Lithium Mining Projects – Supply Projections

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Prepared by:

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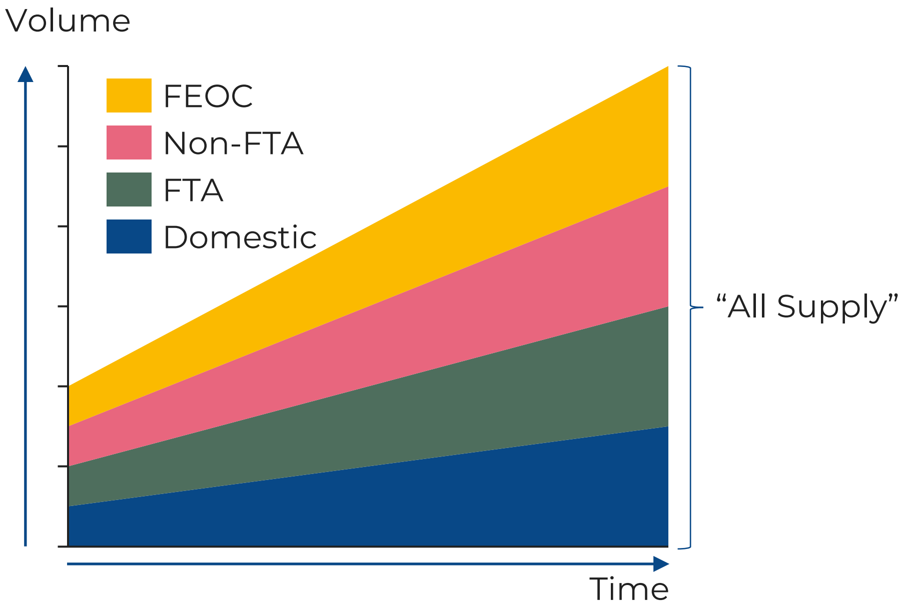
Supply modeling is generally applied on a weighted-by-probability basis and related back to IRA source-country categories



Domestic	USA
FTA (Free-Trade Agreement Countries)	Australia, Bahrain, Canada, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Israel, Jordan, Mexico, Morocco, Nicaragua, Oman, Panama, Peru, Singapore, South Korea and Japan
Non-FTA	Remaining countries excluding USA, FTA and FEOC
FEOC (Foreign Entities of Concern)*	China, Russia, North Korea, and Iran

BMI is aware of 330 lithium mining projects, ranging from those that have been announced to those that are fully operating. The supply projections here include only the 153 projects that are producing or have public, identified production estimates as of December 2022; they do not include the 177 projects for which there is currently no publicly available information on likely annual production levels.

The 153 projects included in our projections are categorised by their current operational status, as described below. For projects that are not currently operating, we assign a category based upon the completion of certain development milestones. "Unweighted" modeling runs weight supply projections for these 153 projects at 100%.

Operating: Projects actively producing material today (weighted at 100%)

Care and Maintenance: Projects that were at some point in production, or have been commissioned, but have been idled/placed on care and maintenance. These projects could be brought online with less capital and time than other projects (weighted at 90%)

Brownfield expansions: Capacity expansions planned by existing producers (weighted at 90%).

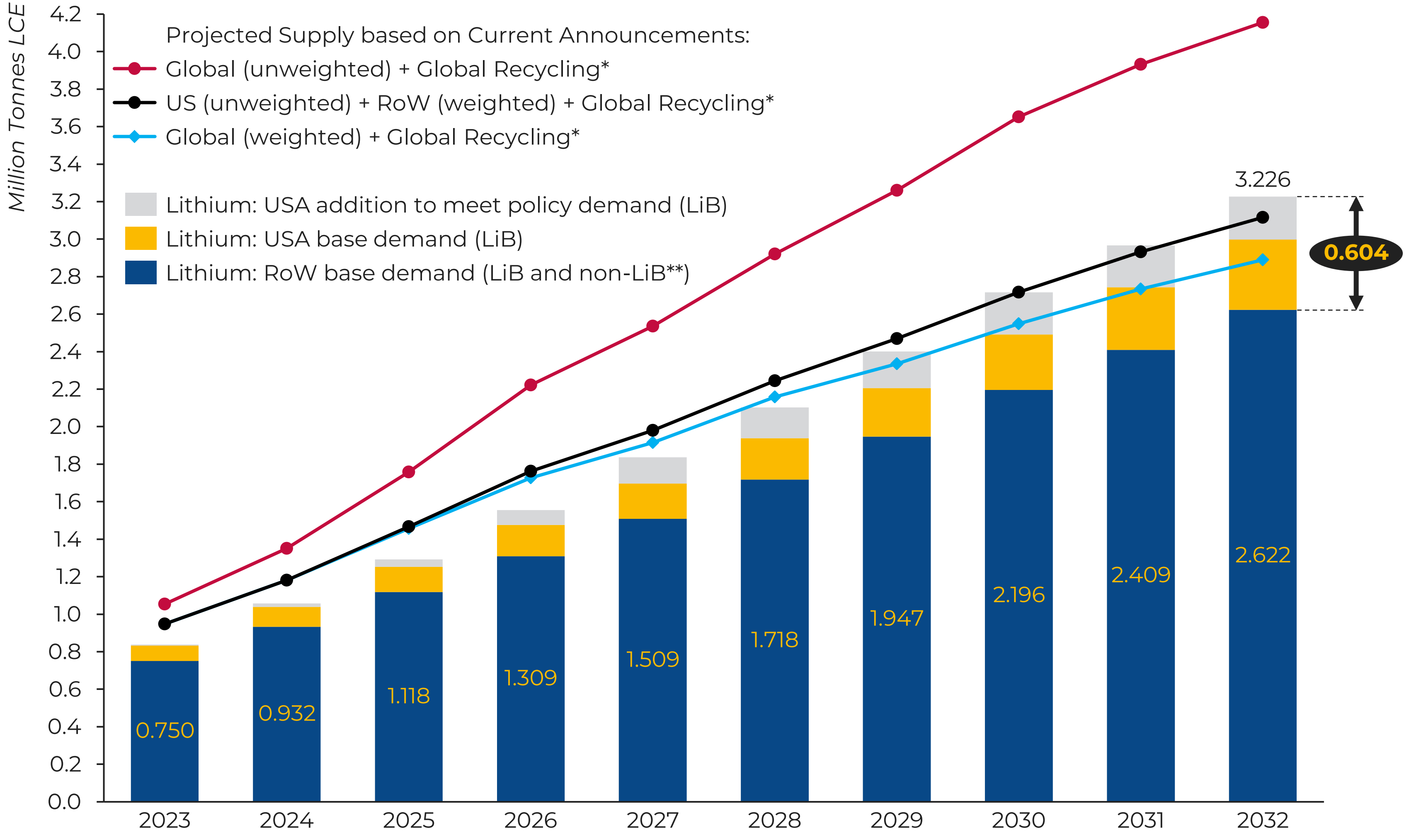
Highly probable: a project that has completed necessary public market requirements and government approvals, is fully funded and expected to place their product in the market in the next 24 months (weighted at 90%)

Probable: project's having secured a significant proportion of its funding, and completed certain feasibility milestones necessary for production within the next 5 years (weighted at 50%)

Possible: a project in the earlier stages of development with only a small portion of financing secured (weighted at 40%)

*The IRS and the US Treasury will provide further guidance on entities to be treated as Foreign Entities of Concern for the purpose of application in Sec. 30D – Clean Vehicle Credit

Global Lithium Supply Based on Current Announcements of Projected Production



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* Connotes maximum recycling potential based on attainment of USA policy demand and RoW base LiB demand levels

** Non-LiB demand is expressed in global terms, and so for this element is inclusive of US non-LiB demand

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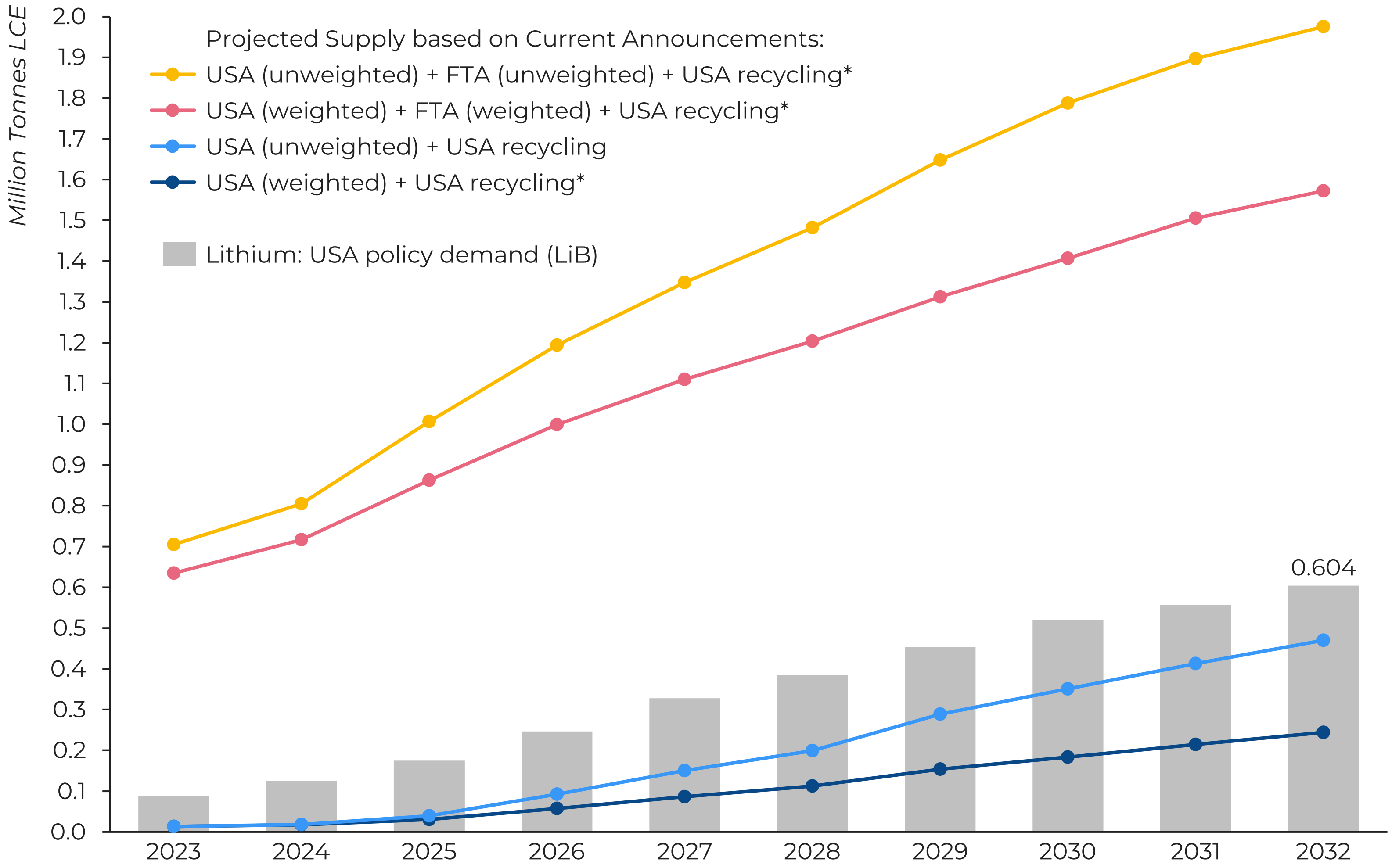

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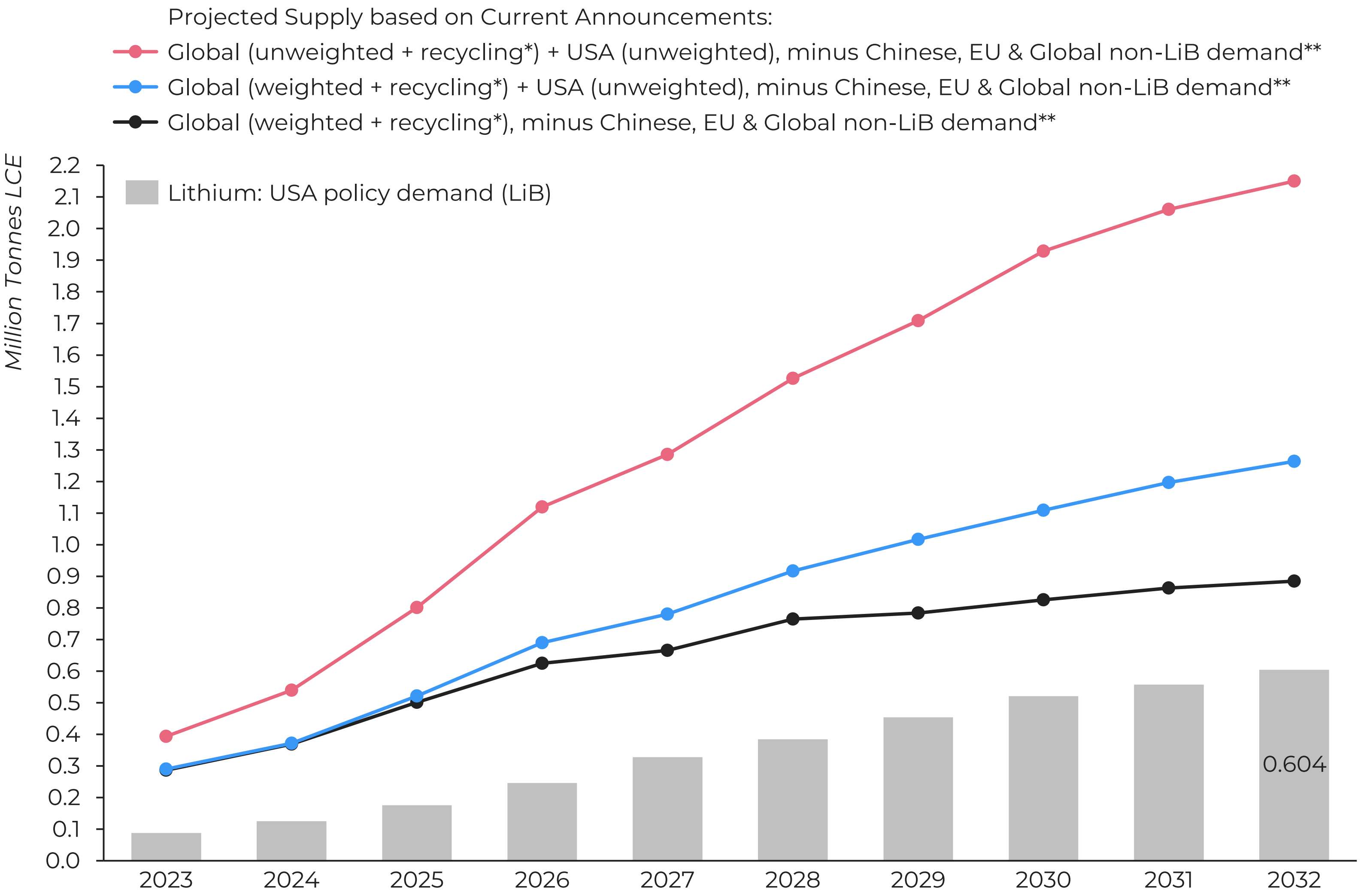

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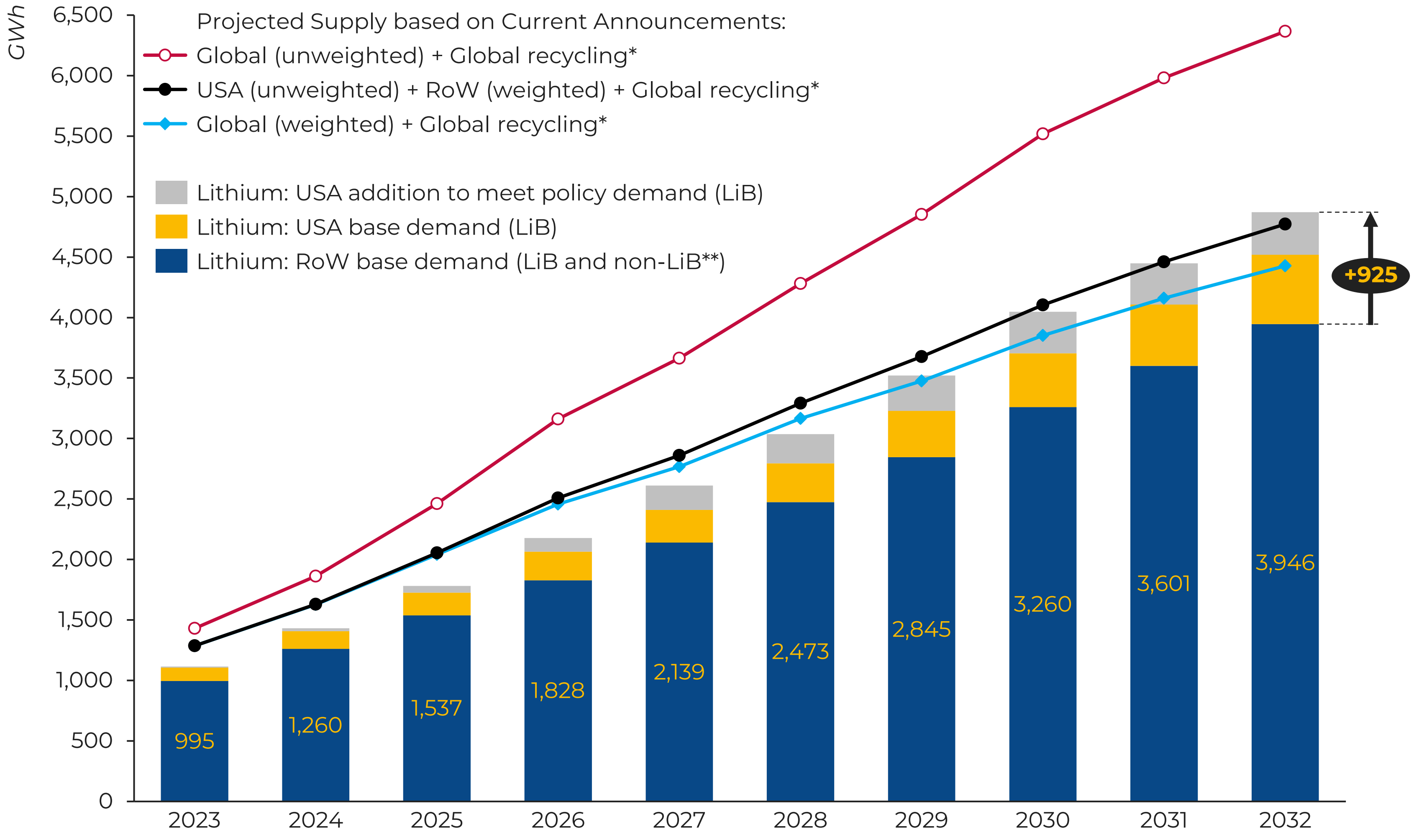
Global Lithium Supply Based on Current Announcements of Projected Production — GWh-basis



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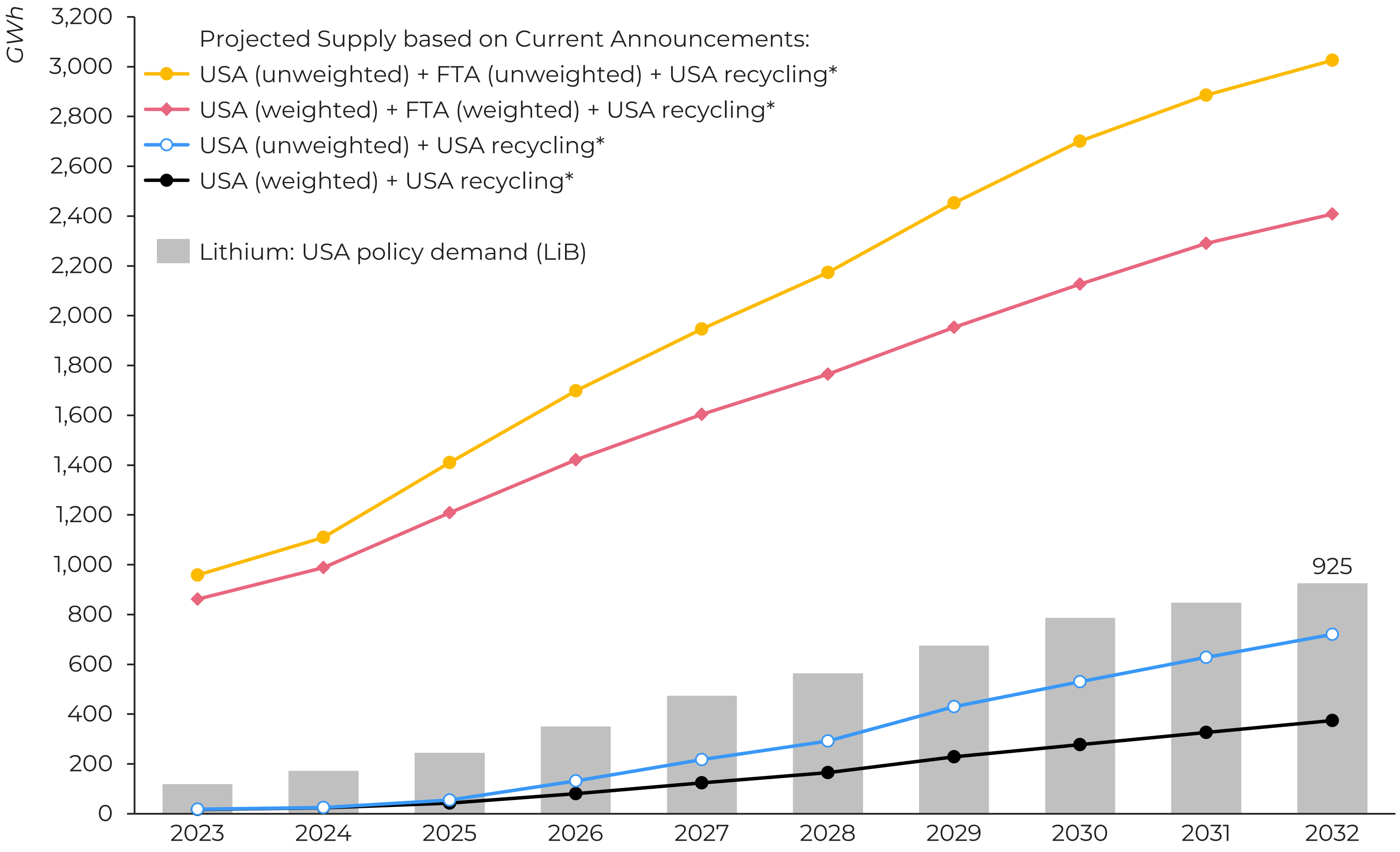

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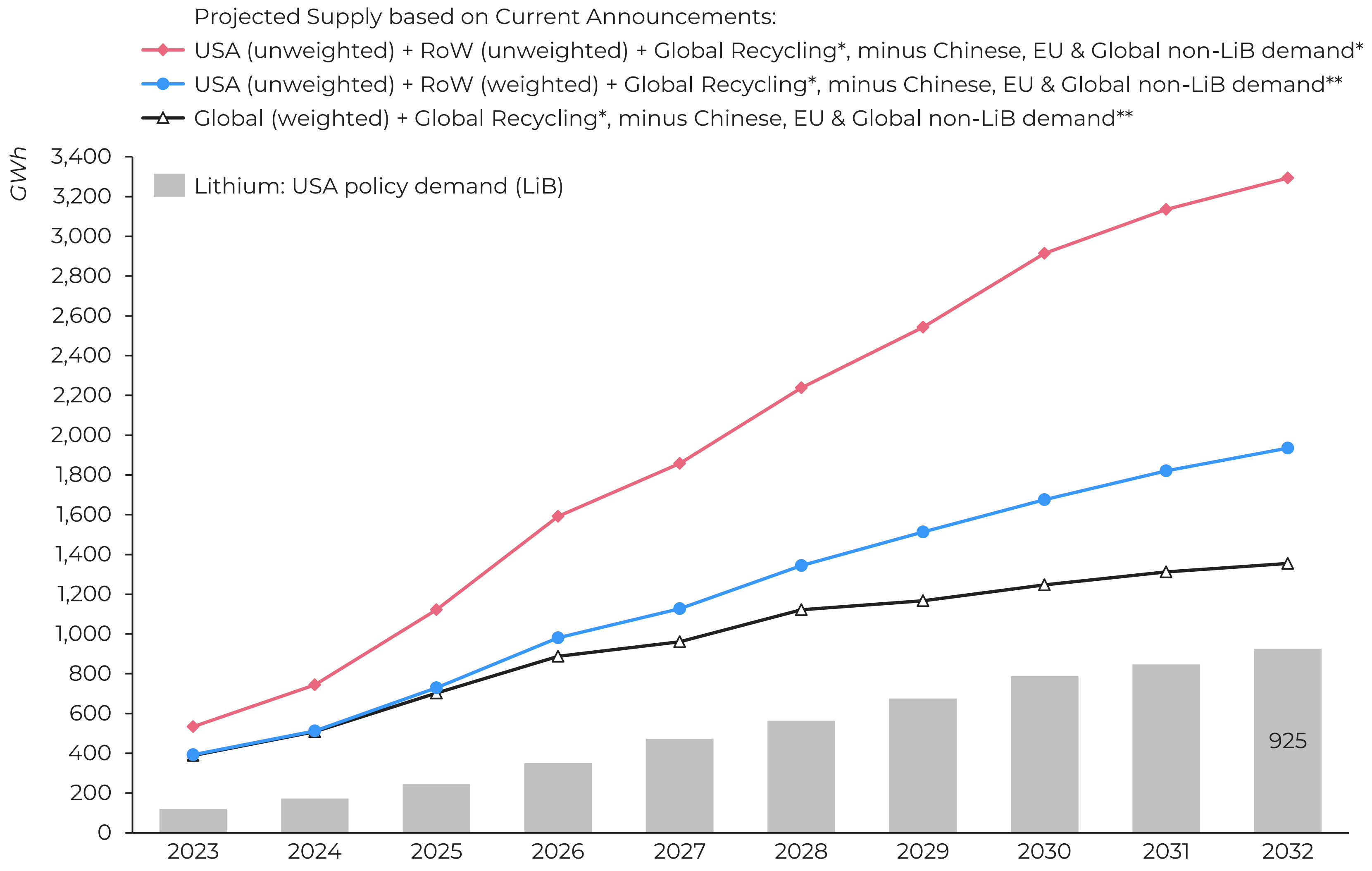

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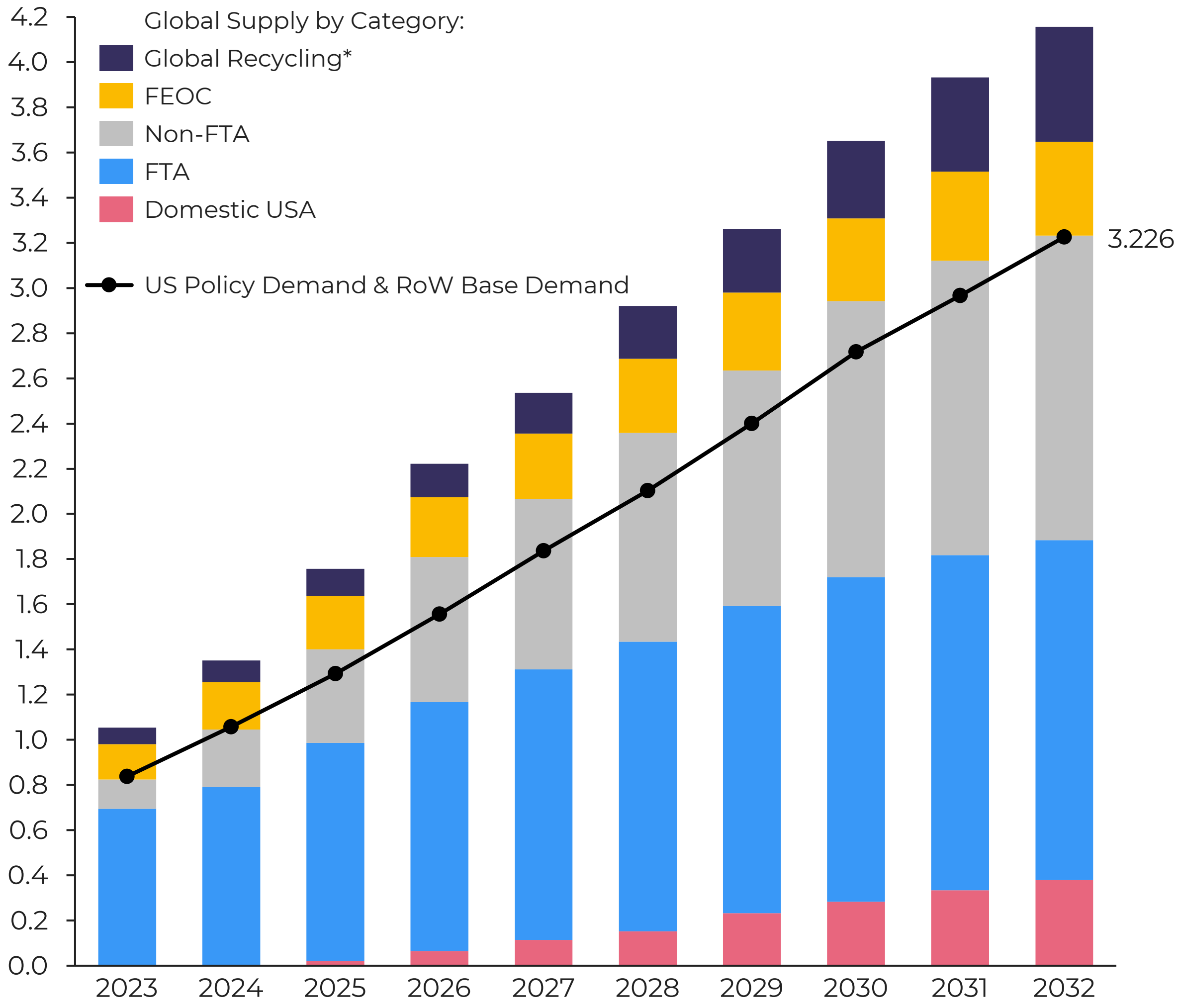
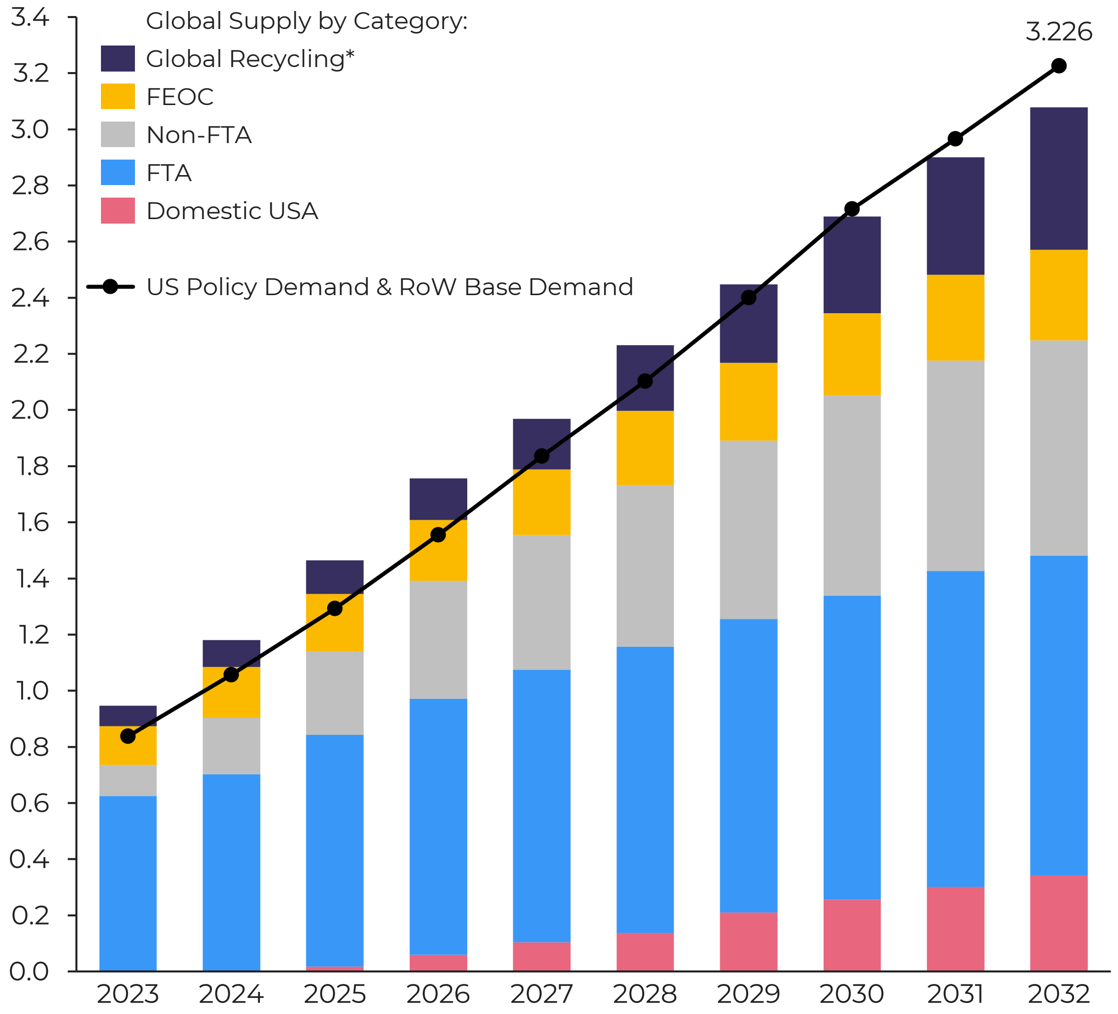
Global Lithium Supply Based on Current Announcements of Projected Production by Country/U.S. Trade Status

Million LCE tonnes; All Supply Categories Unweighted



Million LCE tonnes, Domestic USA (Unweighted), RoW (Weighted)



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Methodology and Assumptions

Methodology — Demand modelling

- For **base-case** scenarios, demand for lithium is derived from forecasts of EV sales (both light-duty EVs and medium-/heavy-duty EVs) from EPA's "No Action" scenarios in their current rulemaking proceedings for US demand and from Rho Motion forecasts for the rest of the world (the latter are informed by OEM's announcements regarding their own strategy planning).
- In a **policy-led** scenario, EPA's estimated EV sales under their proposed standards determine projected EV numbers, with the rest of the world demand held constant at base-case forecast levels.
- In summary, a top-down approach is applied to estimate lithium demand moving from end-use application to battery demand and eventually estimating lithium requirement over time

End-use application

Battery Demand is split into three major application segments – EV, ESS and Portables.. Further, EV application segment demand is estimated from forecasted electrification penetration rates of passenger and commercial vehicles and vehicle battery pack sizes.

ESS application segment demand is estimated from battery requirement in grid storage and Behind the Meter (BTM) storage applications

Portable application segment demand is estimated based on consumer electronics demand in the future

LiB

Summation of demand from three major application segments

CAM / AAM

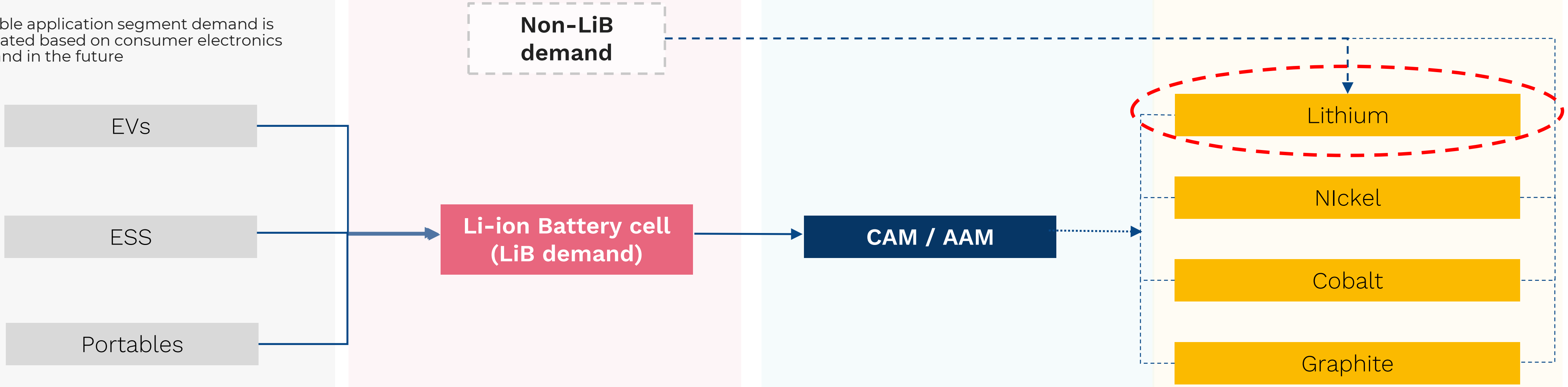
Applying cathode and anode chemistry splits on an application as well as on a regional basis gives CAM and AAM demand in MWh

For Eg, EV segment is split broadly across Ni and Iron based chemistries (NCM / NCA, LFP etc) whereas LFP and LCO have significant shares in ESS and Portables application segments respectively

Lithium Demand

Applying cathode-specific lithium intensity assumptions on CAM demand (in MWh) yields overall LiB-related lithium demand.

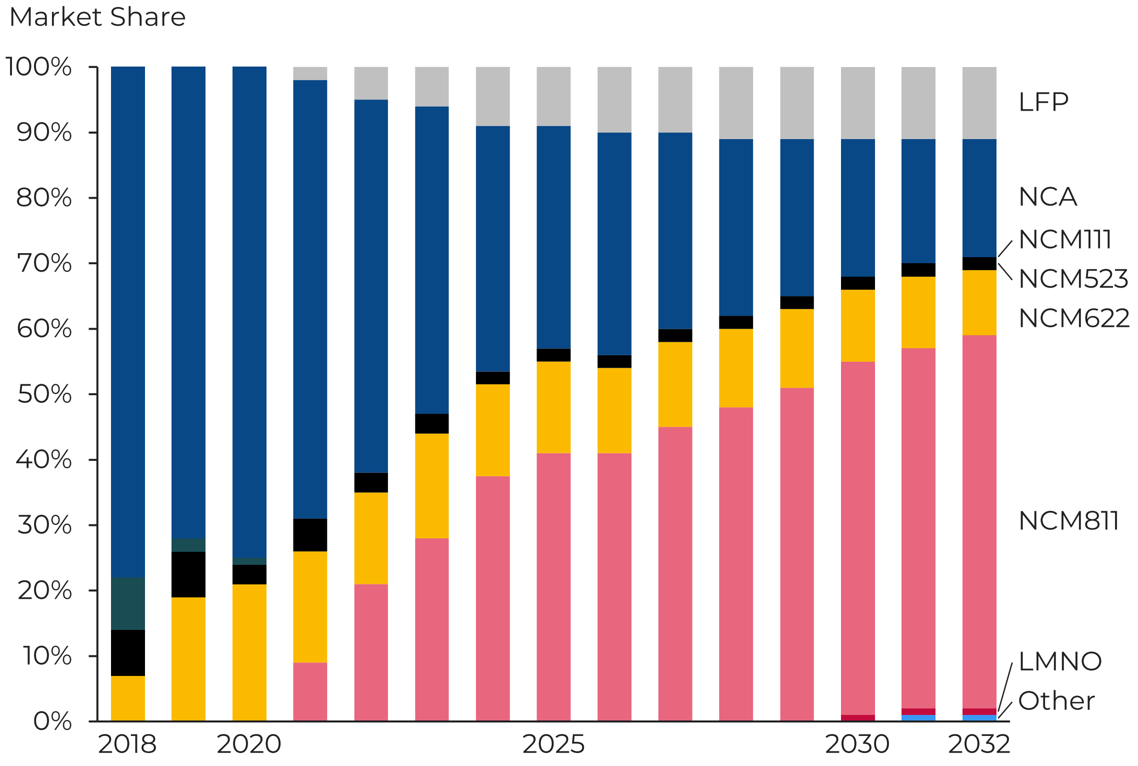
Additionally, some lithium demand originates from non-LiB segment. Lithium chemicals have been, and will continue to be, used in glass, construction, pharmaceuticals industries, etc.



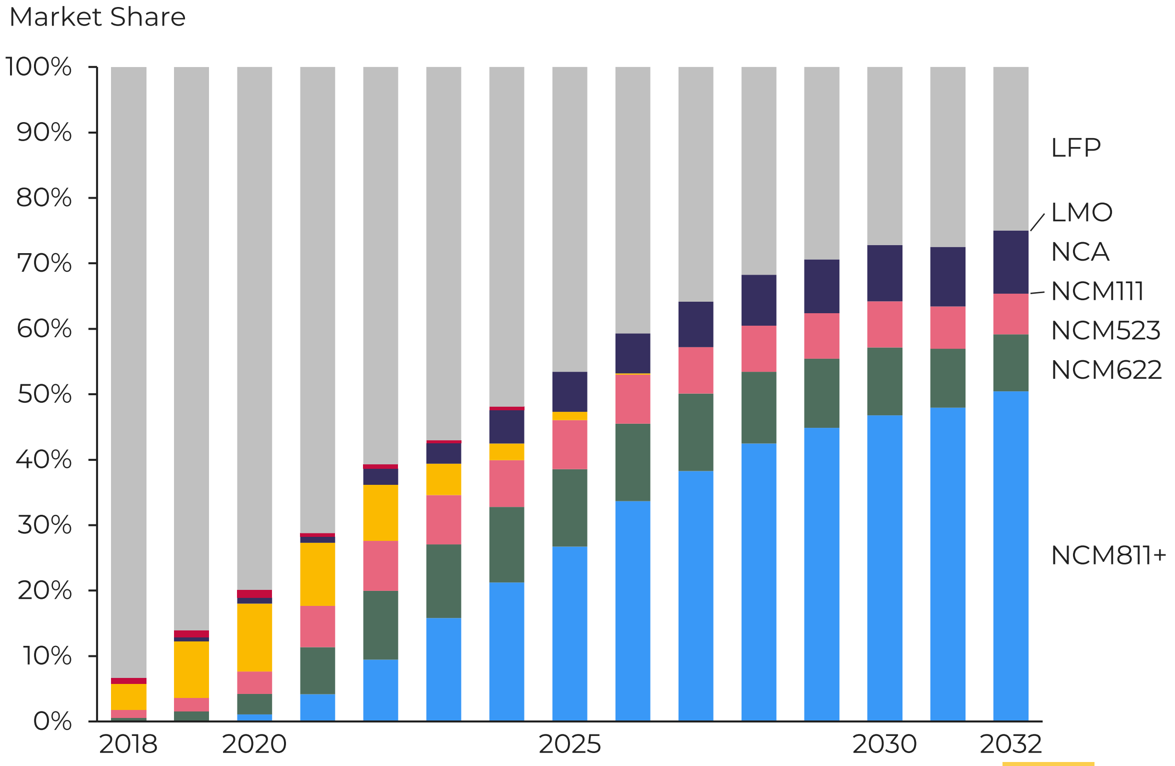
CAM technology: NCM is forecast to displace NCA as the dominant chemistry for US LDV and PCs by 2025

- The below charts illustrate the base-case CAM forecast for the USA. This is informed by the EV platform pathways currently laid out by OEMs. These pathways may alter over time, but the planning involved in securing supply chains for EV production ensures a degree of incumbency in the short-to-medium term (roughly 1 to 6 years).
- The market is currently dominated by Ni-rich NCA and assorted NCM grades. NCM grades will increasingly pivot towards higher Ni-containing grades over time: NCM 811 is forecast to take a +40% market share by around 2030. LFP is forecast to account for roughly 11% and 33% of the LDV/PC and MDV/HDV/Coach markets, respectively, by 2032.

USA LDV and PC Cathode Split

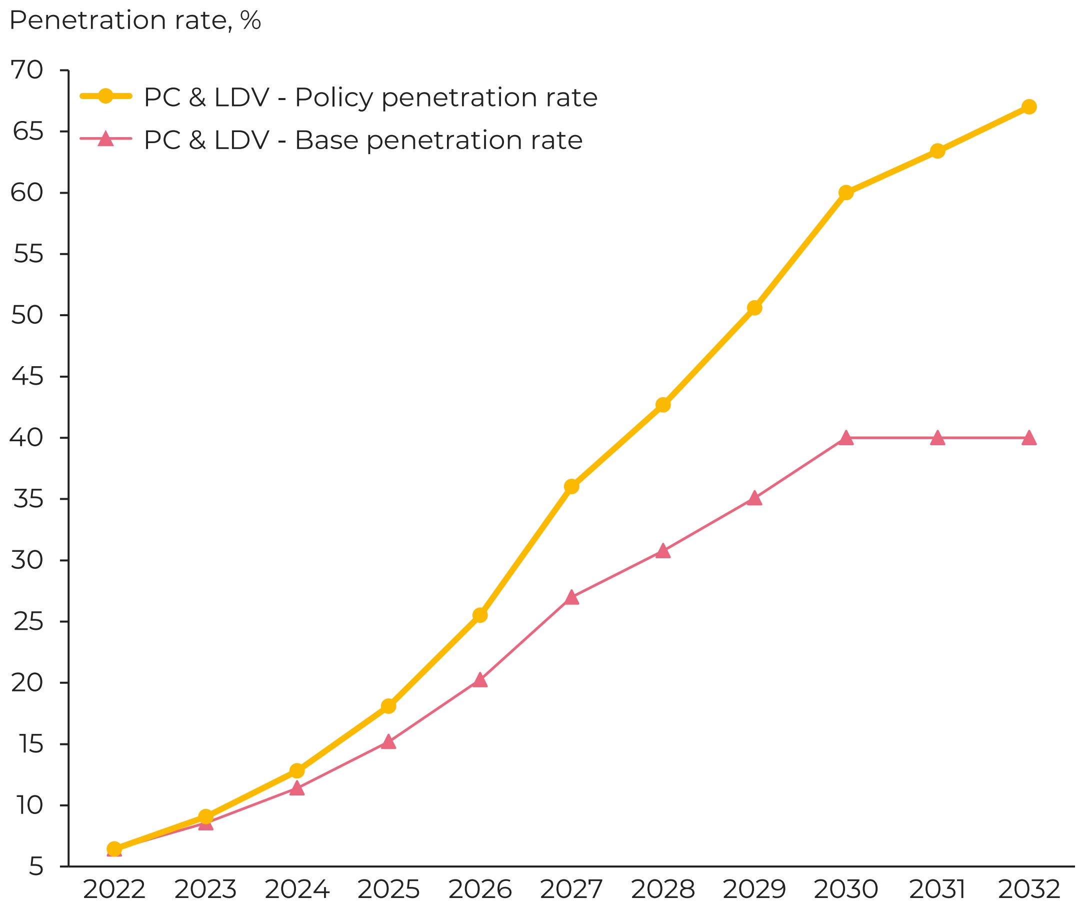


USA Medium & Heavy Truck, Bus & Coach

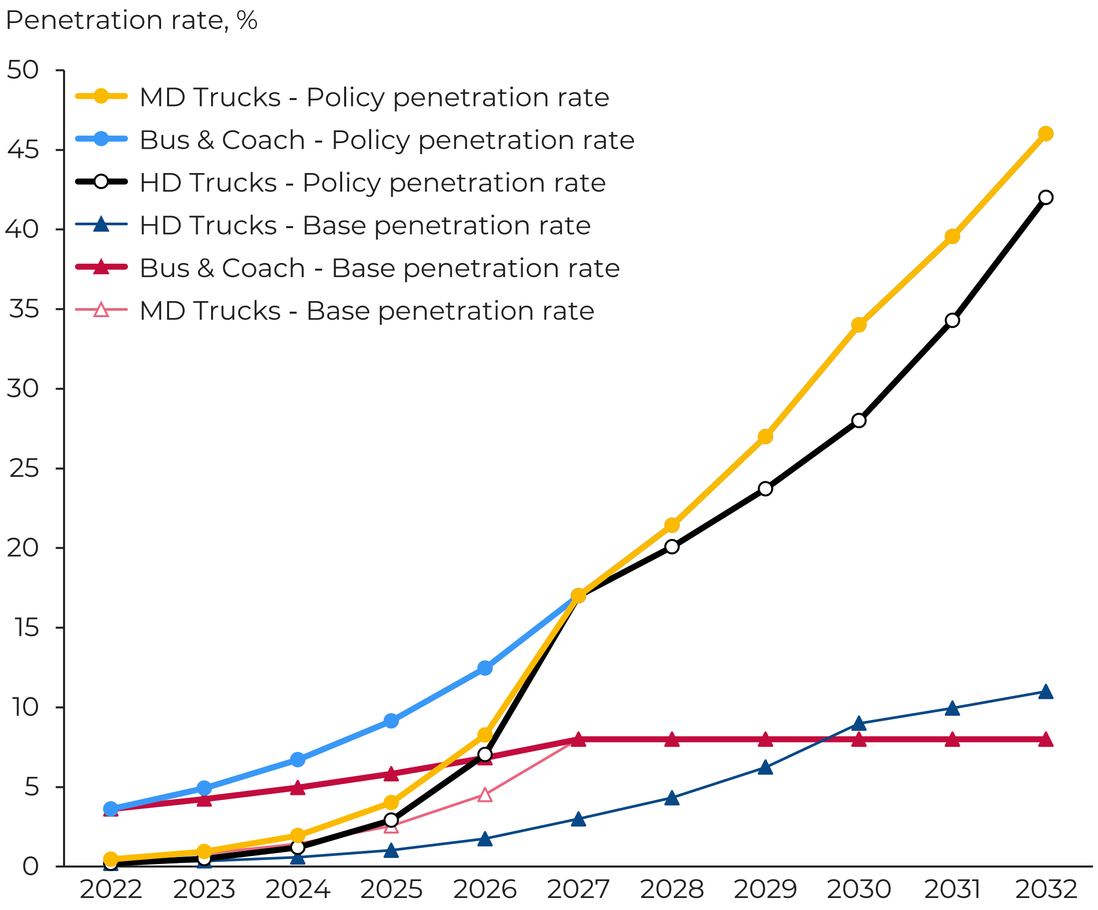


US BEV & PHEV Penetration Rates - base and policy cases

PC & LD vehicles (incl. BEV & PHEV) – Penetration rates (US)

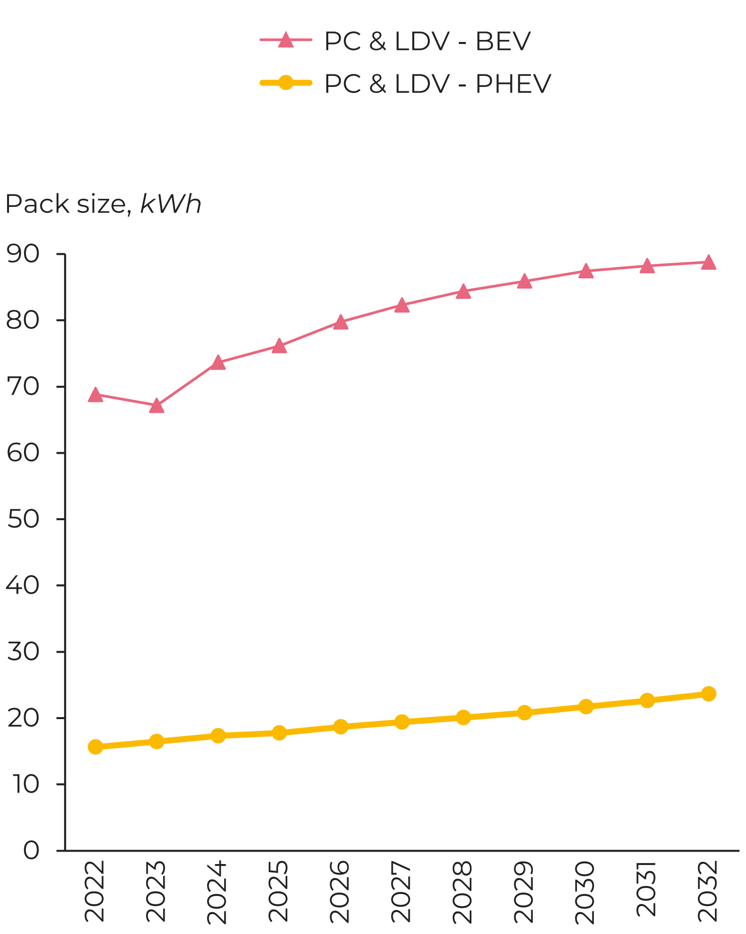


MD & HD vehicles (incl. BEV & PHEV) – Penetration rates (US)

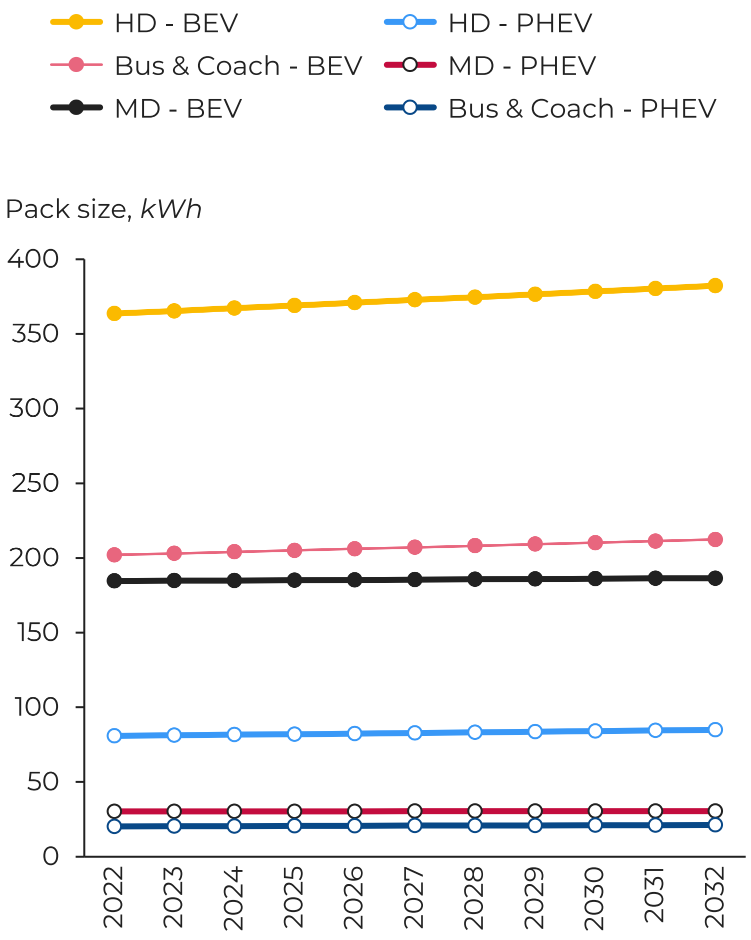


US Pack Size and Lithium Intensity Assumptions

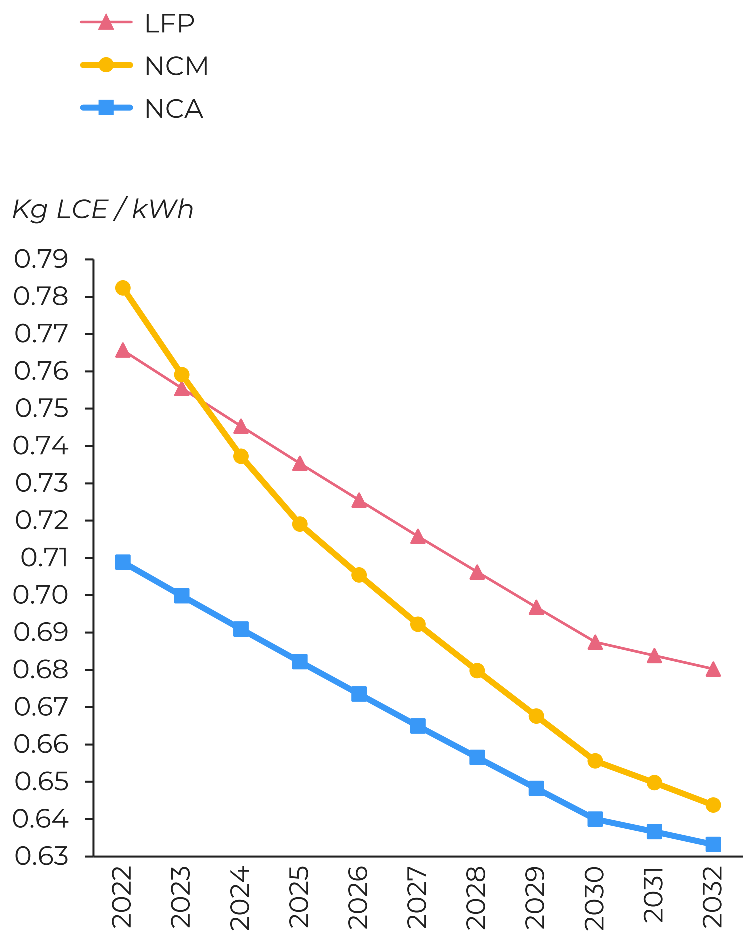
Passenger Car & Light Duty Vehicles – Pack size (US)



Medium Duty & Heavy-Duty Vehicles – Pack size (US)

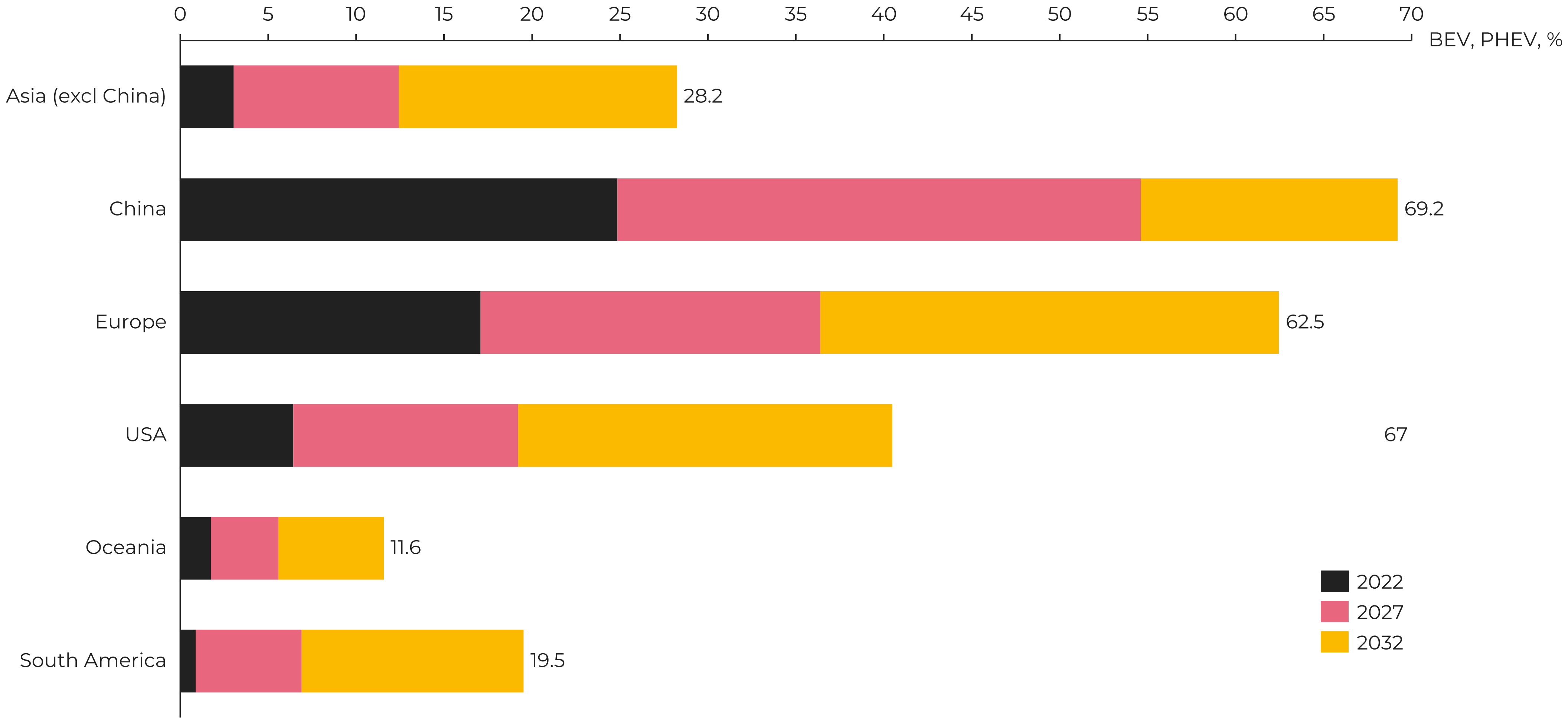


Lithium intensity, kg LCE/ kWh forecast (with yield losses)



Global EV Outlook – China leading the way as the early mover; US set to catch up over the next decade through climate reforms and industrial policy action

BEV / PHEV – PC & LDV Penetration Rates (base case)

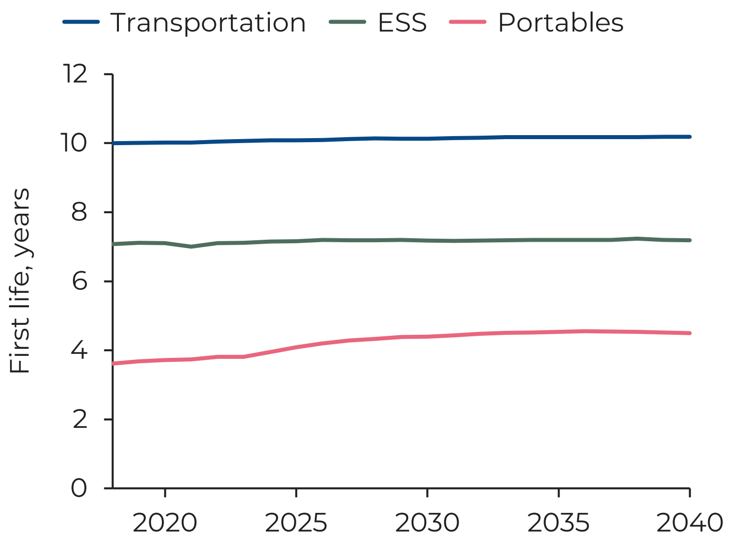


Recycling assumptions

The below data summarises the parameters applied by BMI in its US supply chain modelling

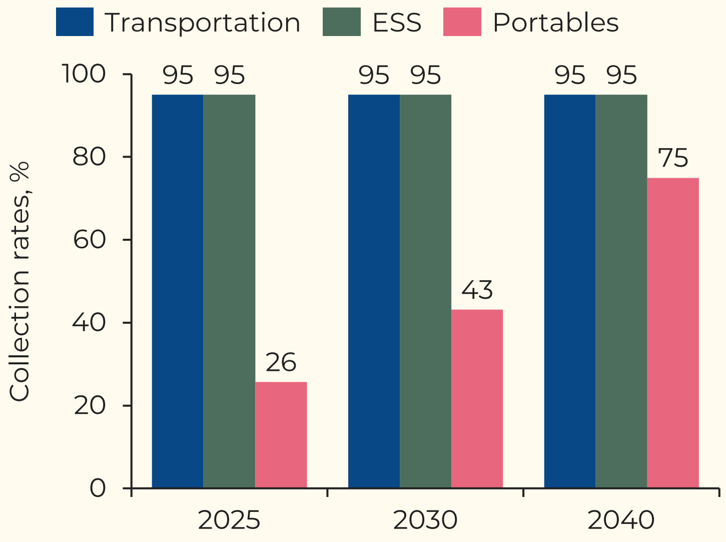
EOL cycle times

1. **Transportation:** 10-15 years depending on consumer behaviour for specific sub-categories of transportation modes.
2. **Energy Storage (ESS):** 3-29 years. Expect relatively consistent mix of sub-category power storage technology
3. **Portables:** 1-5 years with increasing lifespan given consumer behaviour.



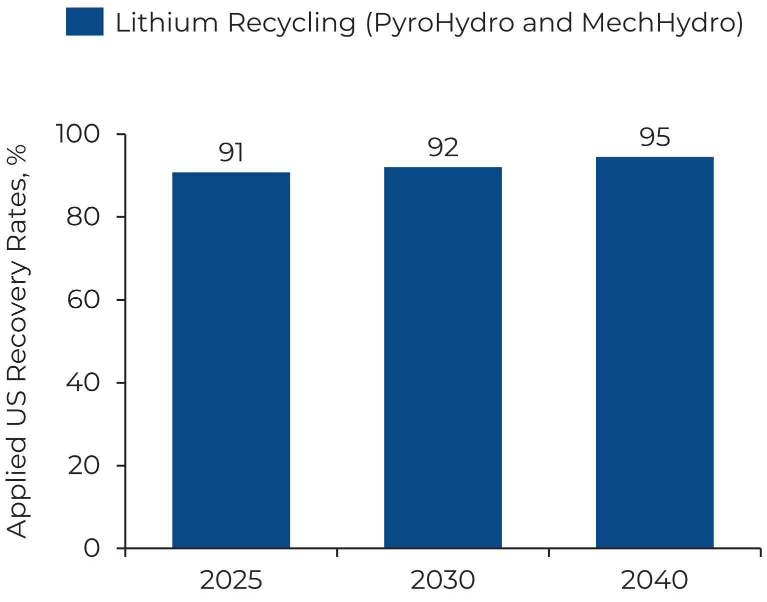
Collection rates

1. **Transportation:** collection rates stay high as batteries are large, valuable and easier to recover
2. **Energy Storage (ESS):** collection rates stay high as batteries are large, valuable and easier to recover
3. **Portables:** collection is fragmented as packs/cells are smaller. Processes require time to improve



Recovery rates

1. **Lithium:** Industry's focus towards lithium has shifted over the last two years with high lithium prices sensitizing industry to push towards high lithium recovery recycling technologies such as PyroHydro and MechHydro, technologies that potentially have a 95% recovery rate, instead of zero lithium recovery Pyro technology.



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