

The Electrification of Future Transport

IMAP Portfolio Management Conference

Gordon Ramsay | October 2019



Quote of the Day – Who Said This?

“I predict that a child born today probably has as much chance of driving in a gas car (*internal combustion engine*) as people today have been driving a car with a stick shift”

Ralton – combining structural and cyclical themes

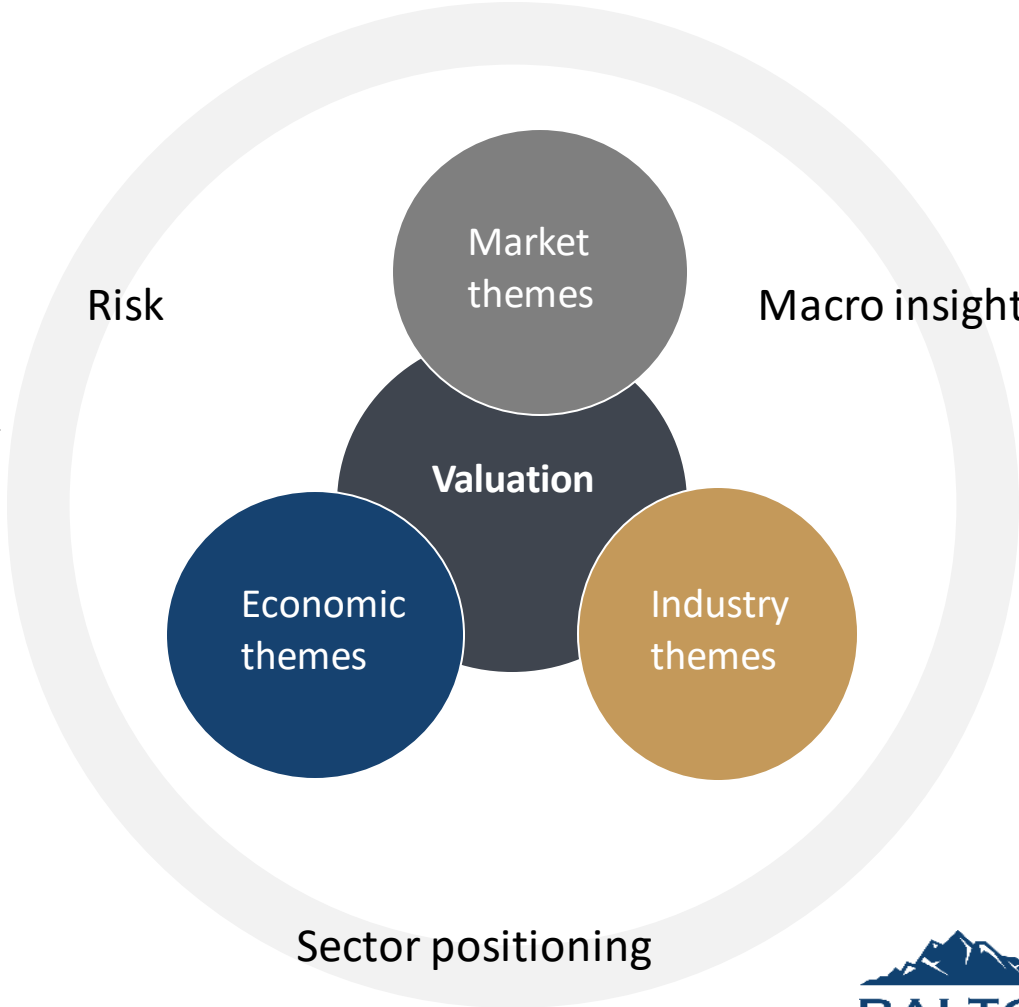


Economic

Geopolitical influences and macro cycles such as the China Cycle and the Monetary Policy Cycle.

Sector / Industry

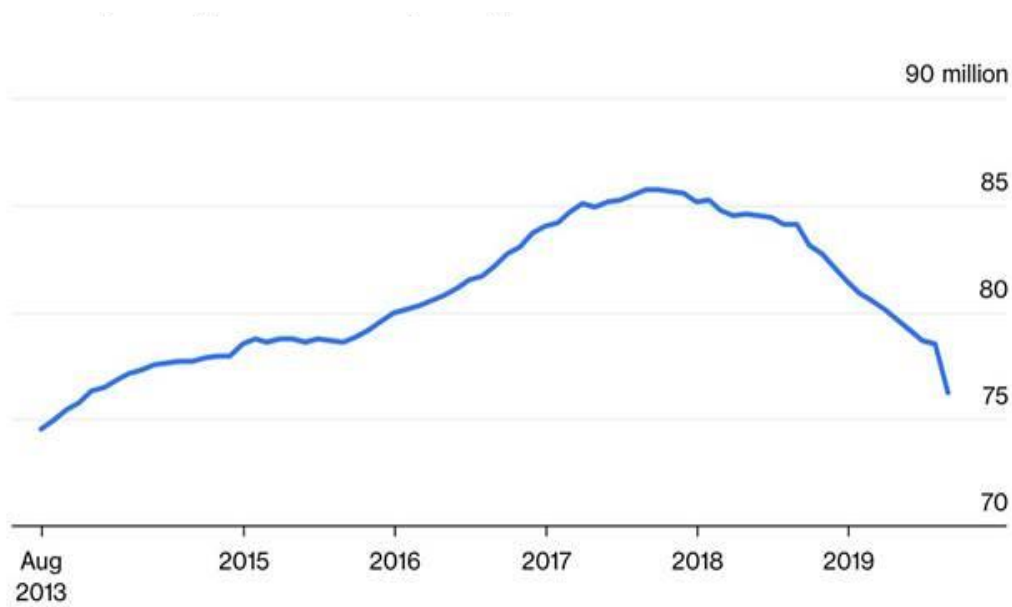
Sector/industry trends, such as demographics and regulation.



Managing time frames

Economic

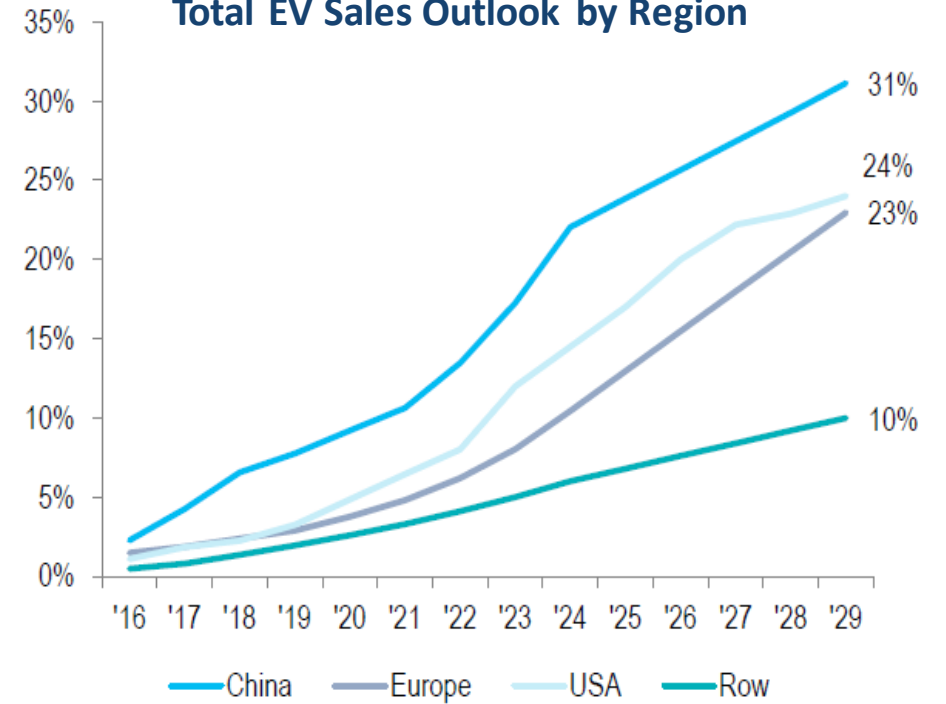
Global car sales, trailing 12 months



Source: Bloomberg

Sector / Industry

Total EV Sales Outlook by Region

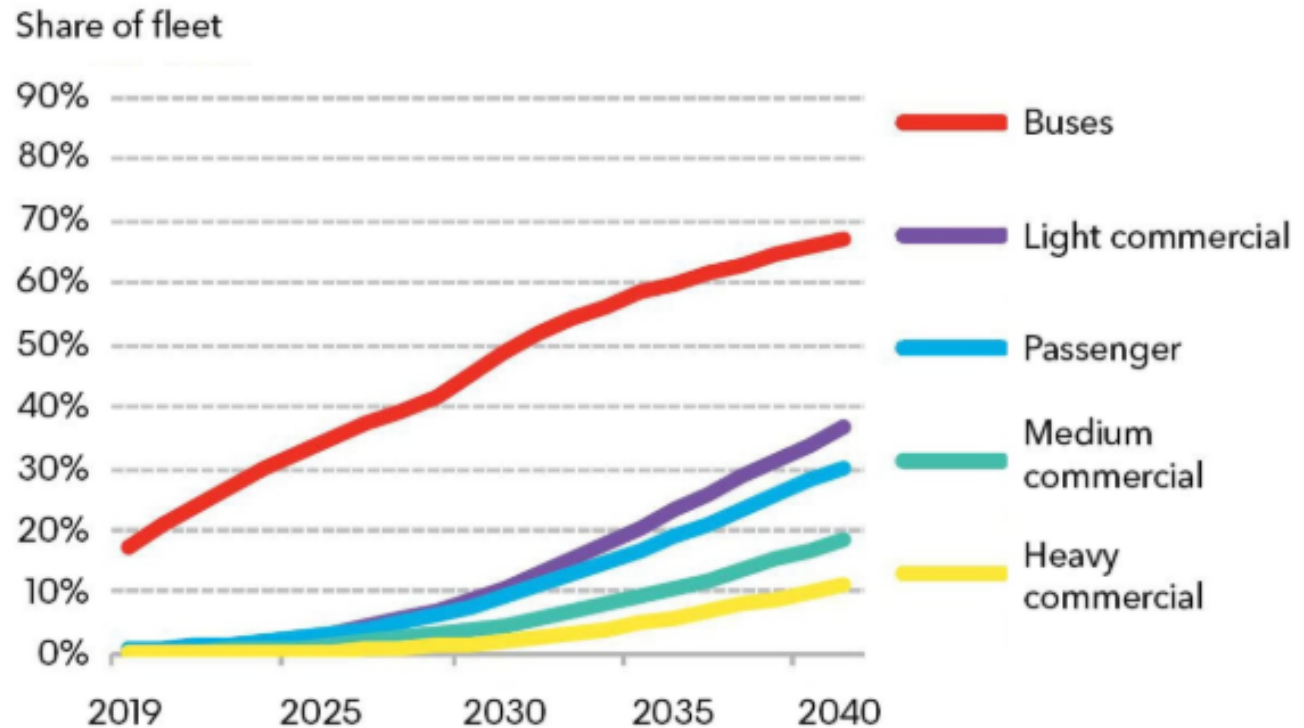


EV Share of the Global Fleet

Amazon has ordered 100,000 electric delivery vehicles that will start appearing on the road in the USA from 2021.

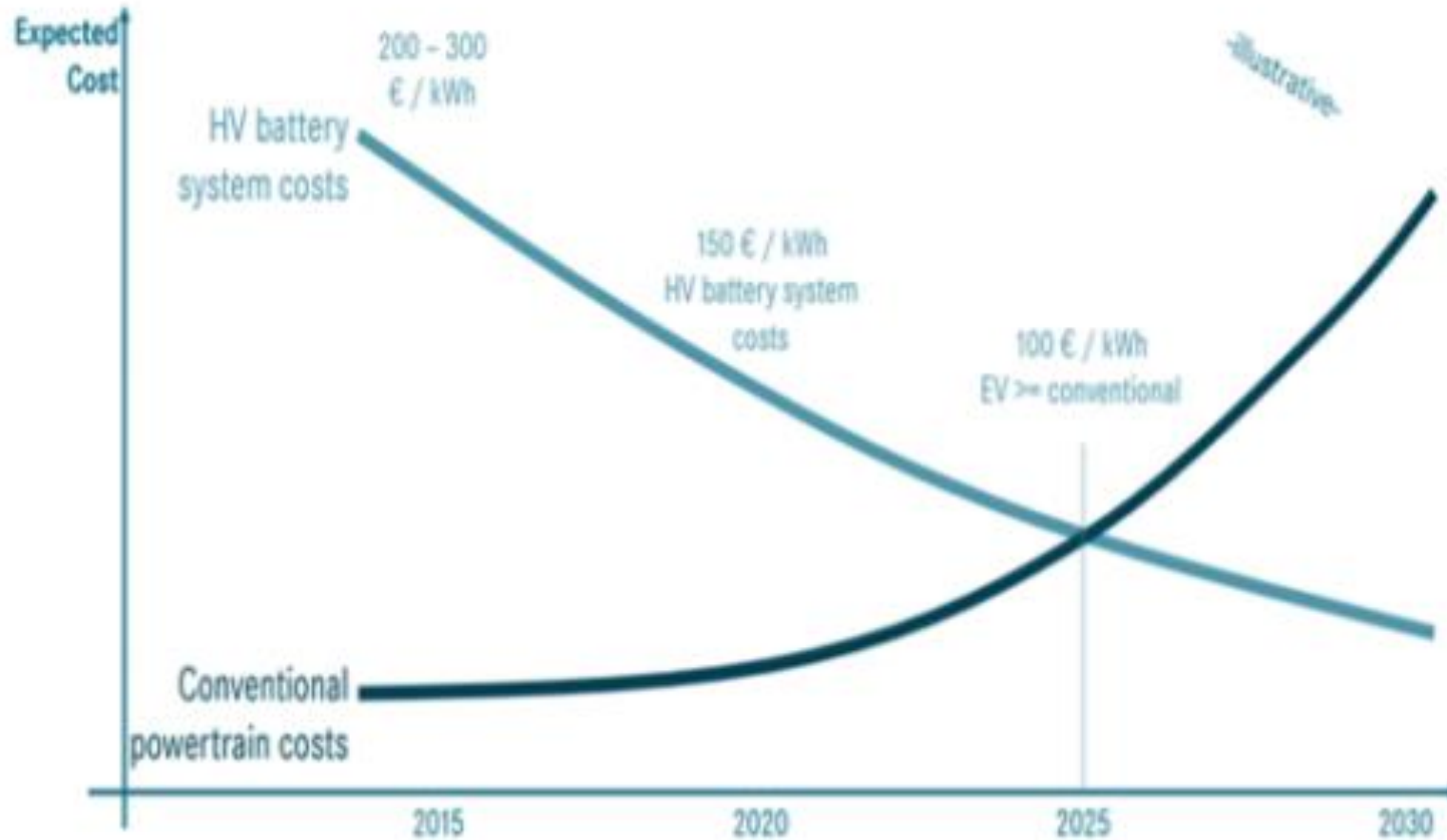


EV share of global vehicle fleet by segment



Source: BloombergNEF. Note: Commercial vehicle adoption figures include the main markets of China, Europe, and the U.S.

EV Battery Pack vs ICE Cost Cross Over

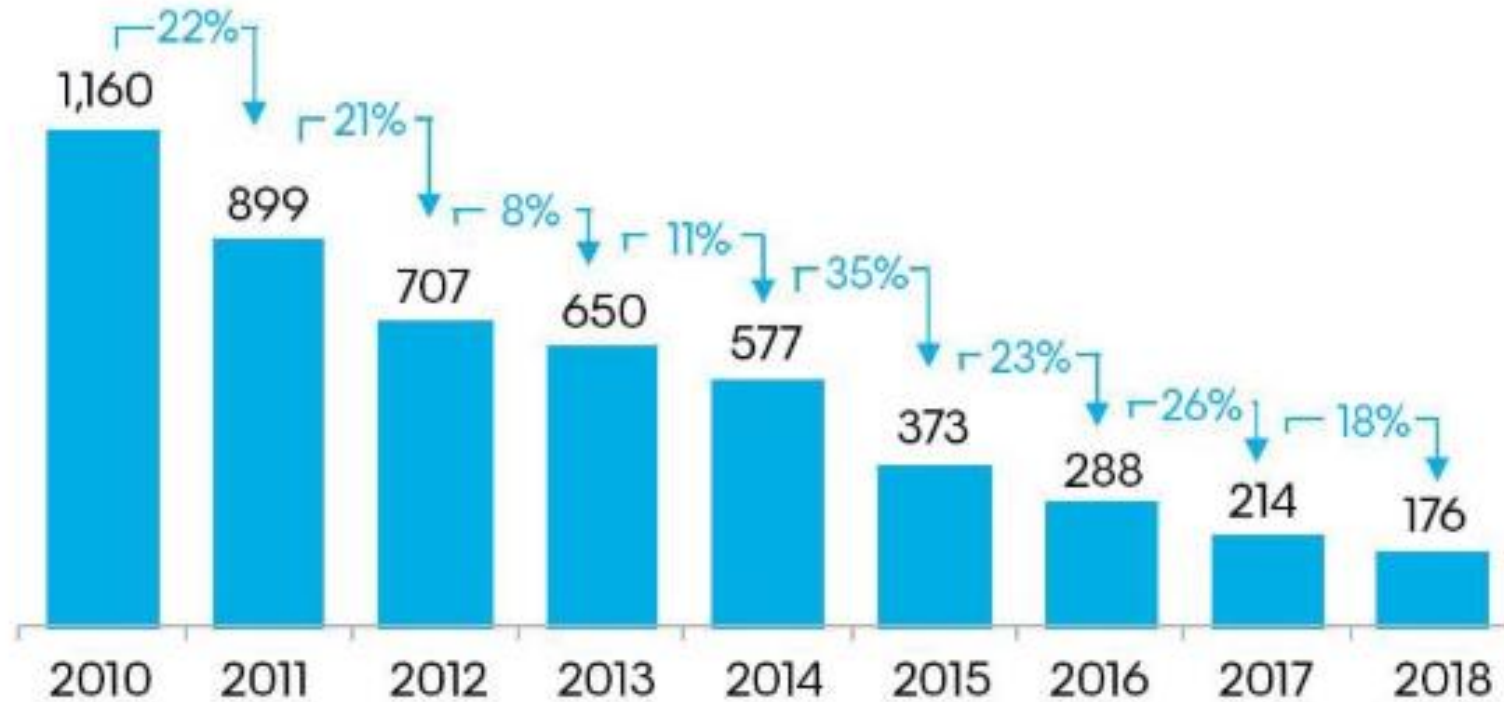


Source: Daimler

Average Battery Pack Costs

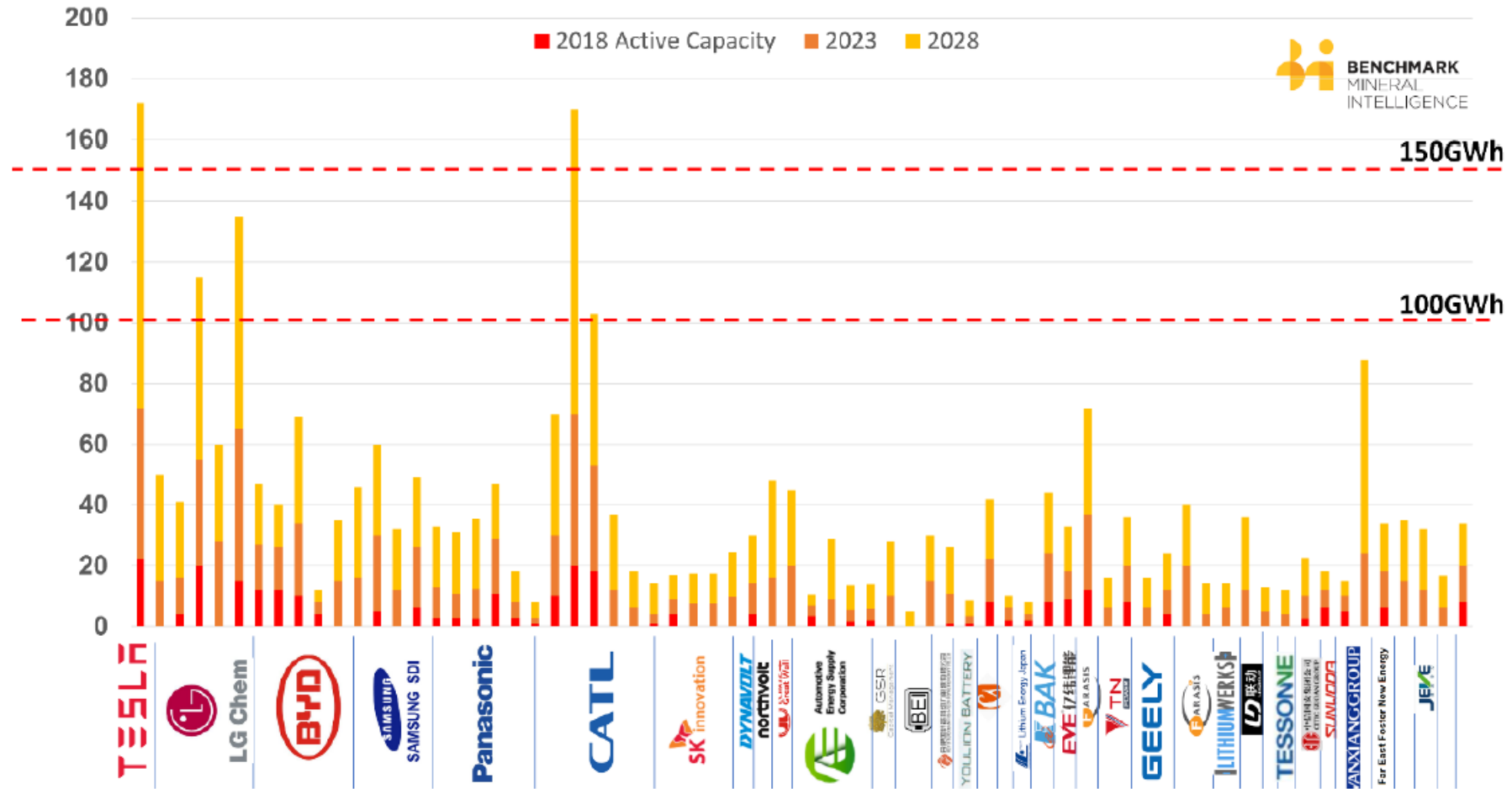
Volume weighted average lithium-ion pack price

Real 2018 USD



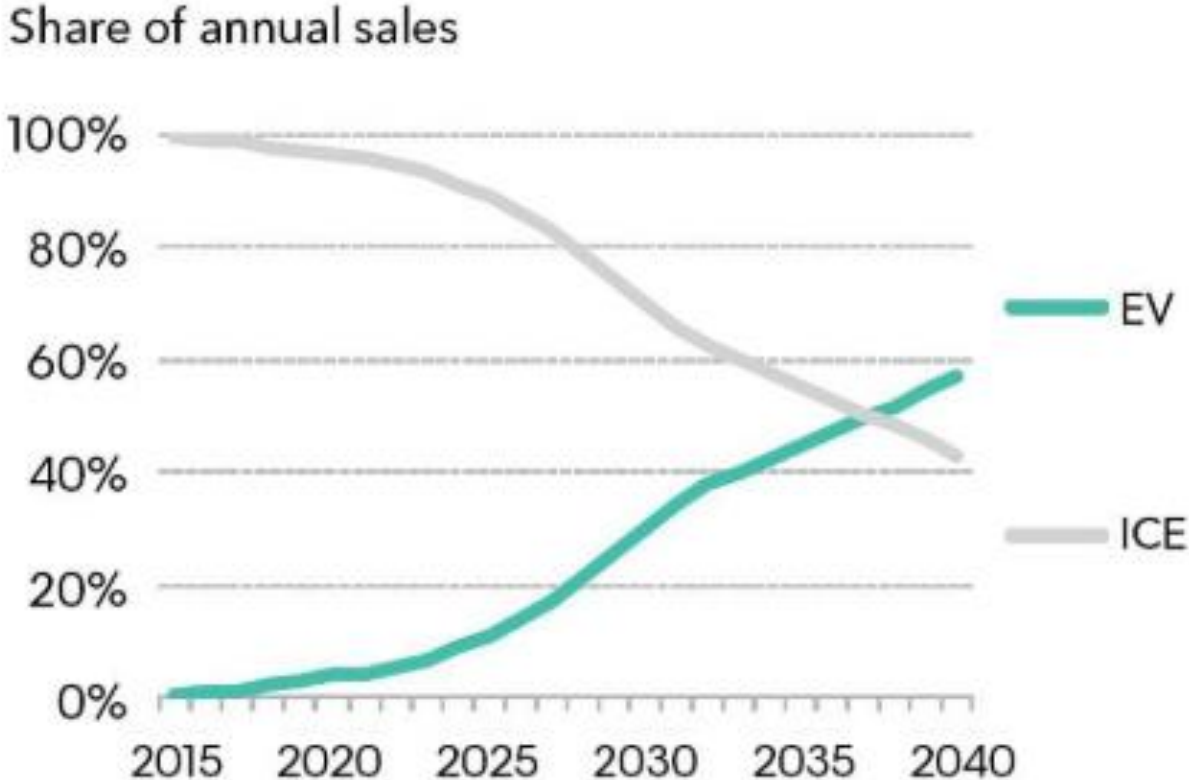
Source: BloombergNEF

Build Out of Lithium Ion Battery Capacity (2018-2028)



EV and ICE Vehicle Sales Forecast

Global EV and ICE share of long-term passenger vehicle sales



Source: BloombergNEF



Cities Banning Fossil Fuel Vehicles

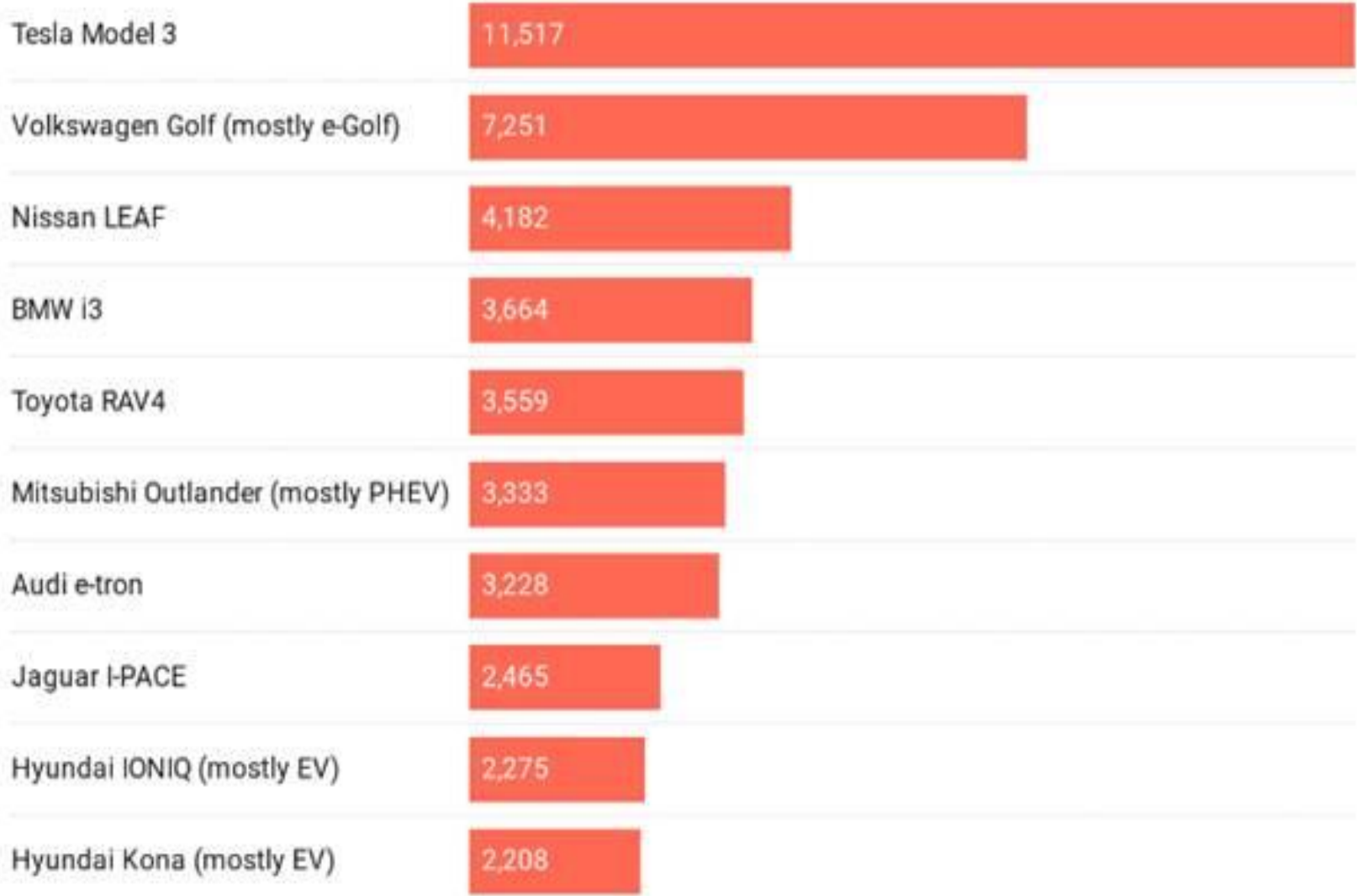
City	Country	Announcement	Implementation	Type	Comment
Delhi	India	2014	Started	Diesel	Diesel cars over 10 years old
Seoul	Korea	2018	2019	Old diesel cars (made before 2005)	Within the city center
Hamburg	Germany	2018	2018	Diesel	All vehicles
Oslo	Norway	2016	2019	Gasoline and Diesel	All vehicles
Oxford	England	2017	2020	Gasoline and Diesel	All vehicles
Rome	Italy	2018	2024	Diesel	All vehicles
Athens	Greece	2016	2025	Diesel	All vehicles
Brussels	Belgium	2018	2025	Gasoline or Diesel	All vehicles
Madrid	Spain	2016	2025	Diesel	All vehicles
Mexico City	Mexico	2016	2025	Diesel	All vehicles
Paris	France	2016	2025	Diesel	All vehicles
Auckland	New Zealand	2017	2030	Gasoline or Diesel	All vehicles, Electric Buses by 2025
Barcelona	Spain	2017	2030	Gasoline or Diesel	All vehicles, Electric Buses by 2025
Cape Town	South Africa	2017	2030	Gasoline or Diesel	All vehicles, Electric Buses by 2025
Copenhagen	Denmark	2017	2030	Gasoline or Diesel	All vehicles, Electric Buses by 2025
Heidelberg	Germany	2017	2030	Gasoline or Diesel	All vehicles, Electric Buses by 2025
London	England	2017	2030	Gasoline or Diesel	All vehicles, Electric Buses by 2025
Los Angeles	United States	2017	2030	Gasoline or Diesel	All vehicles, Electric Buses by 2025
Milan	Italy	2017	2030	Gasoline or Diesel	All vehicles, Electric Buses by 2025
Quito	Ecuador	2017	2030	Gasoline or Diesel	All vehicles, Electric Buses by 2025
Seattle	United States	2017	2030	Gasoline or Diesel	All vehicles, Electric Buses by 2025
Vancouver	Canada	2017	2030	Gasoline or Diesel	All vehicles, Electric Buses by 2025

Source: Multiple news sources (i.e. Money.CNN.com, the Guardian, Independent etc.), Deutsche Bank

European Vehicle Impact



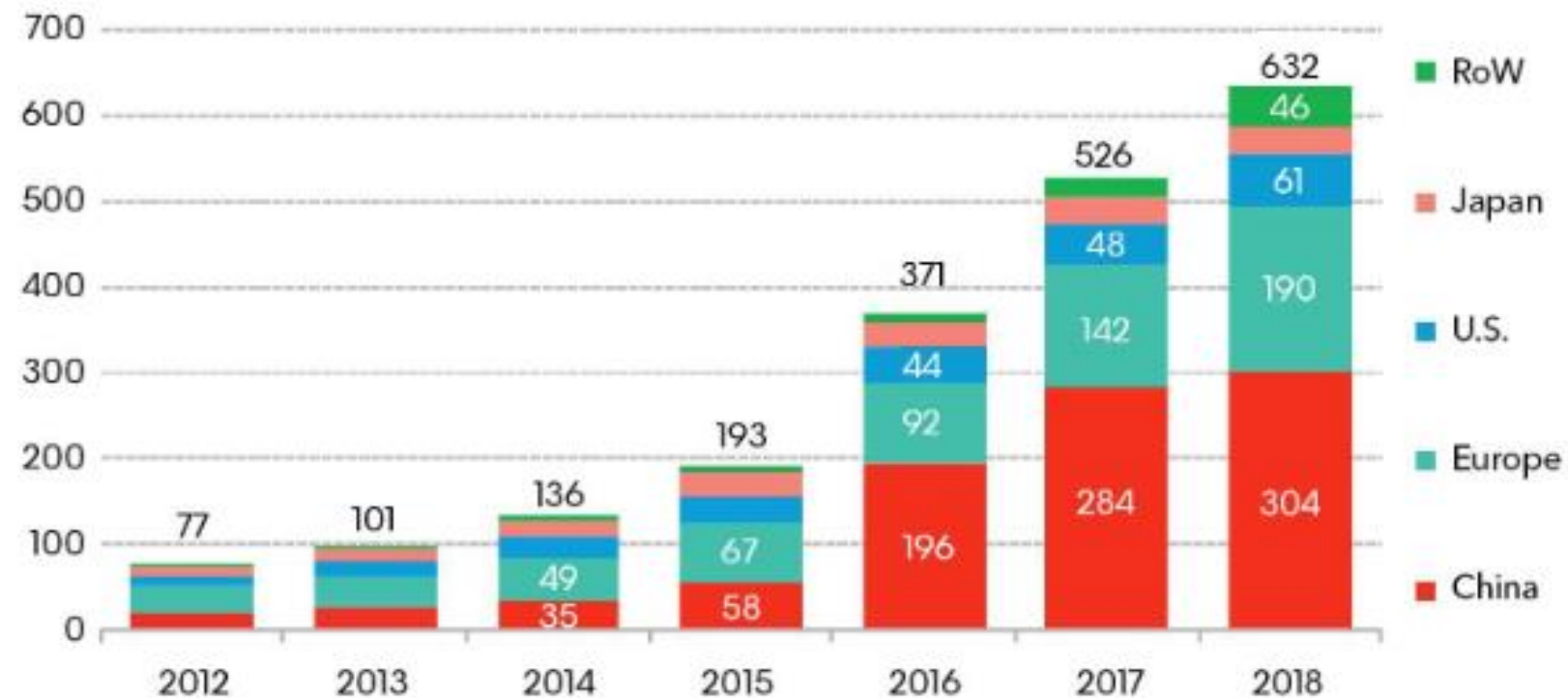
Norway - Top 10 Vehicles Sold (August YTD)



Growth in Global Charging Infrastructure

Public charging outlets installed globally

Thousand units



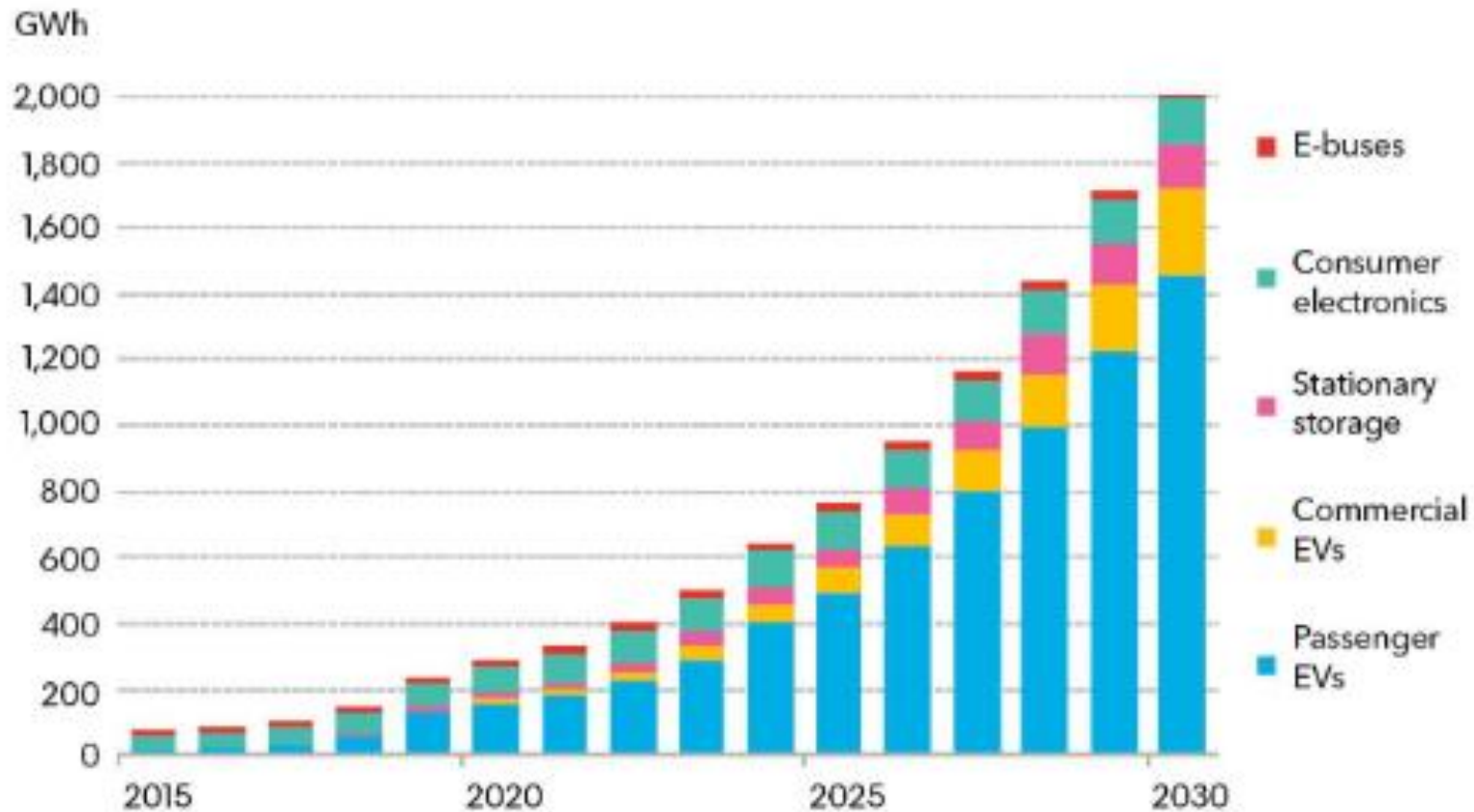
Source: BloombergNEF. Note: Data current as of January 1, 2019. Data will be updated on the BNEF data hub at the end of 1H 2019.

Would You like Fries With That?



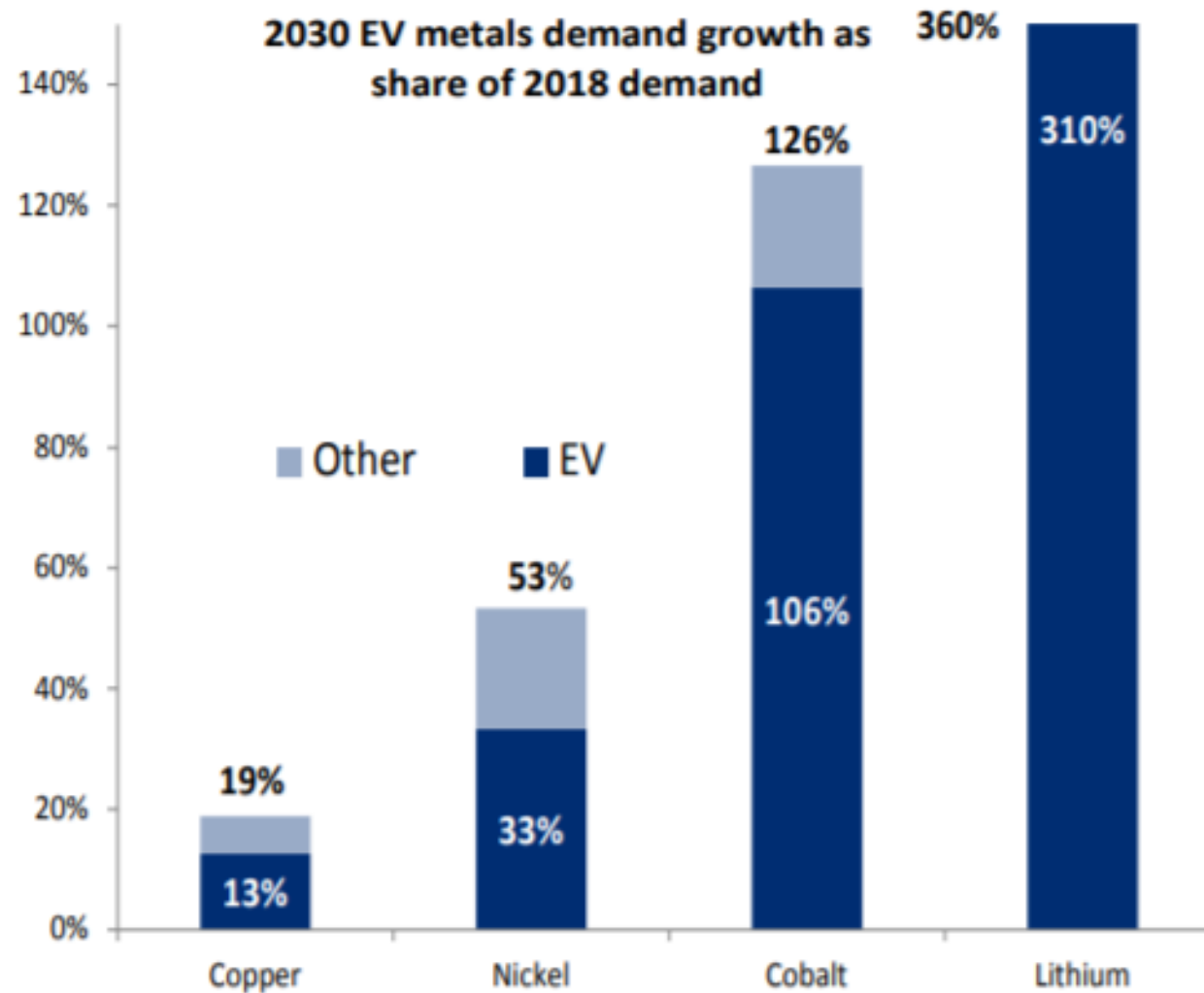
Forecast Growth in Global Battery Demand

Annual lithium-ion battery demand



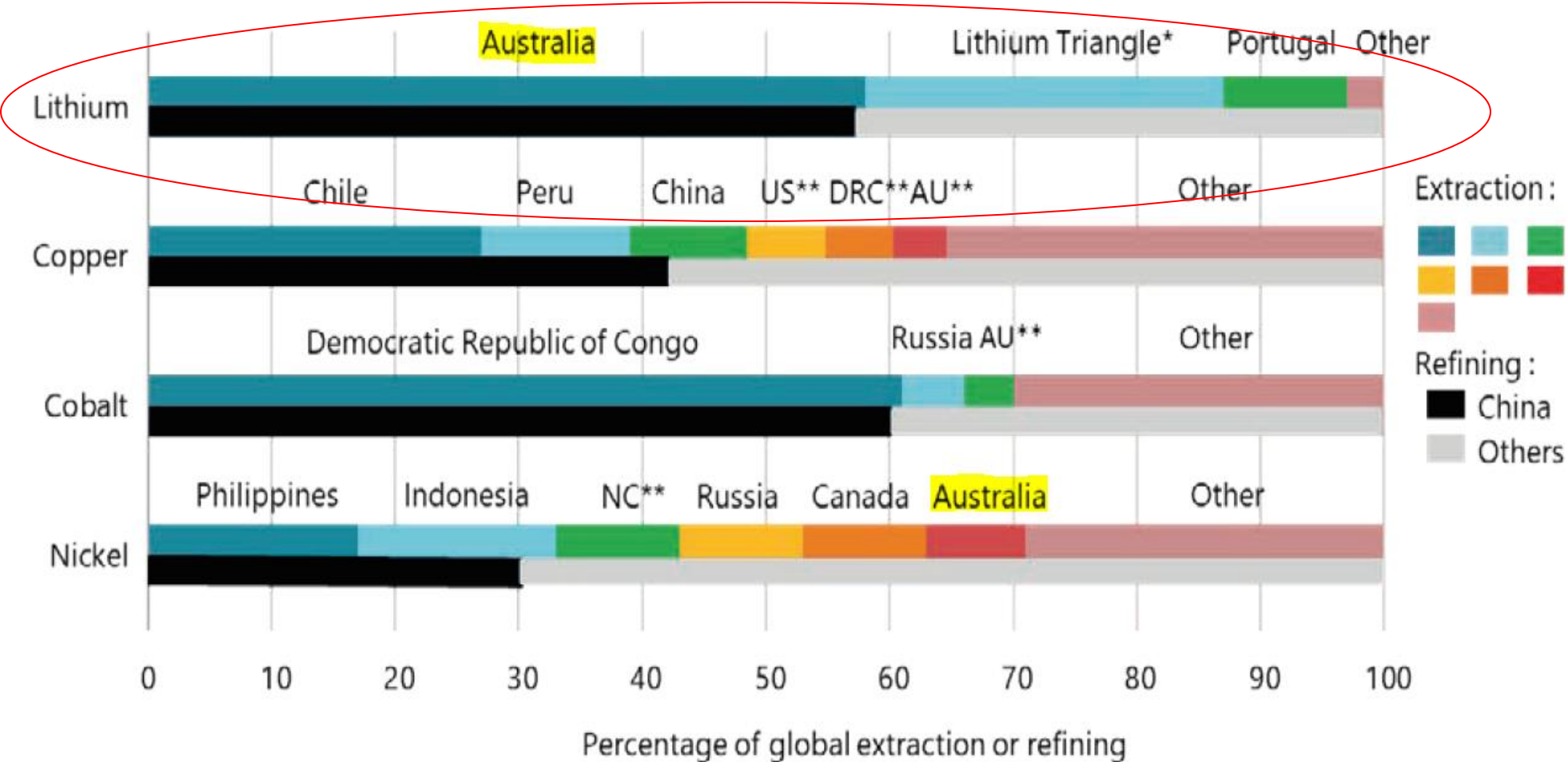
Source: BloombergNEF, Avicenne

Forecast Growth in EV Metal Demand



Source: Citi Research, copper and nickel is net of ICE counterfactual

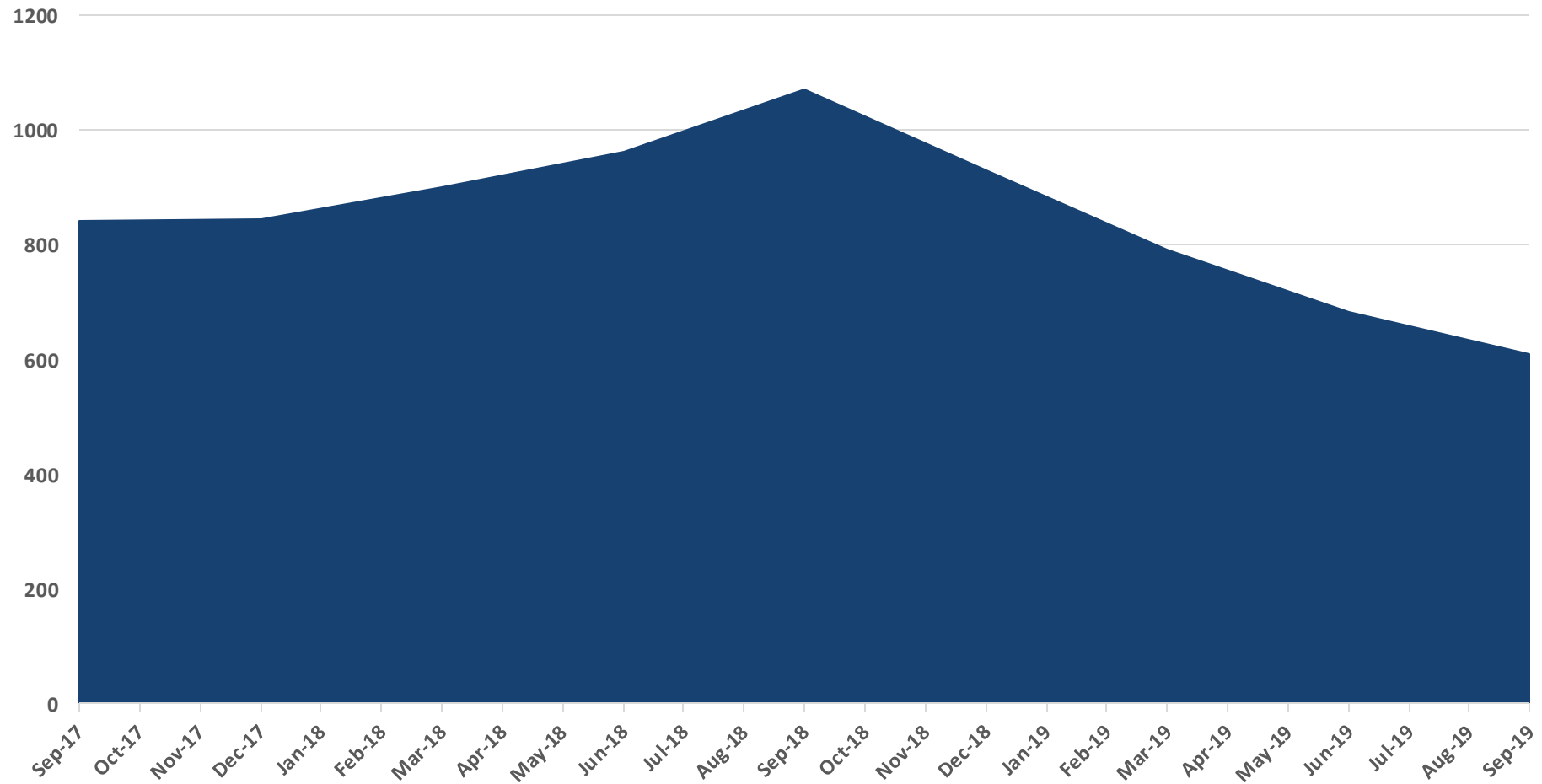
Battery Material Extraction and Refining Locations



Source: IEA



MIN Realised Lithium Pricing (6% in US\$/DMT)



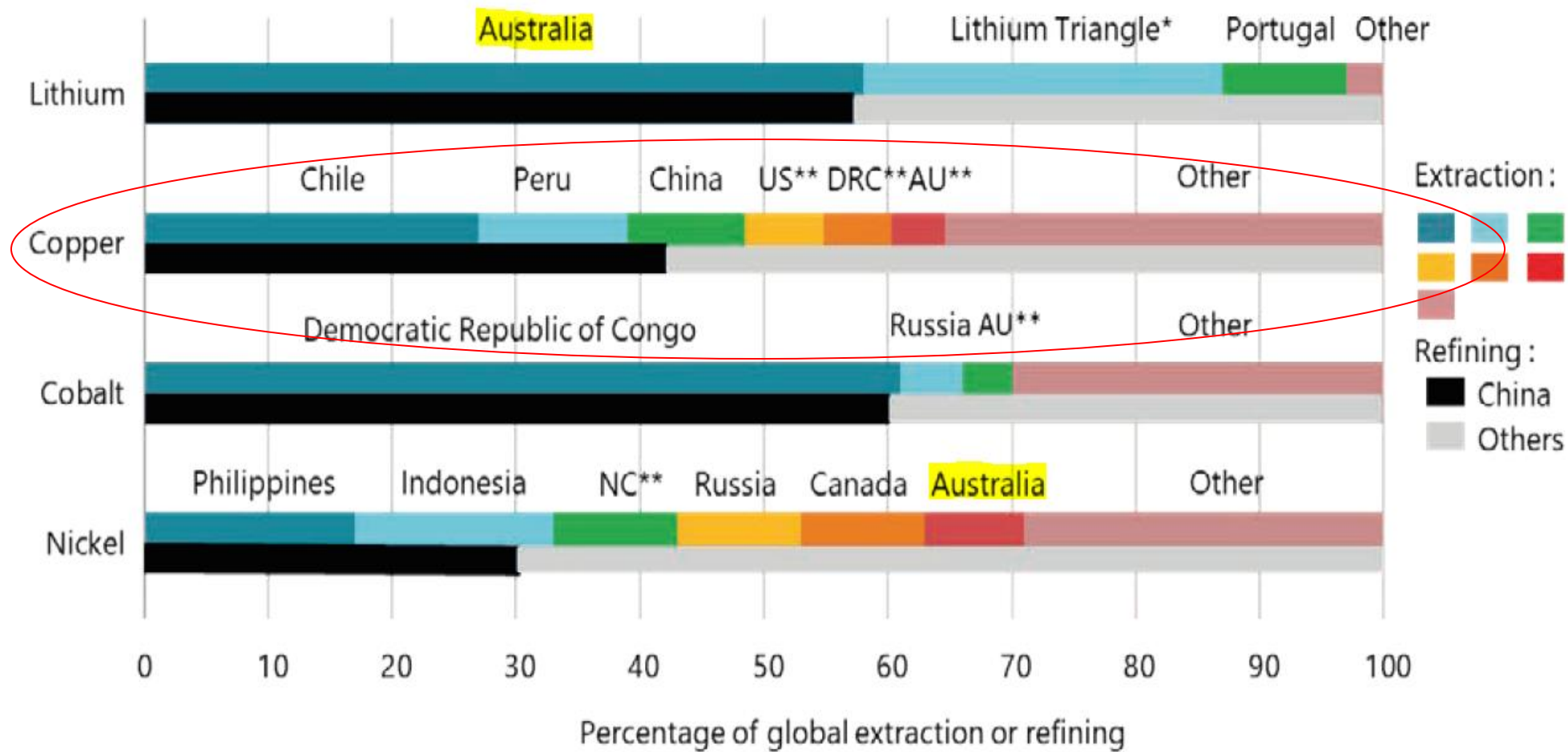
Lithium – Share Price Performance



Global X Lithium ETF (orange), Mineral Resources Ltd (purple), Orocobre (green), Pilbara Minerals (blue)

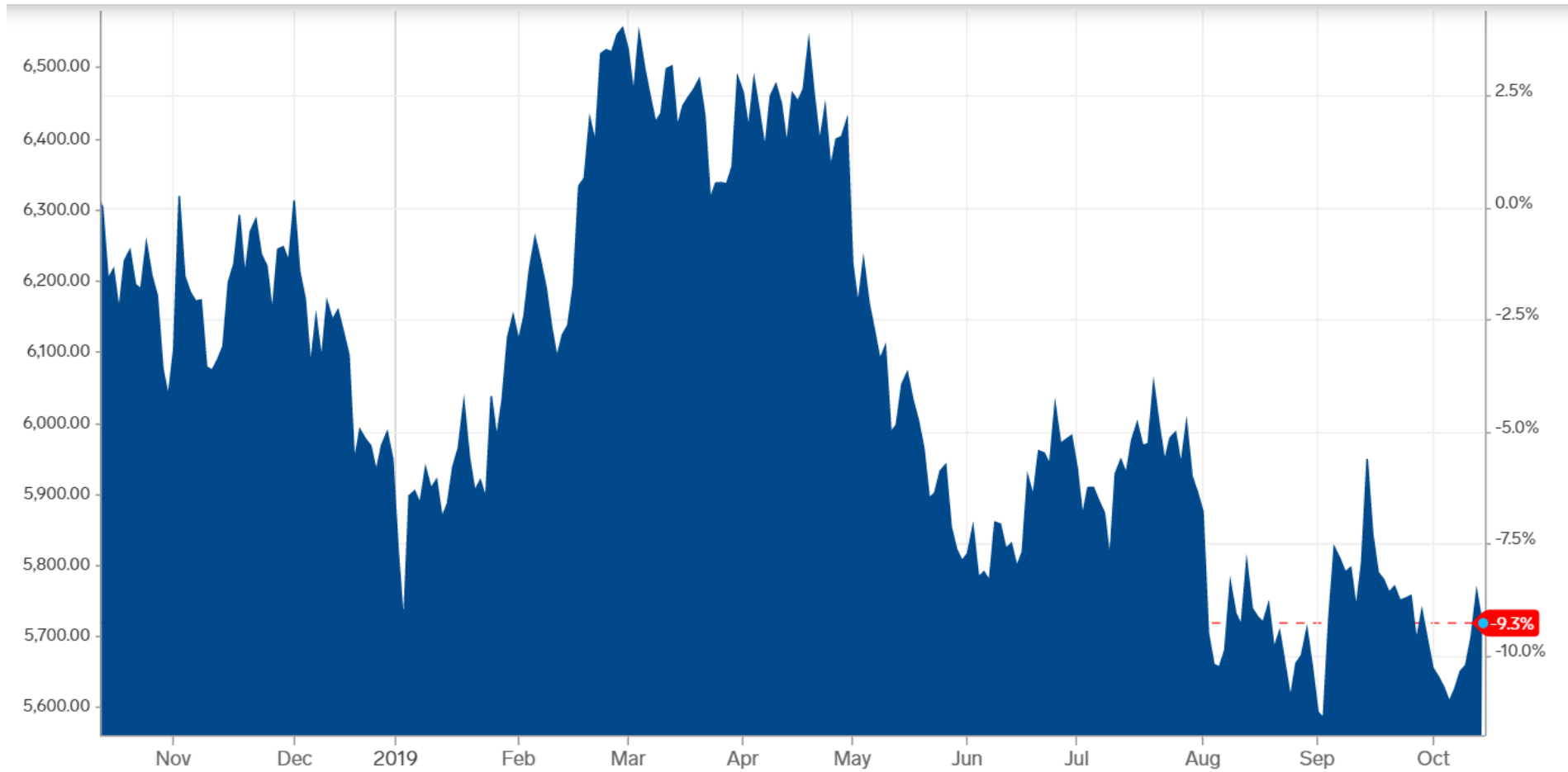


Battery Material Extraction and Refining Locations



Source: IEA

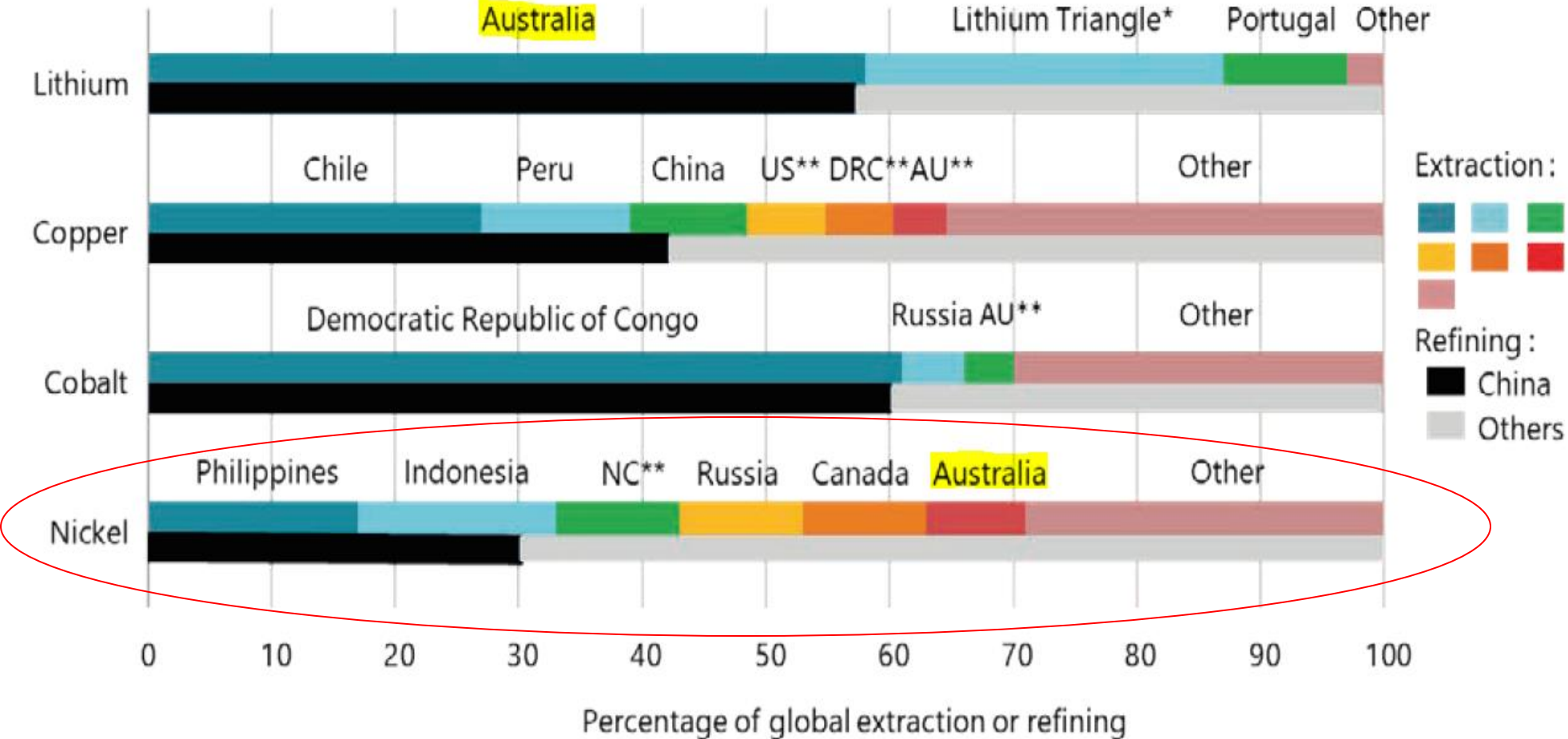
Copper Price (USD)



Oz Minerals Share Price (AUD)



Battery Material Extraction and Refining Locations



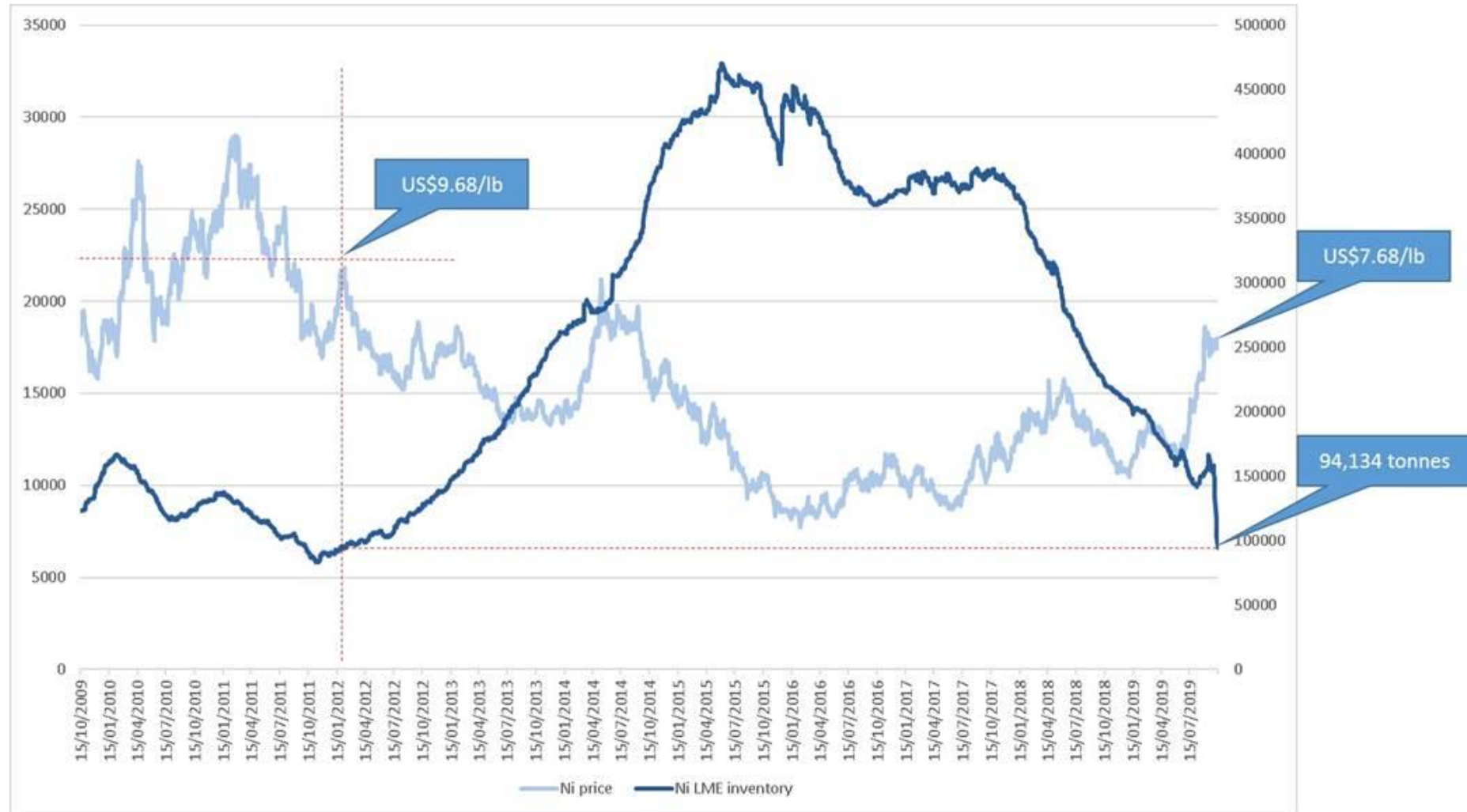
Source: IEA



Nickel Price (USD)



Nickel Price and LME Inventories

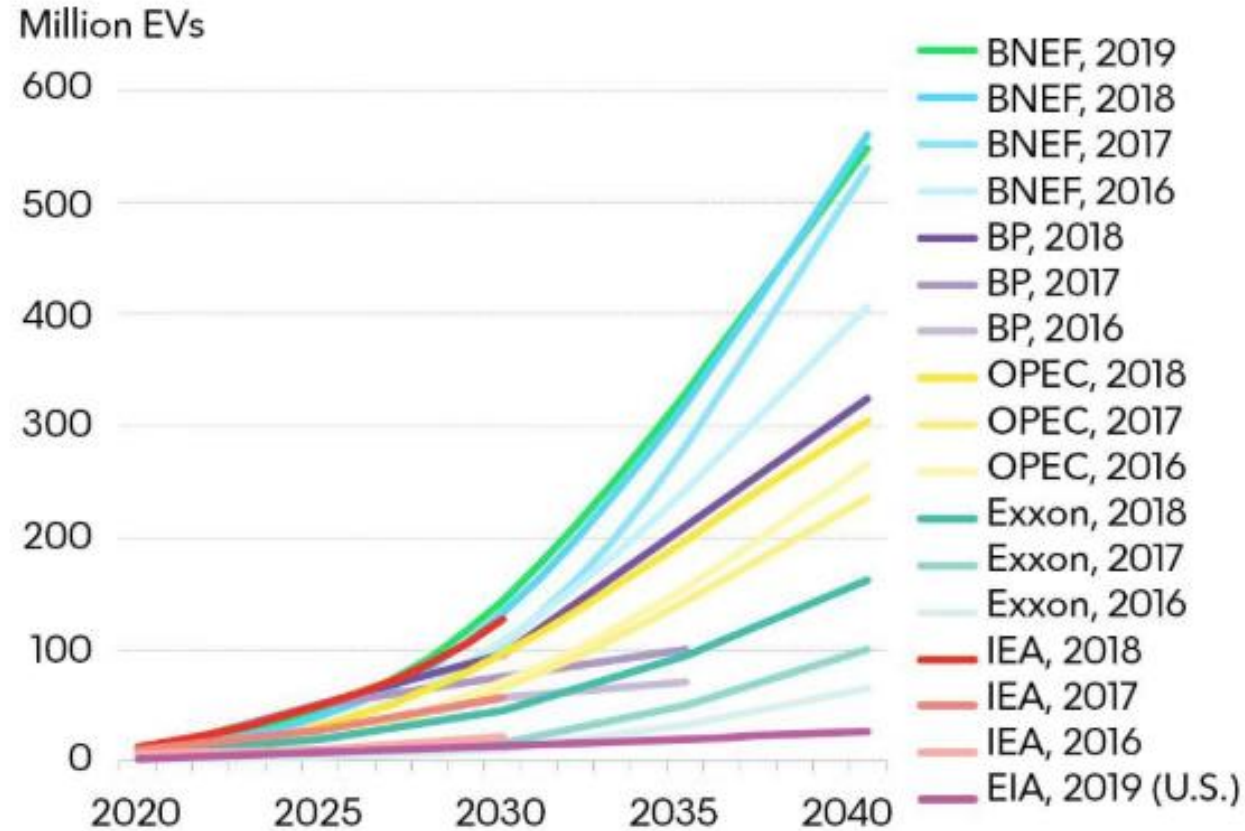


Independence Group Share Price (AUD)



The Trend is Undeniable ...

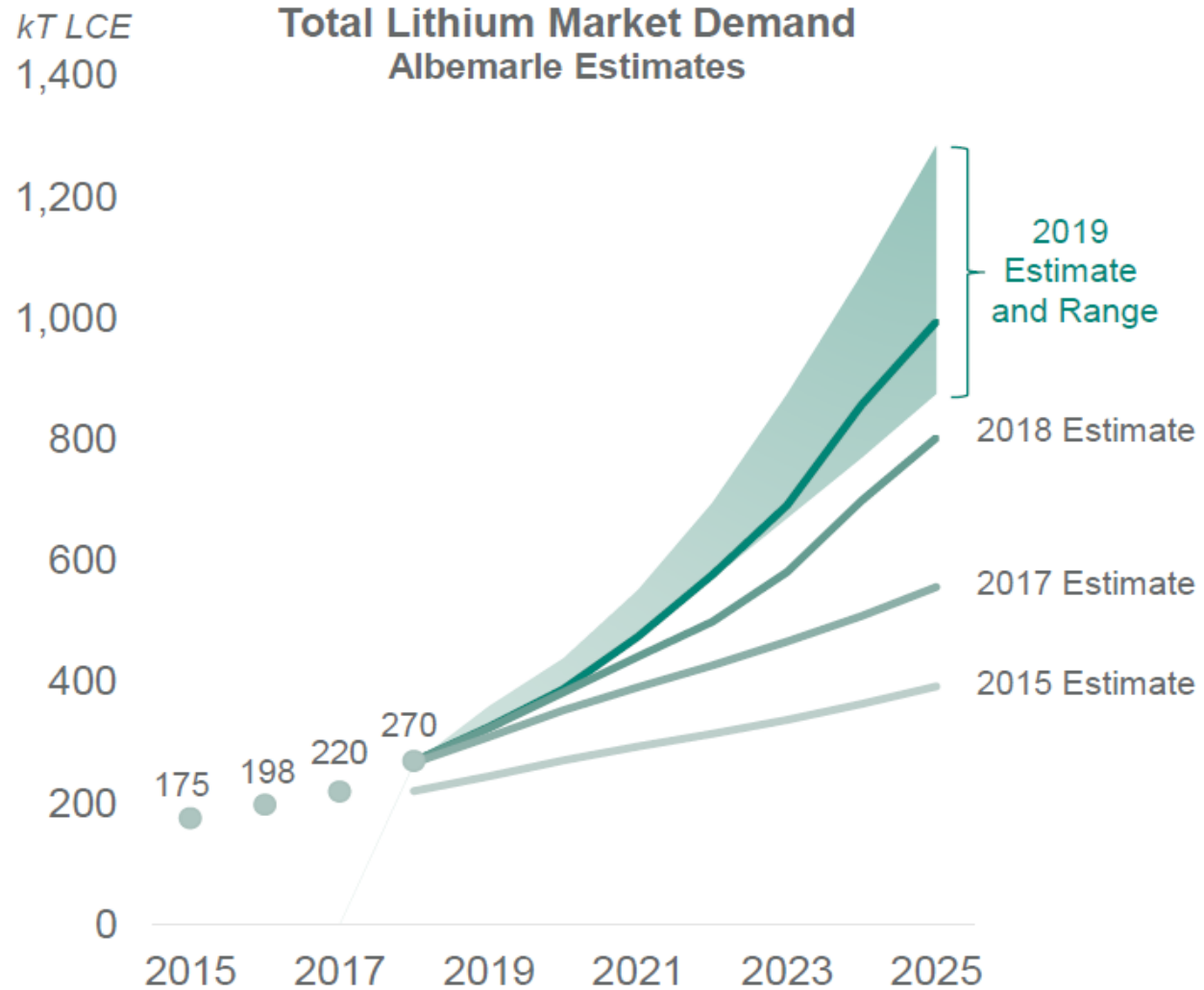
EV Outlooks then and now



Source: BloombergNEF, organization websites. Note: BNEF's 2019 outlook includes passenger and commercial EVs. Some values for other outlooks are BNEF estimates based on organization charts, reports and/or data (estimates assume linear growth between known data points). Outlook assumptions and methodologies vary. See organization publications for more.

... and Battery Materials Should Move First

Albemarle Corporation: Global Lithium Ranking No. 1



Jay Leno loves his Tesla: 'There's almost no reason to have a gas car'

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