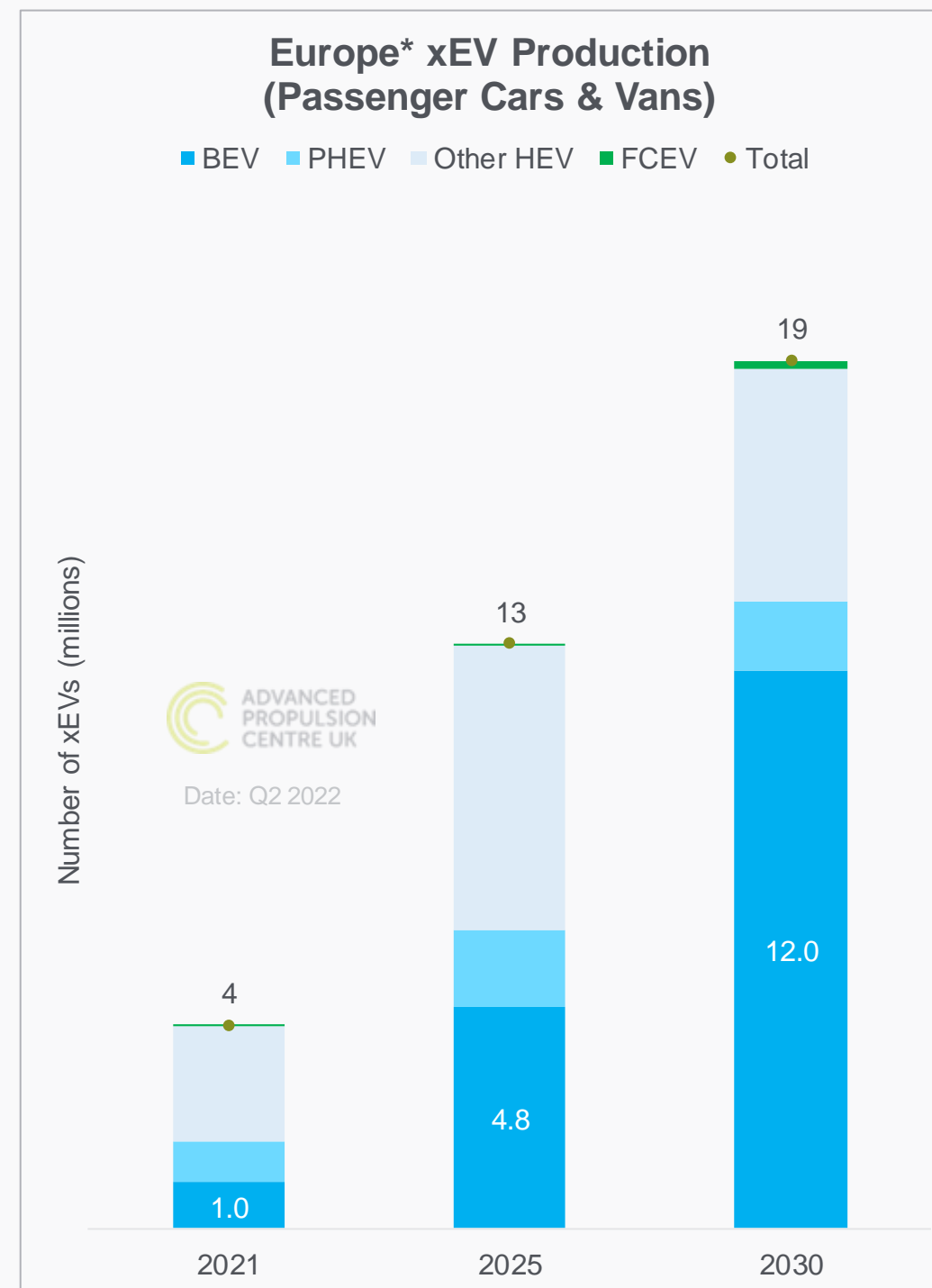
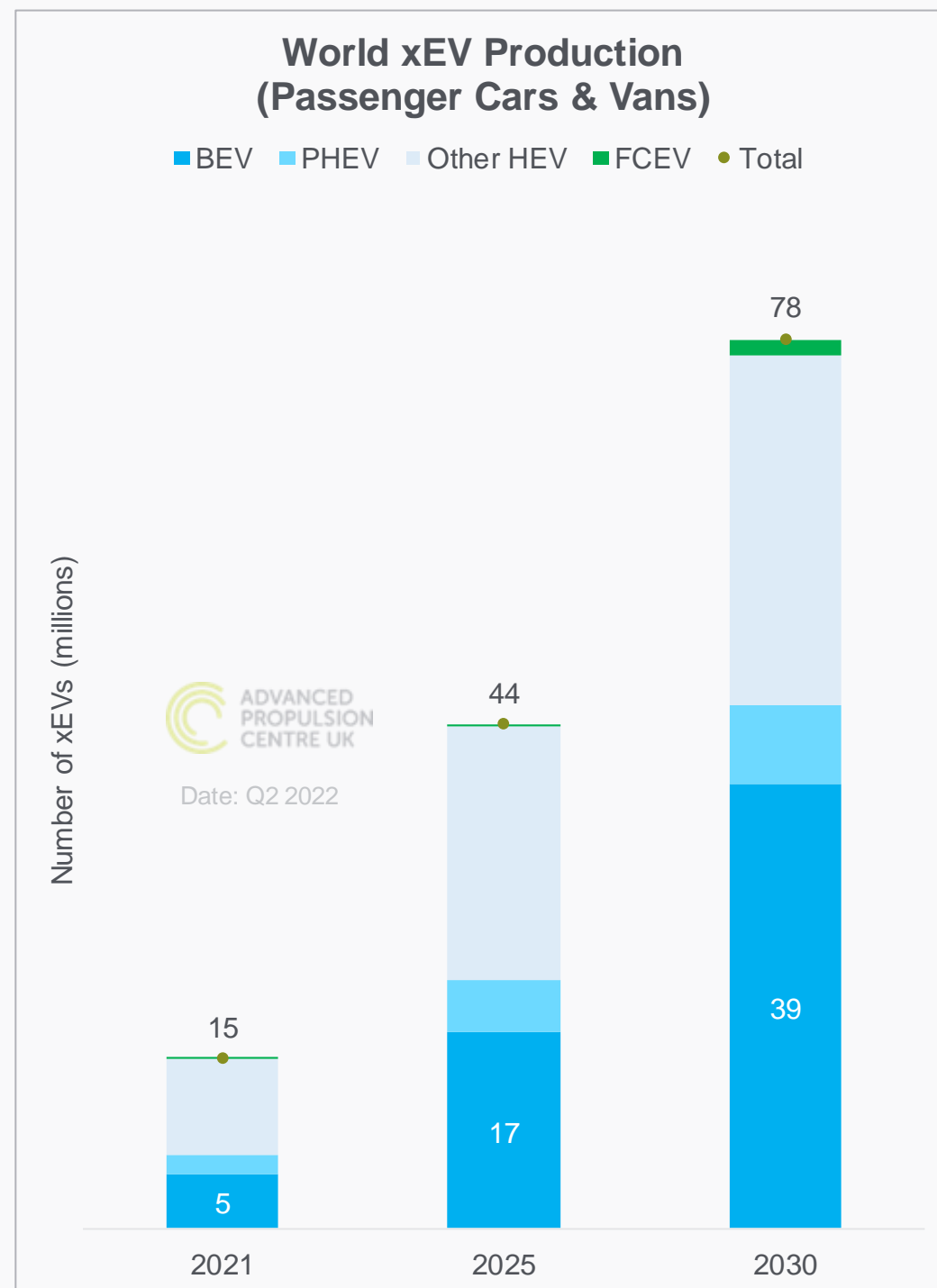
- Zero-emission vehicles (ZEVs) expected to dominate European and UK production by the end of the decade
- ICE-led powertrains still make up over 50% of global production by 2030



Forecasts for light duty xEV production

Q2 2022 notes

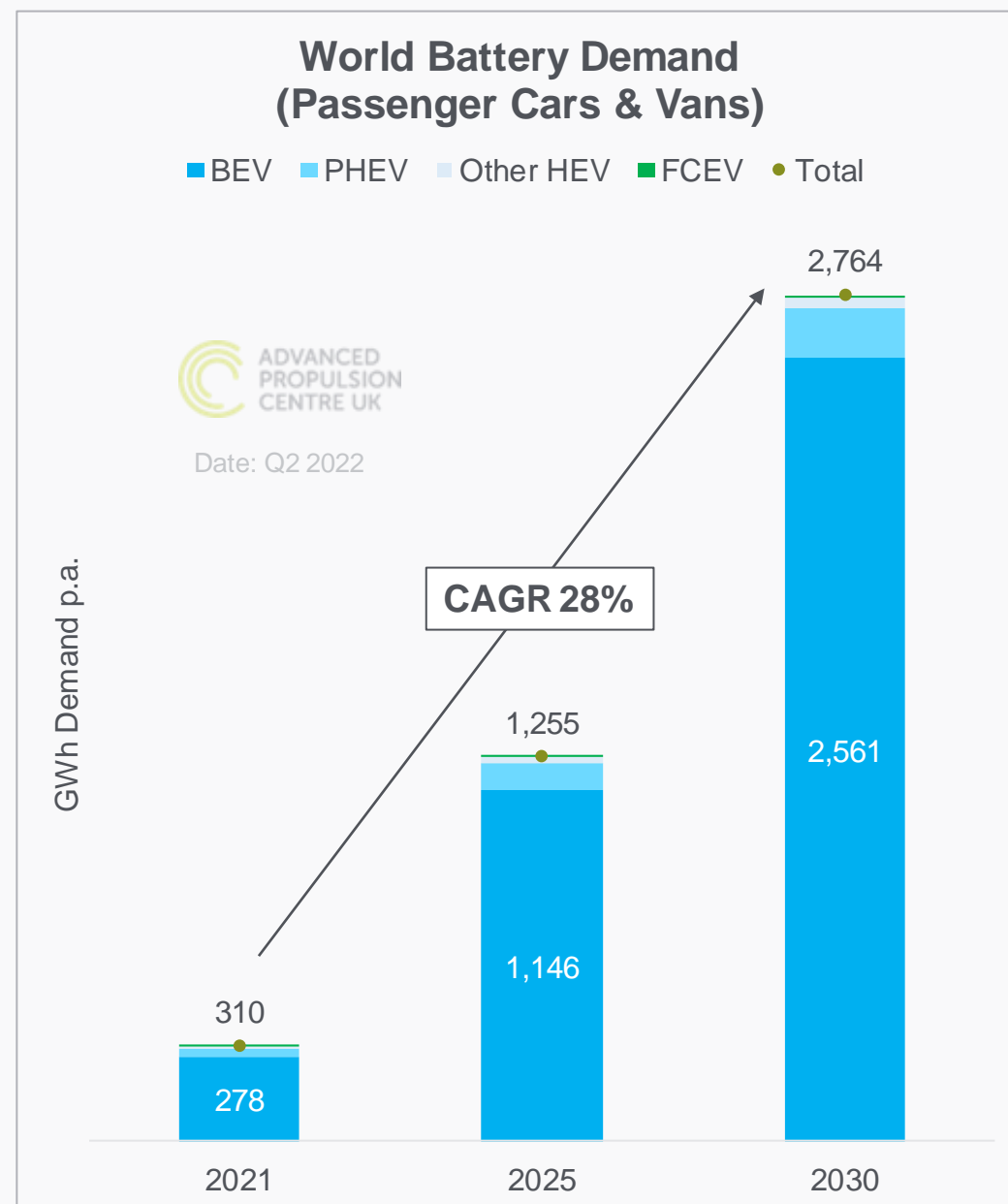
- European BEV production in 2030 forecast to almost triple that of 2025 levels



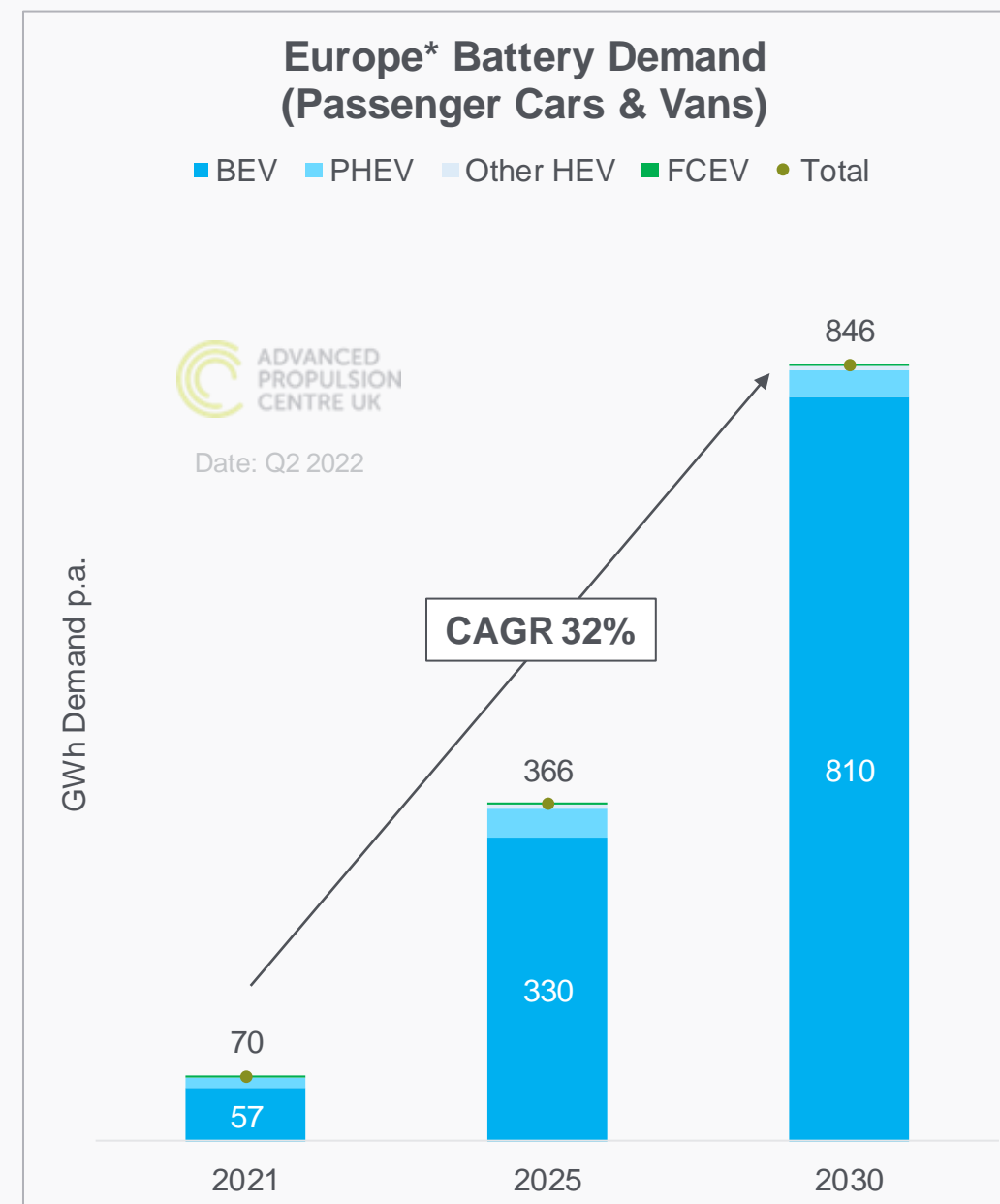
World battery demand for LDVs

Q2 2022 notes

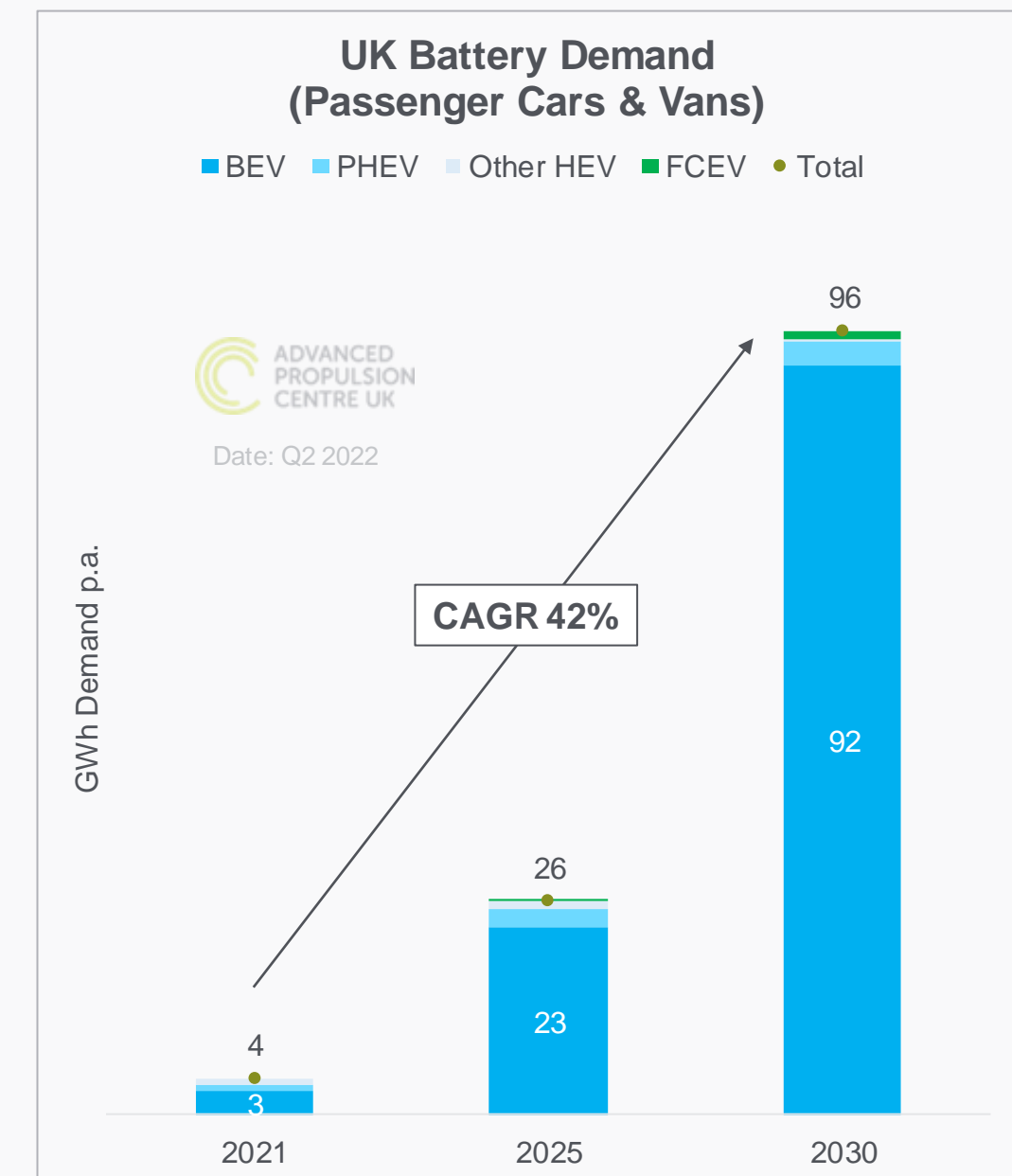
- World battery demand for LDVs to exceed 2,700 GWh by 2030
- 9x higher than demand in 2021
- Europe to account for ~30% of this demand



- World battery demand for light duty xEVs is forecast to exceed **2,700 GWh by 2030**
- Relative to our previous forecast, we have seen a **69 GWh** uplift to our 2030 demand figure mainly due to revised pack size assumptions



- European demand from xEV production is forecast to account for **30%** of world battery demand in **2030**
- Relative to our previous forecast, the 2030 number remains largely unchanged

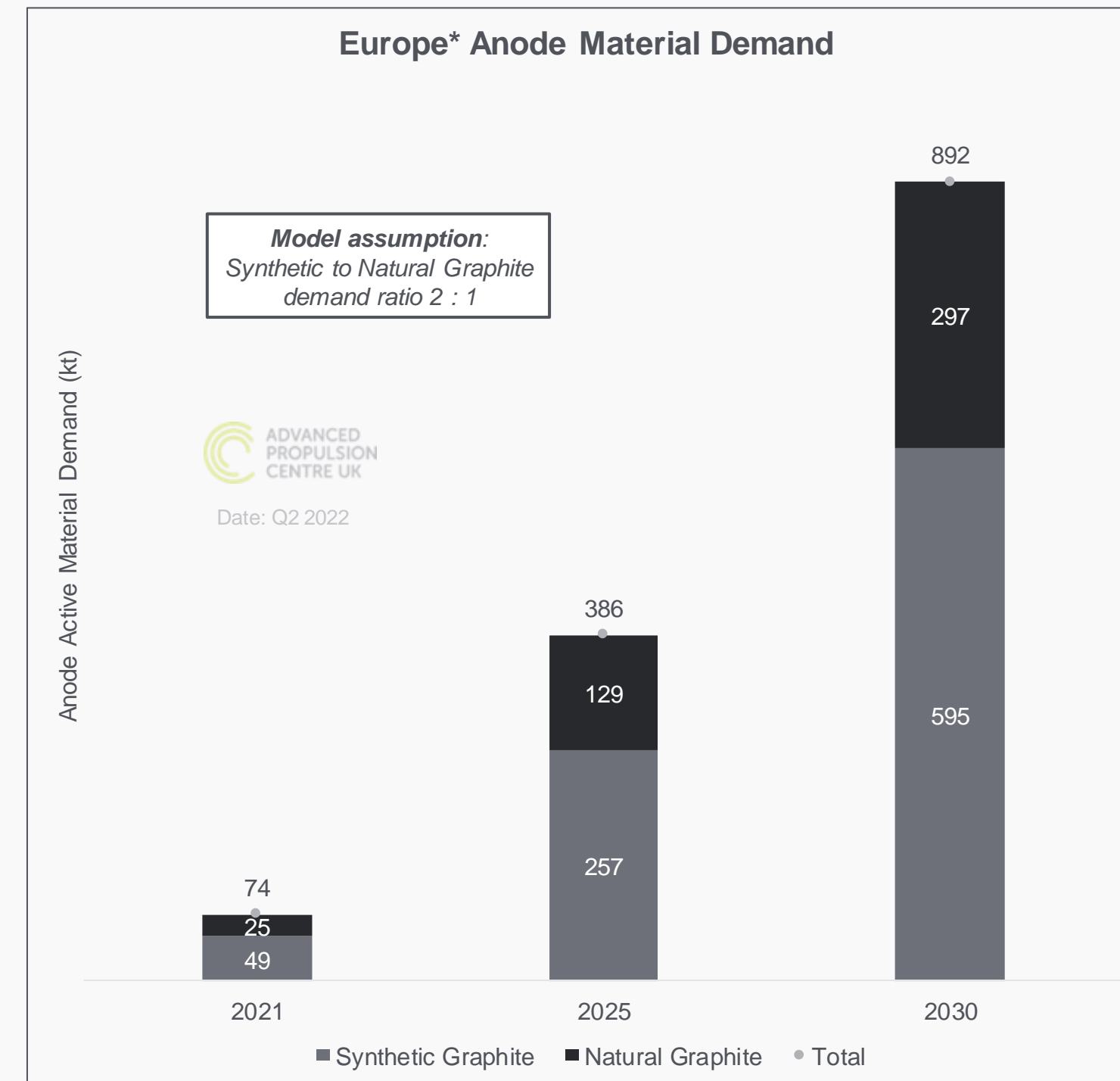
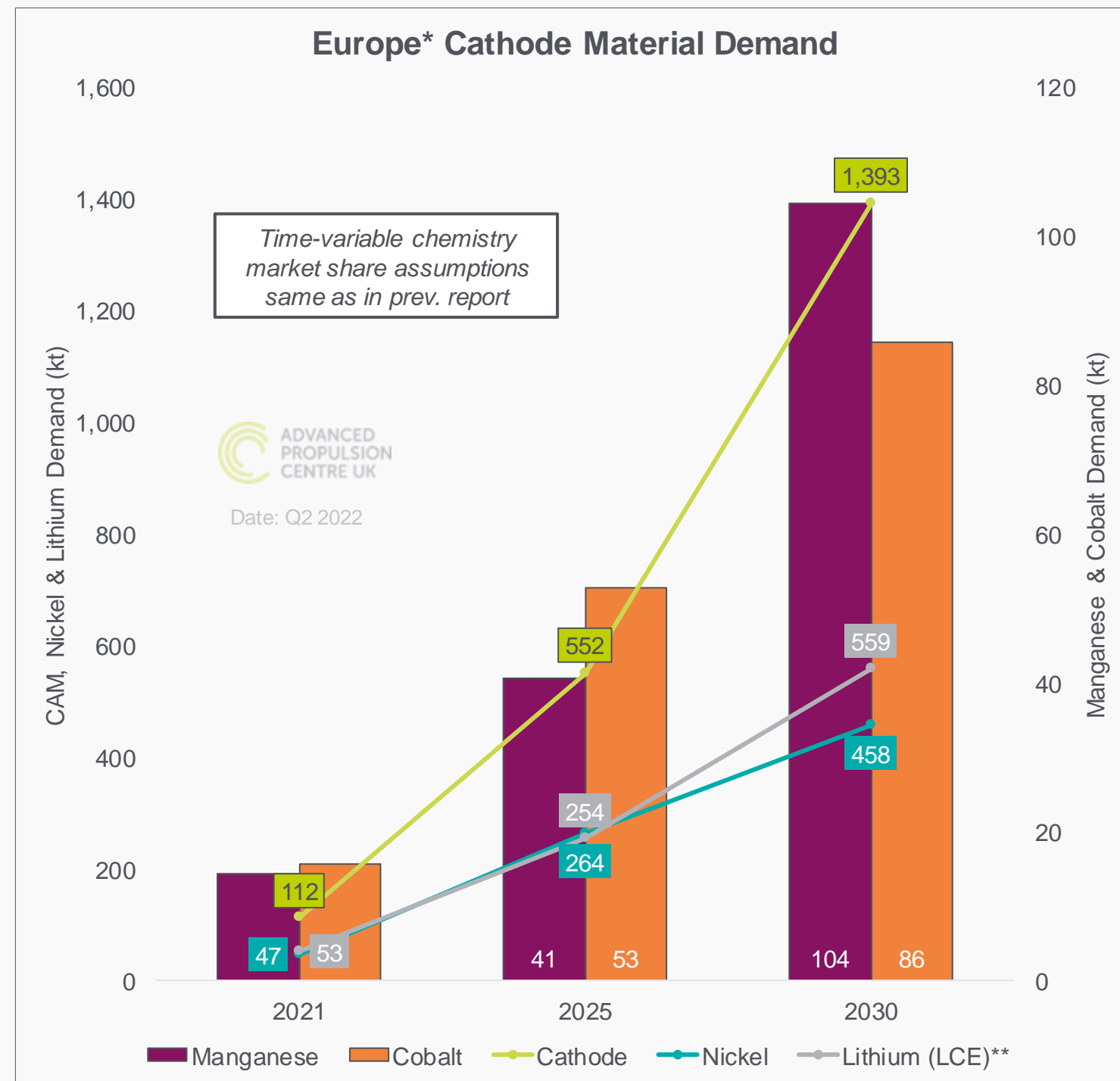


- UK battery demand forecast to account for **11%** of European battery demand in **2030**
- Relative to our previous forecast, we have seen a **5 GWh** uplift in the 2030 demand figure due to a significant update in UK BEV production

European Cathode Active Material (CAM) demand

Q2 2022 notes

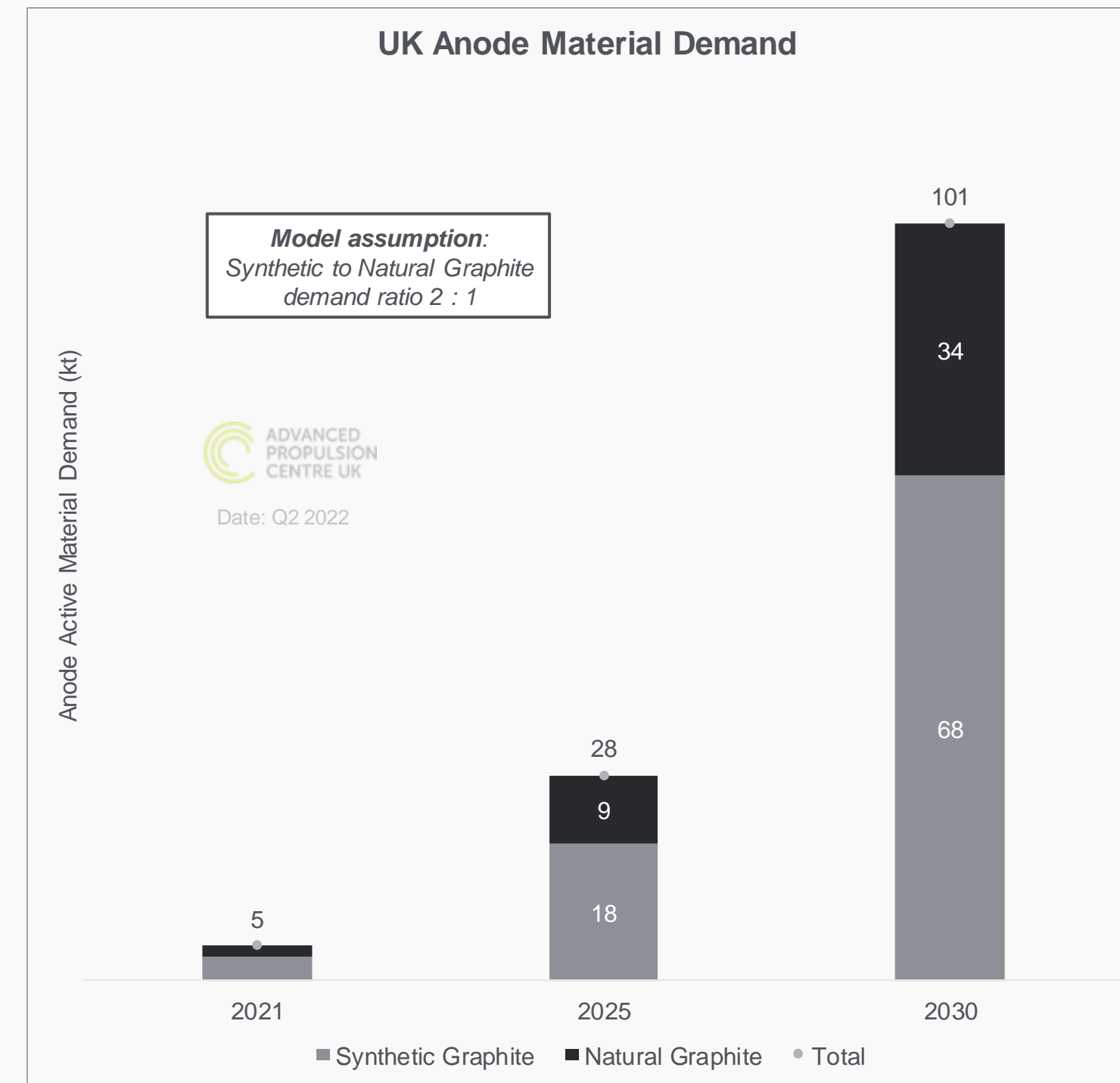
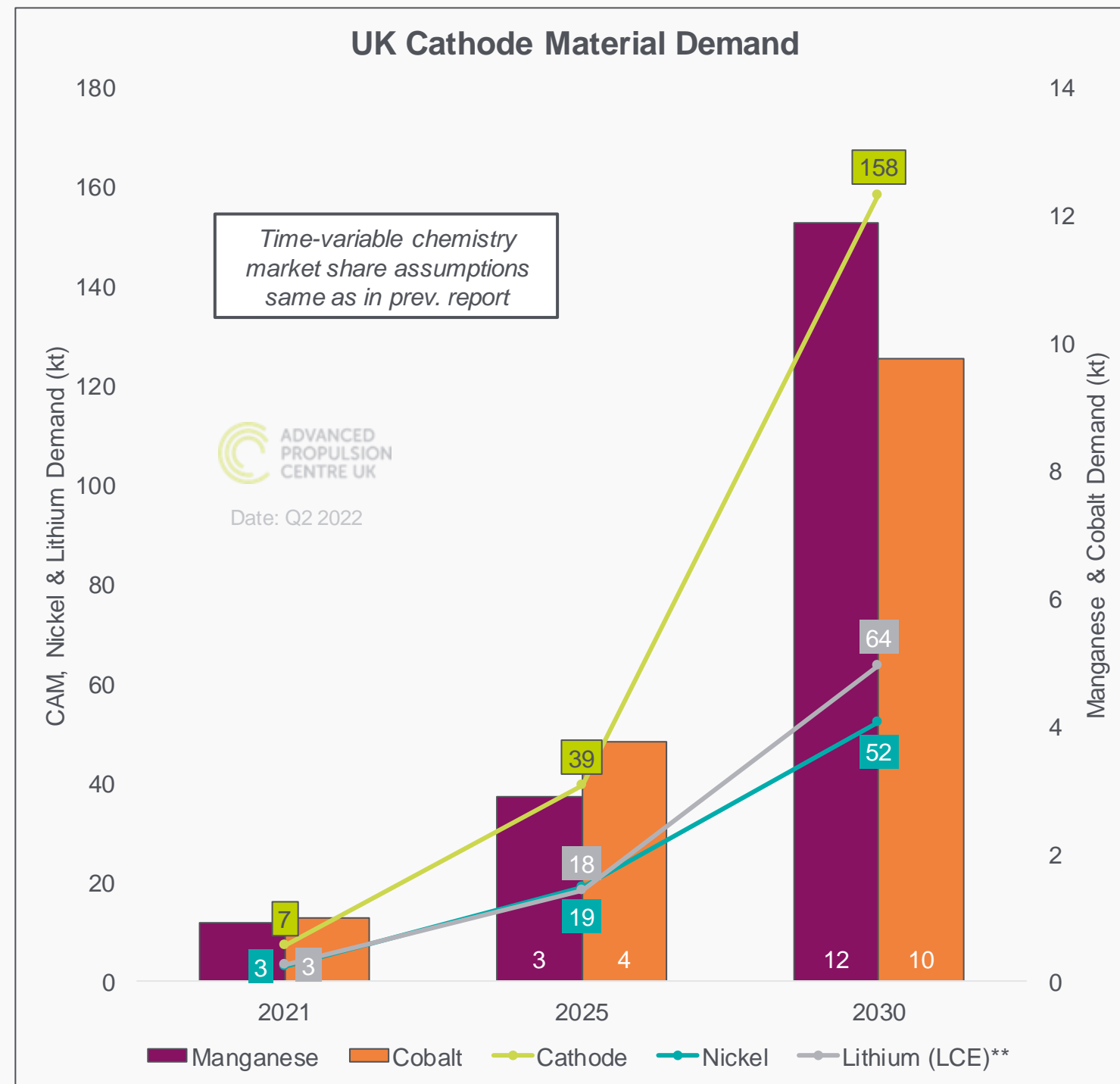
- European Cathode Active Material (CAM) demand for LDVs expected to surpass 500kt by 2025
- Demand increases fivefold from 2021 to 2025.



UK Cathode Active Material (CAM) demand

Q2 2022 notes

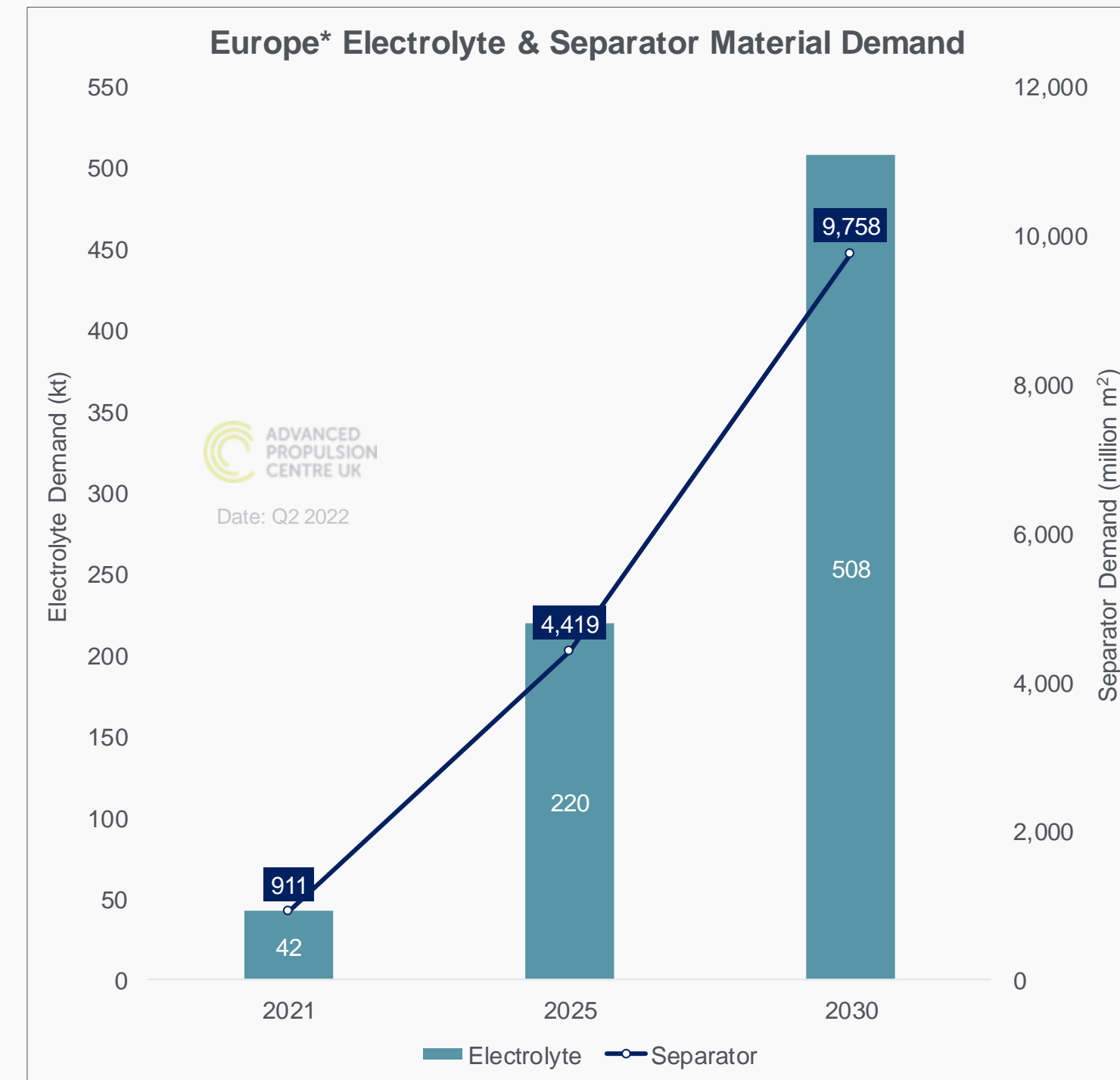
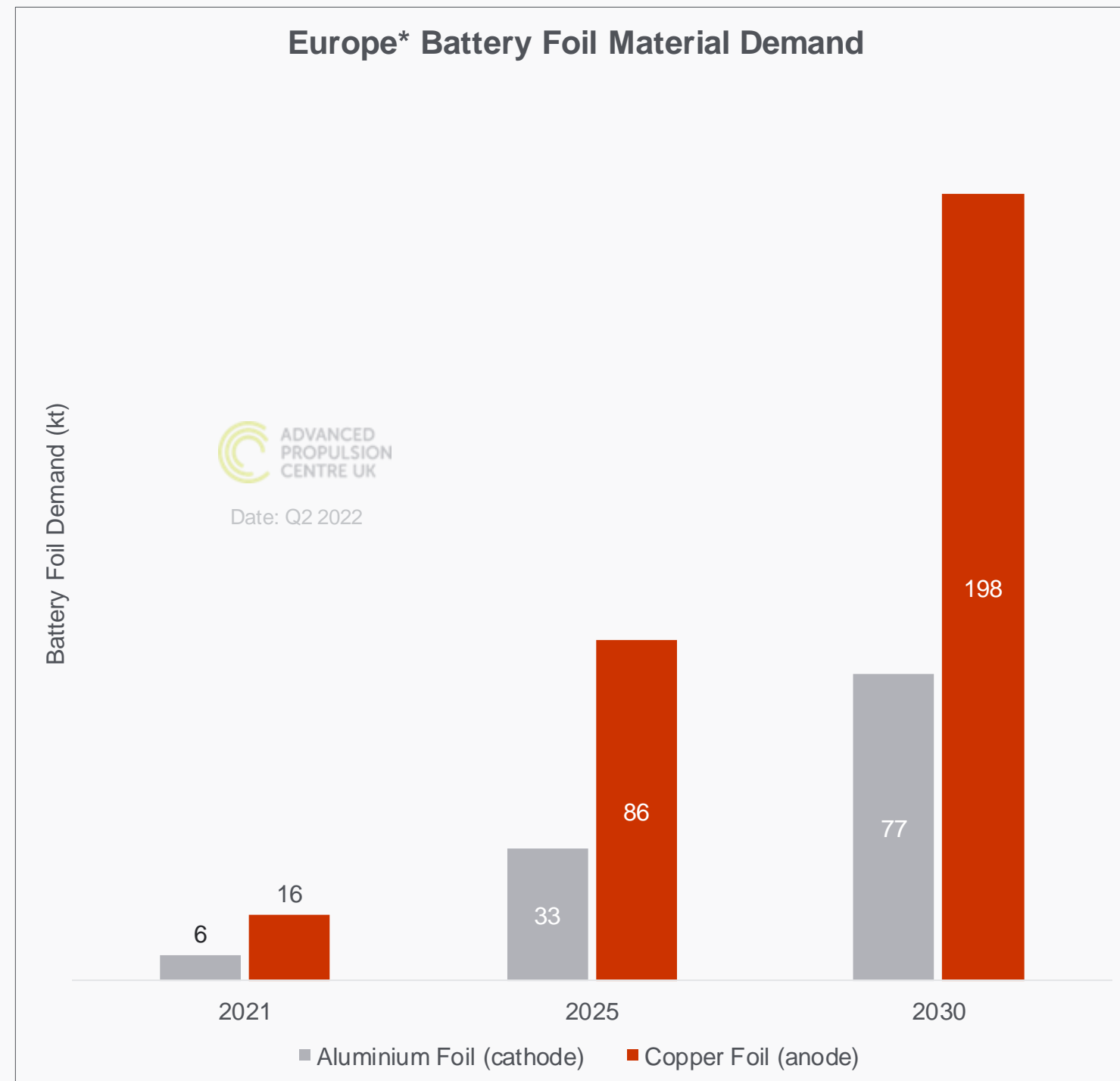
- UK Cathode Active Material (CAM) demand for LDVs expected to exceed 150kt by 2030
- Big opportunity to localise at least 3 CAM plants in the UK.



European demand for battery foils, electrolyte and separator material

Q2 2022 notes

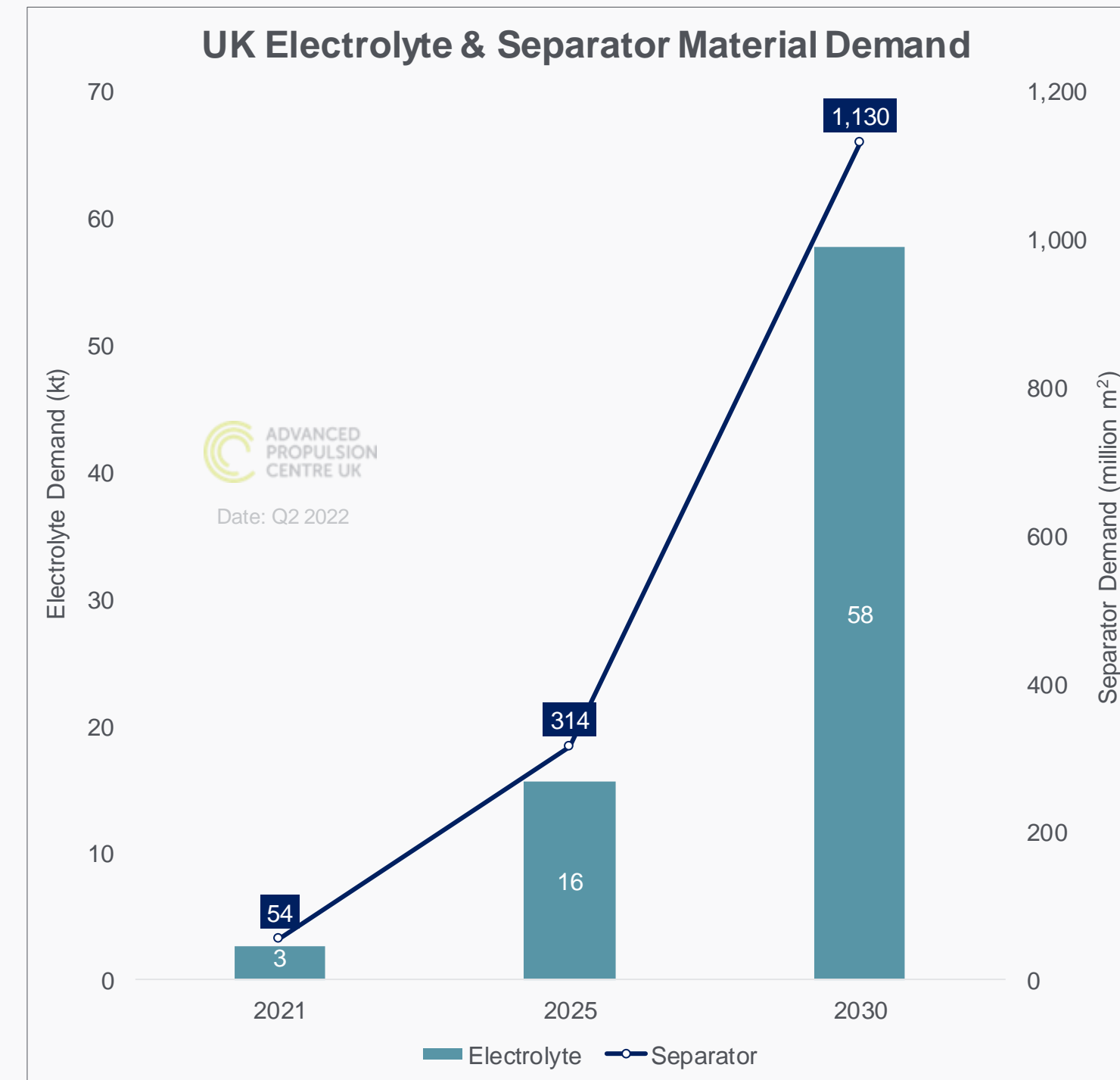
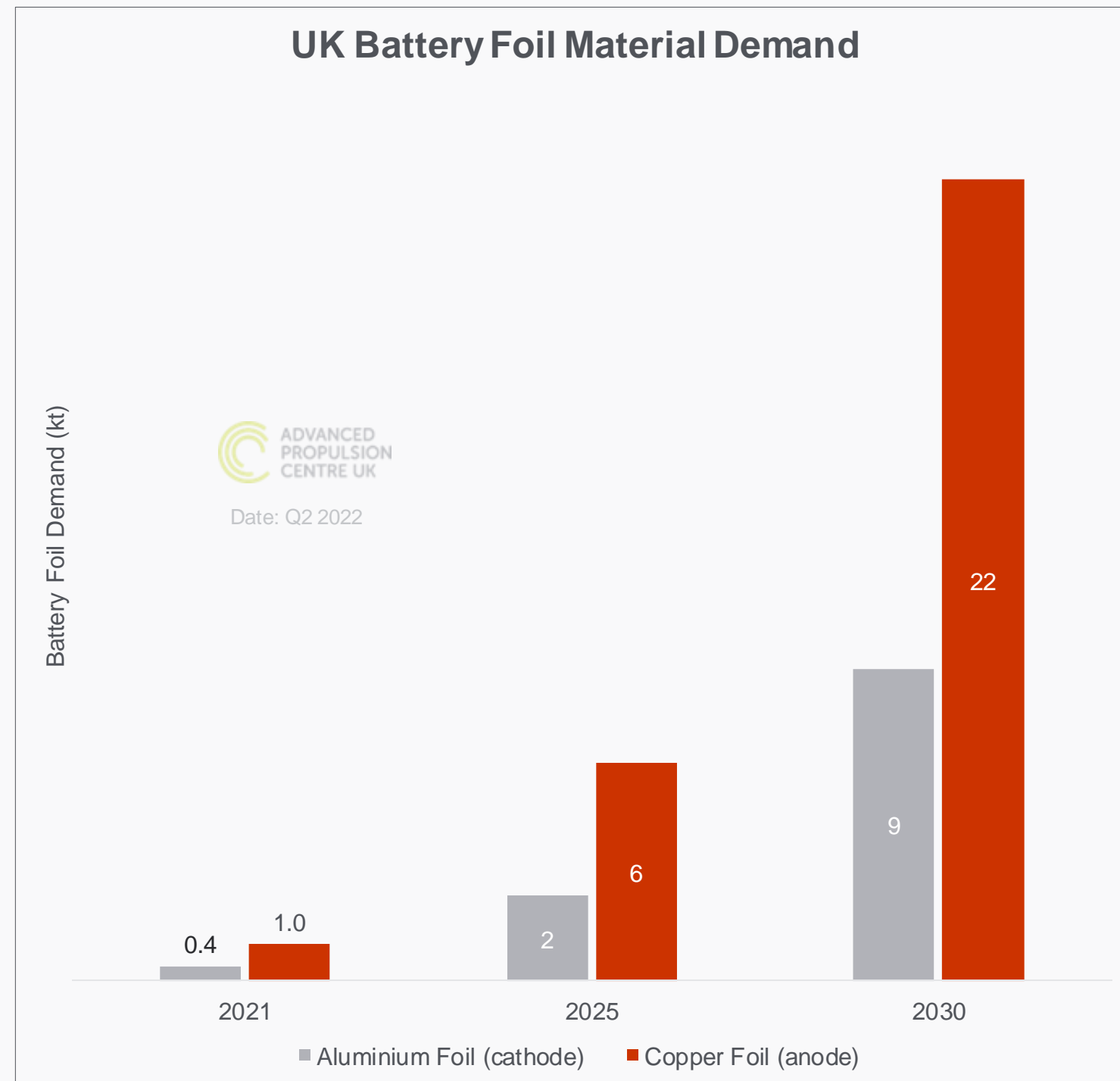
- European demand for battery foils expected to reach 120kt by 2025
- The drive to localise supply of electrolyte & separators will also intensify



UK demand for battery foils, electrolyte and separator material

Q2 2022 notes

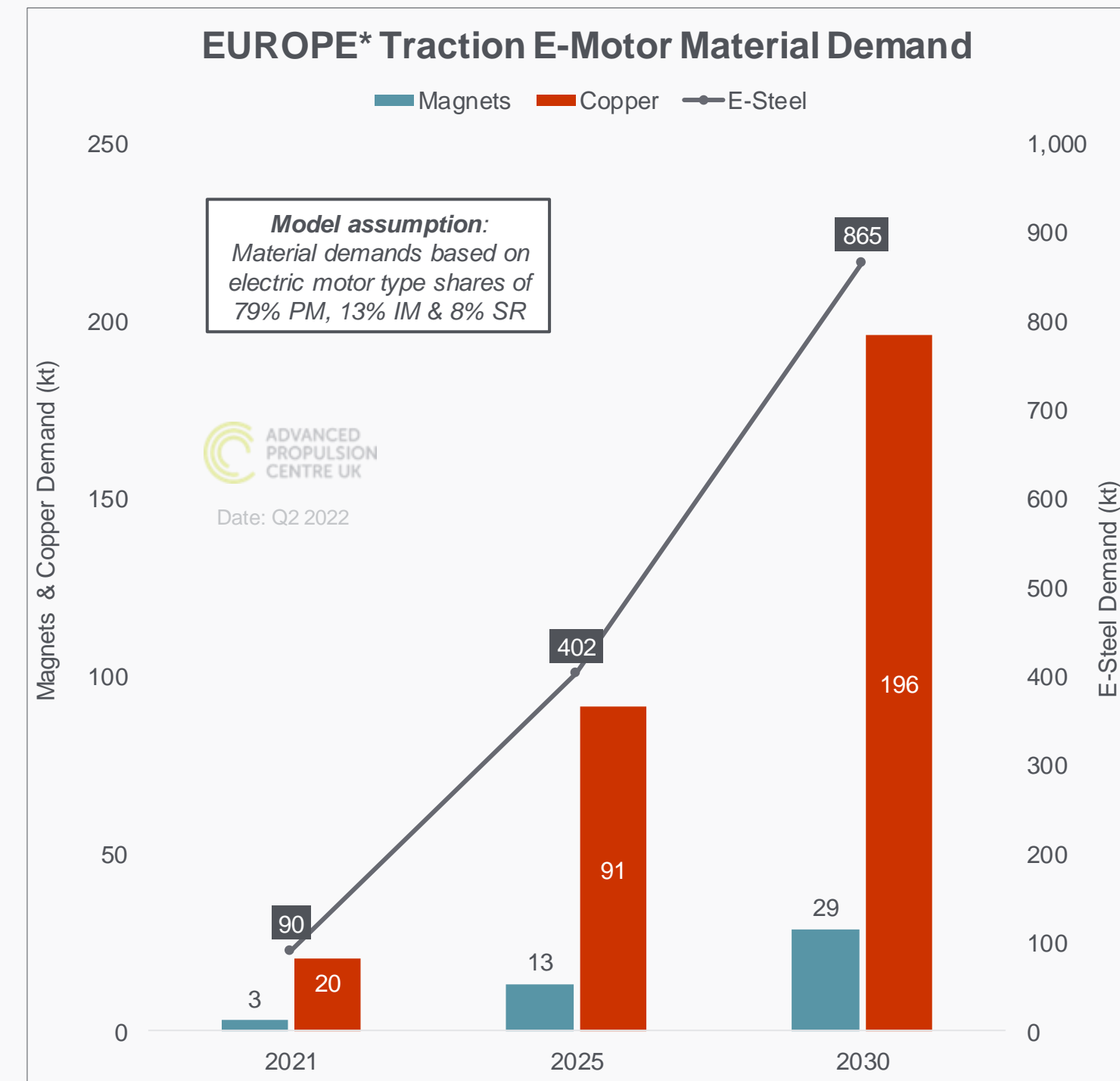
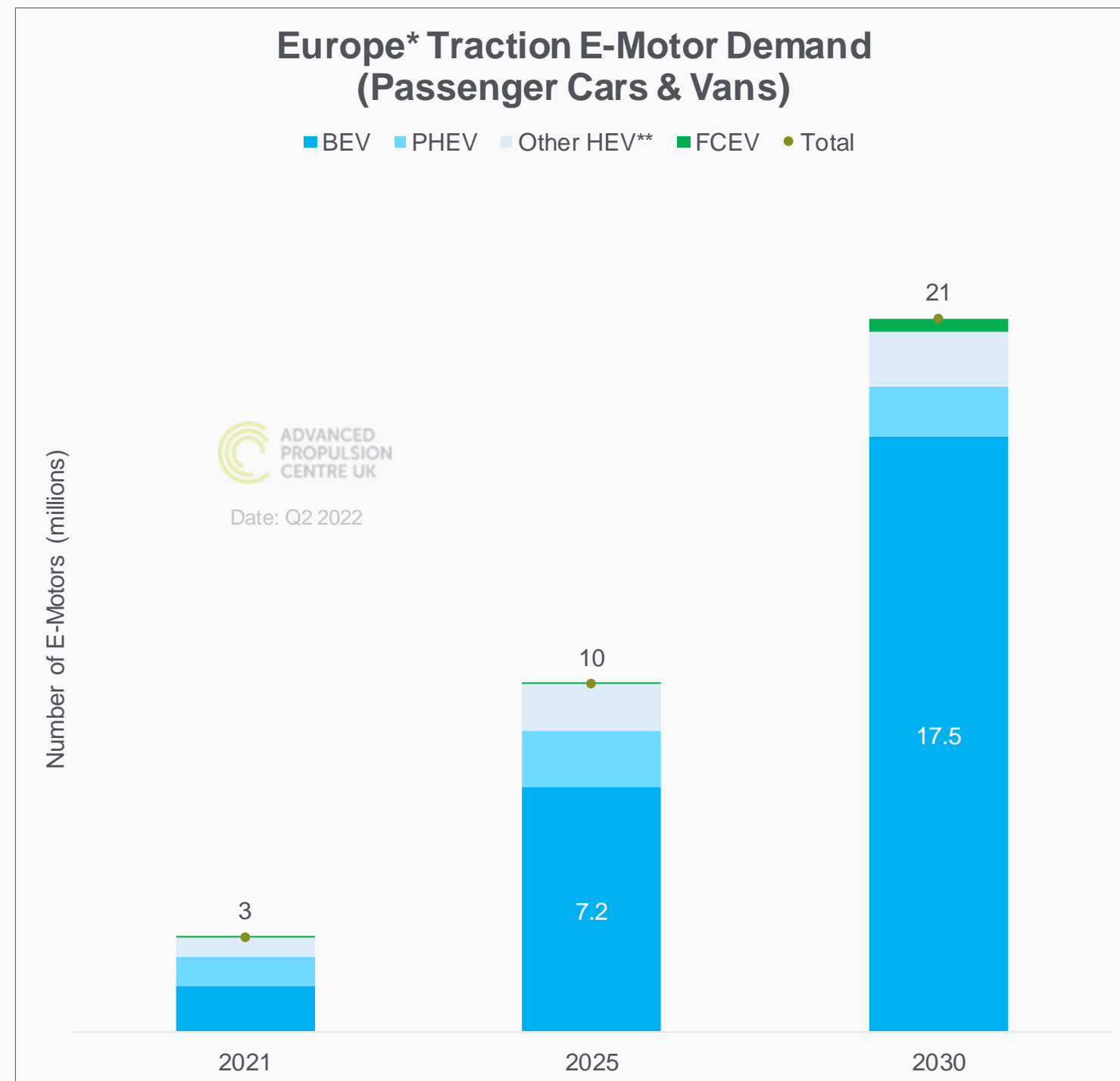
- UK demand for battery foils, electrolyte and separator material continues to grow and offers significant opportunities to localise supply



European demand for traction electric motors

Q2 2022 notes

- APC's latest forecast suggest that European demand for traction electric motors in light duty vehicles would be 7x higher in 2030 relative to 2021



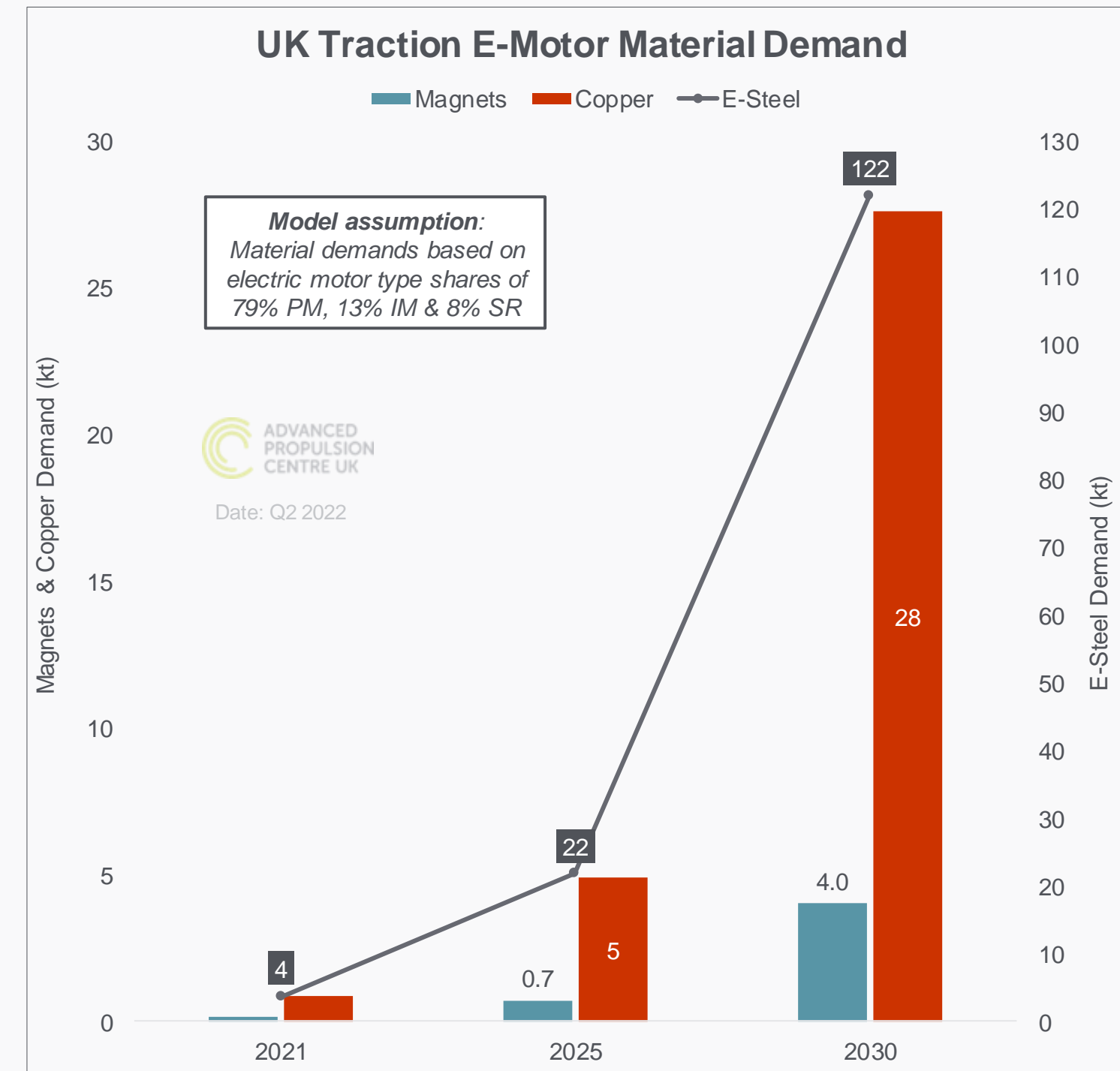
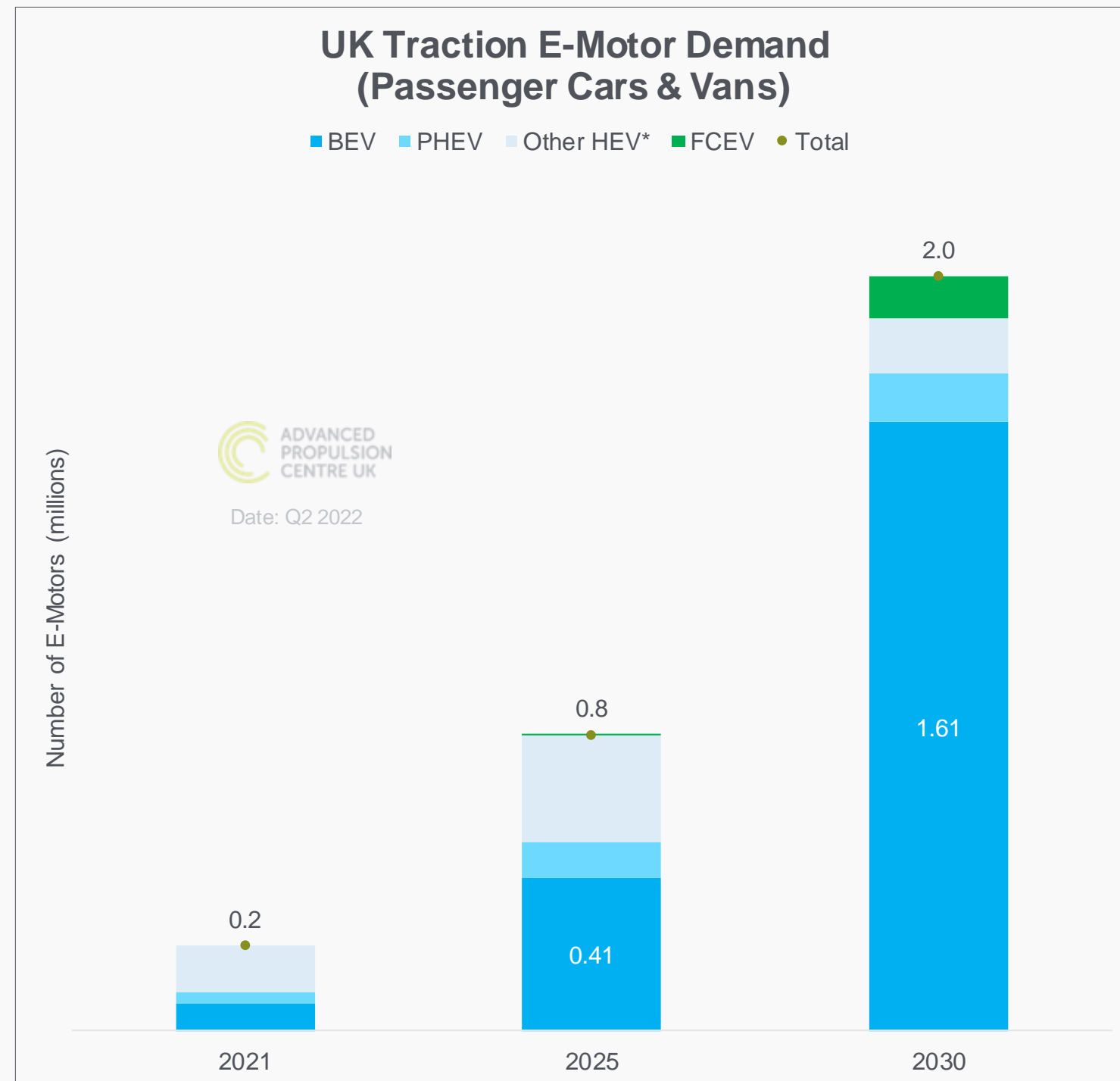
Source: APC Demand Databases using IHS AutoTechInsight (June, 2022)

Note: Passenger cars & Light Commercial Vehicles < 3.5t only, *European forecast includes non-EU countries such as Turkey, **Excluding mild hybrid electric motors

UK demand for traction electric motors

Q2 2022 notes

- UK demand for traction electric motors expected to reach 2 million units by 2030, providing an opportunity to transition the UK's ICE manufacturing plants



The Quarterly demand forecast is provided by the
Technology Trends team at the APC

If you have any questions or would like more detail on
any of the graphs or data email: info@apcuk.co.uk