

# State of the EV Industry

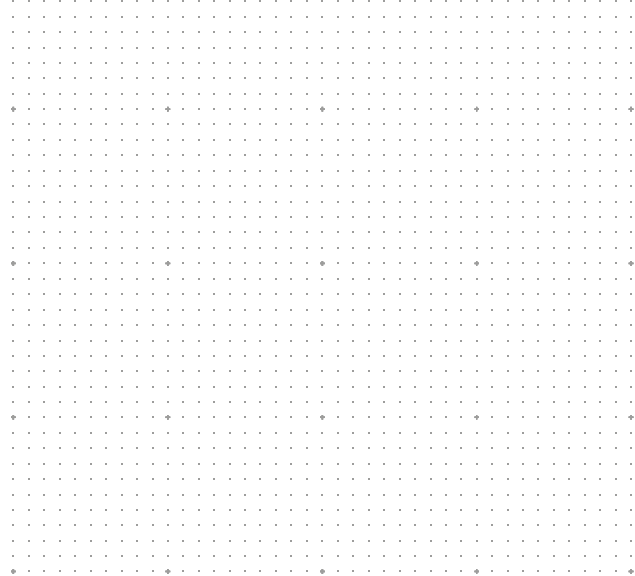
2022: A record-breaking year

Evelina Stoikou

February 21, 2023

# The road traveled

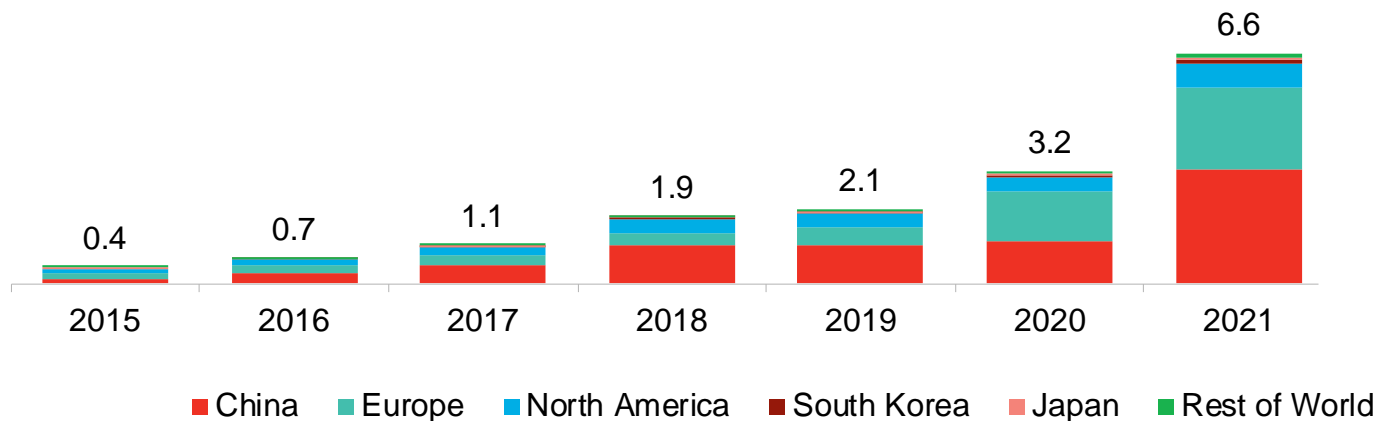
Looking back at the EV and battery industry



# EV sales hit >6 million in 2021... more than 6x 2017 final sales numbers

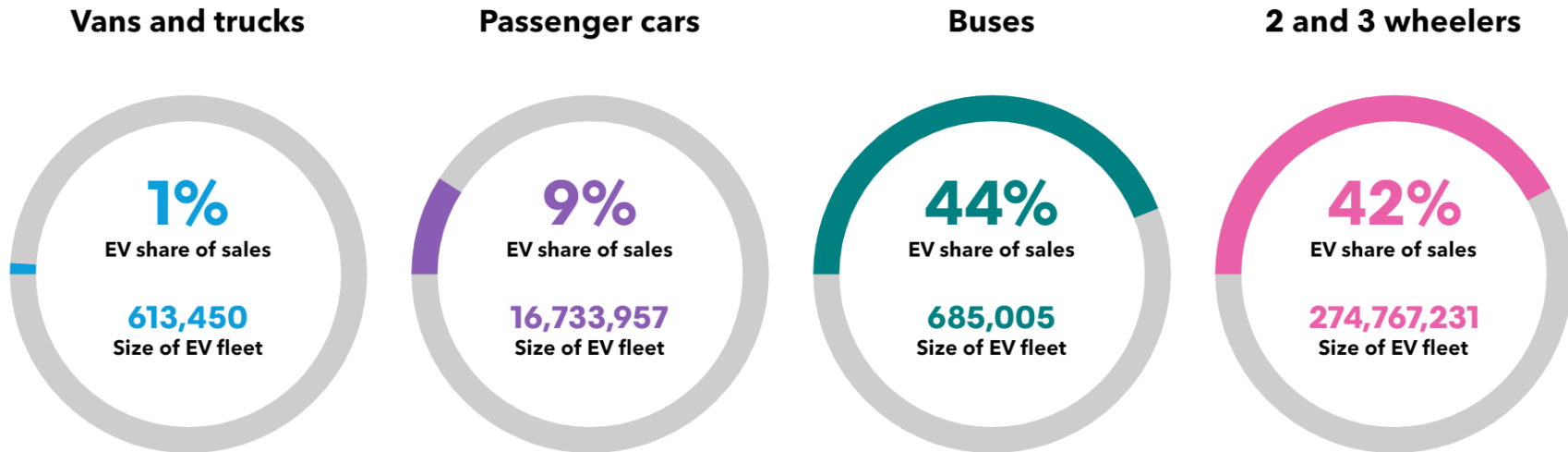
## Annual passenger EV sales by region

Million



Source: BloombergNEF, Marklines.

# The picture of the EV industry today

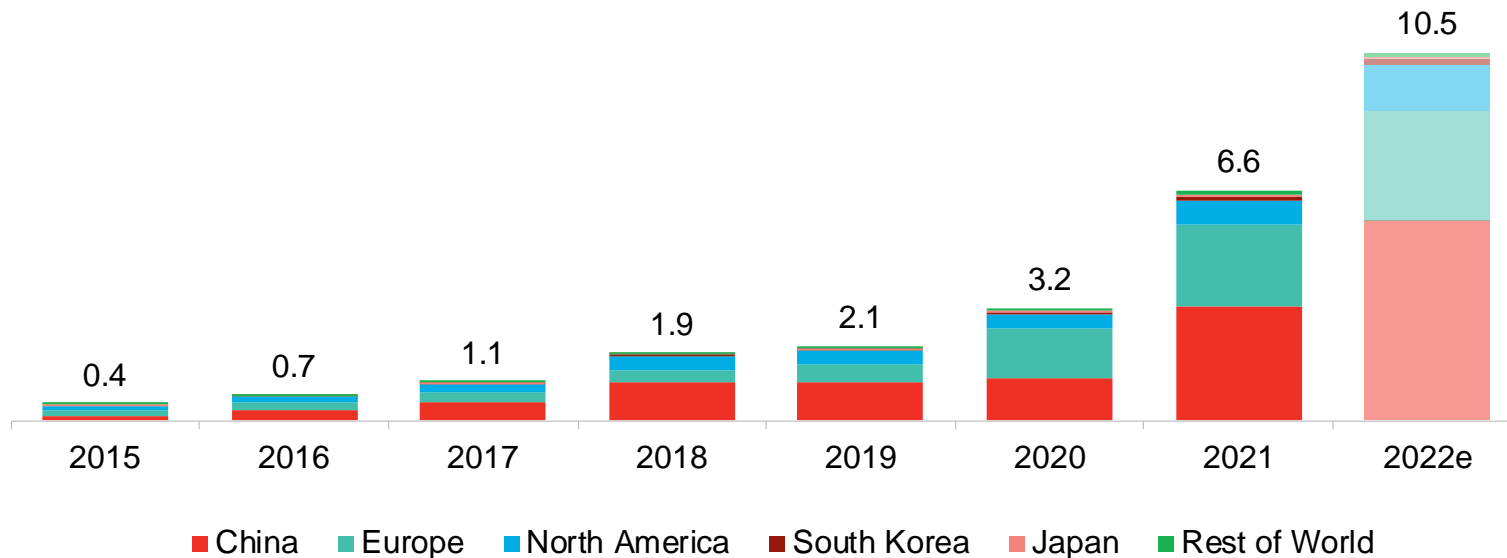


Source: BloombergNEF. All data as of end of 2021.

# And we're expecting a record-breaking **2022** of > 10 million sales

## Annual passenger EV sales by region

Million



Source: BloombergNEF, Marklines.

**But not all the records broken in 2022  
were good**

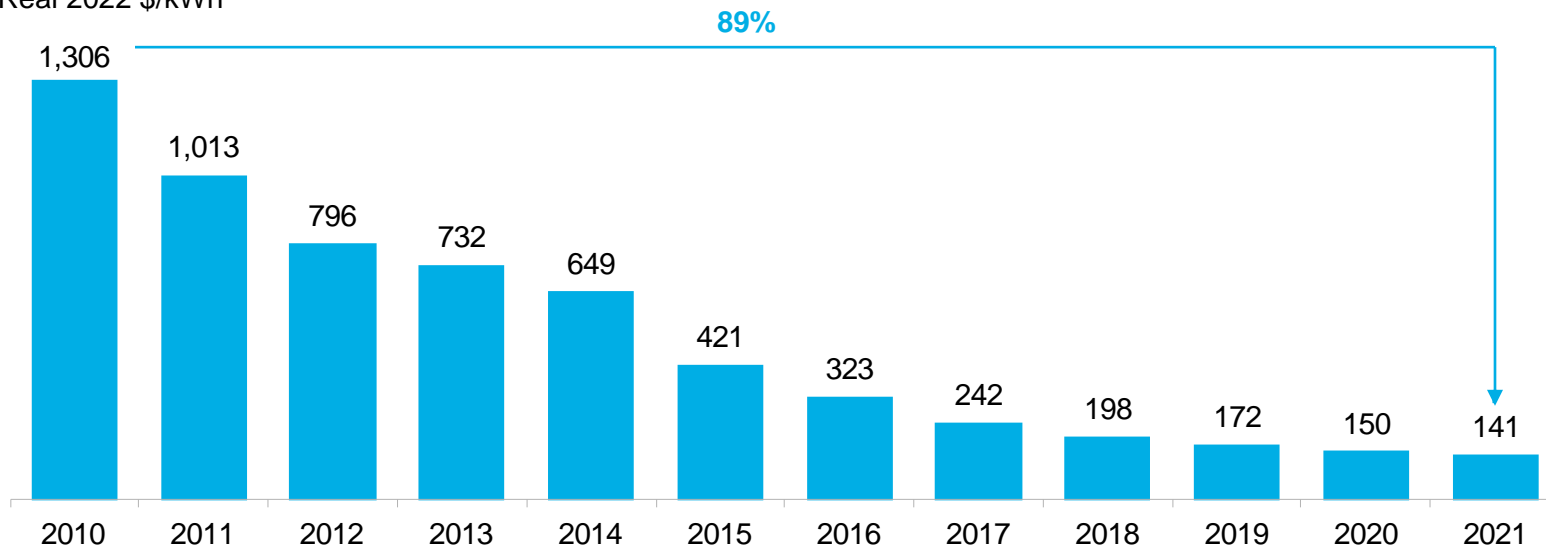


*Source: Bloomberg*

# Declining battery prices were key in lowering EV costs

## Volume-weighted average lithium-ion battery pack prices

Real 2022 \$/kWh

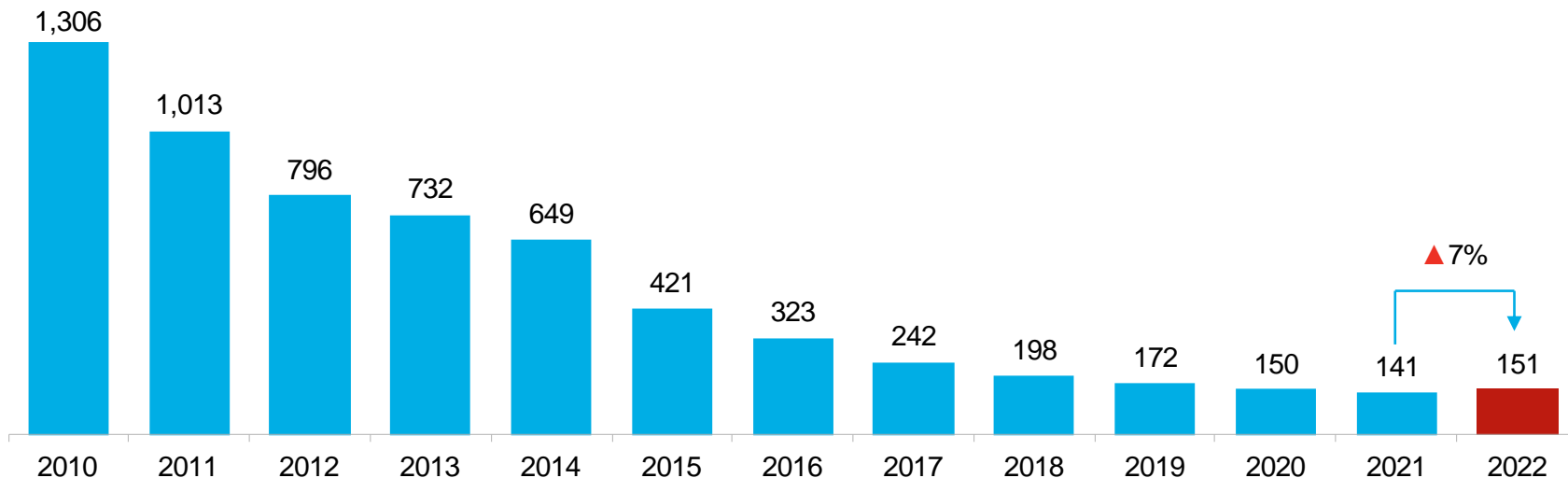


Source: BloombergNEF. Note: Historical prices have been adjusted using June 2021 to June 2022 inflation rates based on the US Consumer Price Index (CPI) index.

# However, battery prices **increased** for the first time in 2022

## Volume-weighted average lithium-ion battery pack prices

Real 2022 \$/kWh



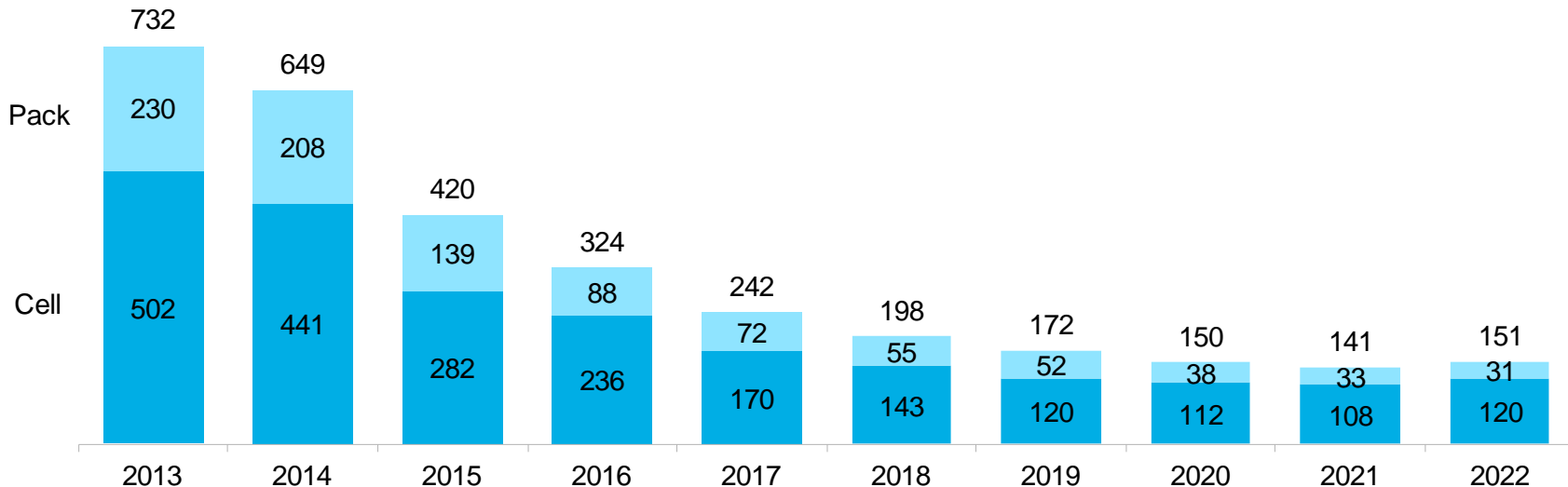
Source: BloombergNEF. Note: Historical prices have been adjusted using June 2021 to June 2022 inflation rates based on the US Consumer Price Index (CPI) index.



# Cell prices increased by **11%** in 2022 compared to the previous year

## Volume-weighted average lithium-ion battery pack prices: pack and cell split

Real 2022 \$/kWh

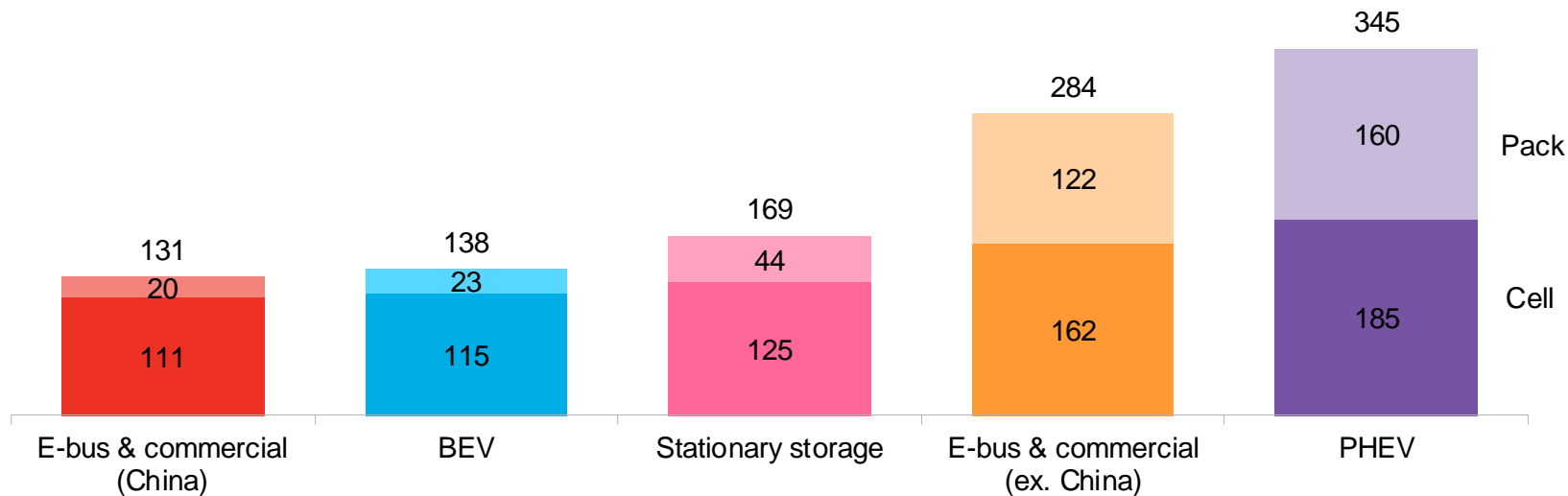


Source: BloombergNEF. Note: Historical prices have been adjusted using June 2021 to June 2022 inflation rates based on the US Consumer Price Index (CPI) index.

# Battery prices for EVs reached \$138/kWh

## Volume-weighted average lithium-ion battery prices by sector: pack and cell split

real 2022 \$/kWh



Source: BloombergNEF

# Lithium



Source: Bloomberg Mercury

# Nickel

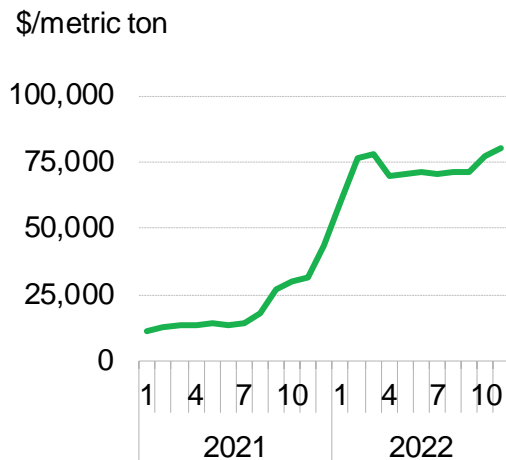


# Cobalt



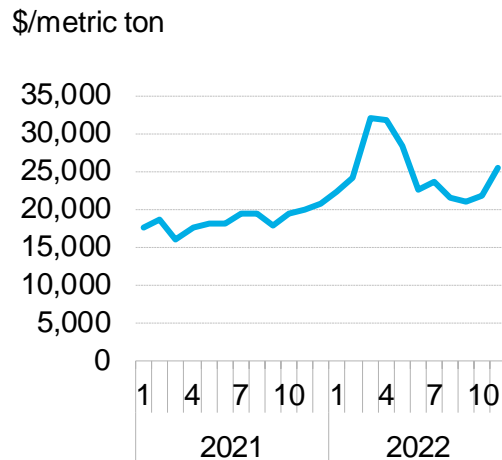
# Prices for key battery metals went up

## Lithium carbonate prices



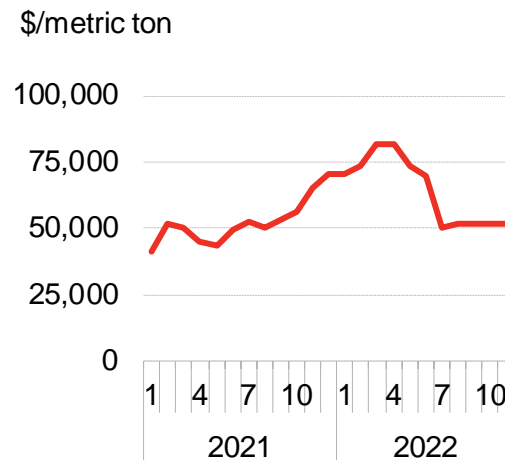
Source: BloombergNEF, Asian Metal. Note: Used China lithium carbonate 99.5% DEL and China lithium hydroxide monohydrate 56.5% DEL index.

## Nickel prices



Source: BloombergNEF, London Metal Exchange (LME). Note: Used LME Nickel three-month rolling forward index.

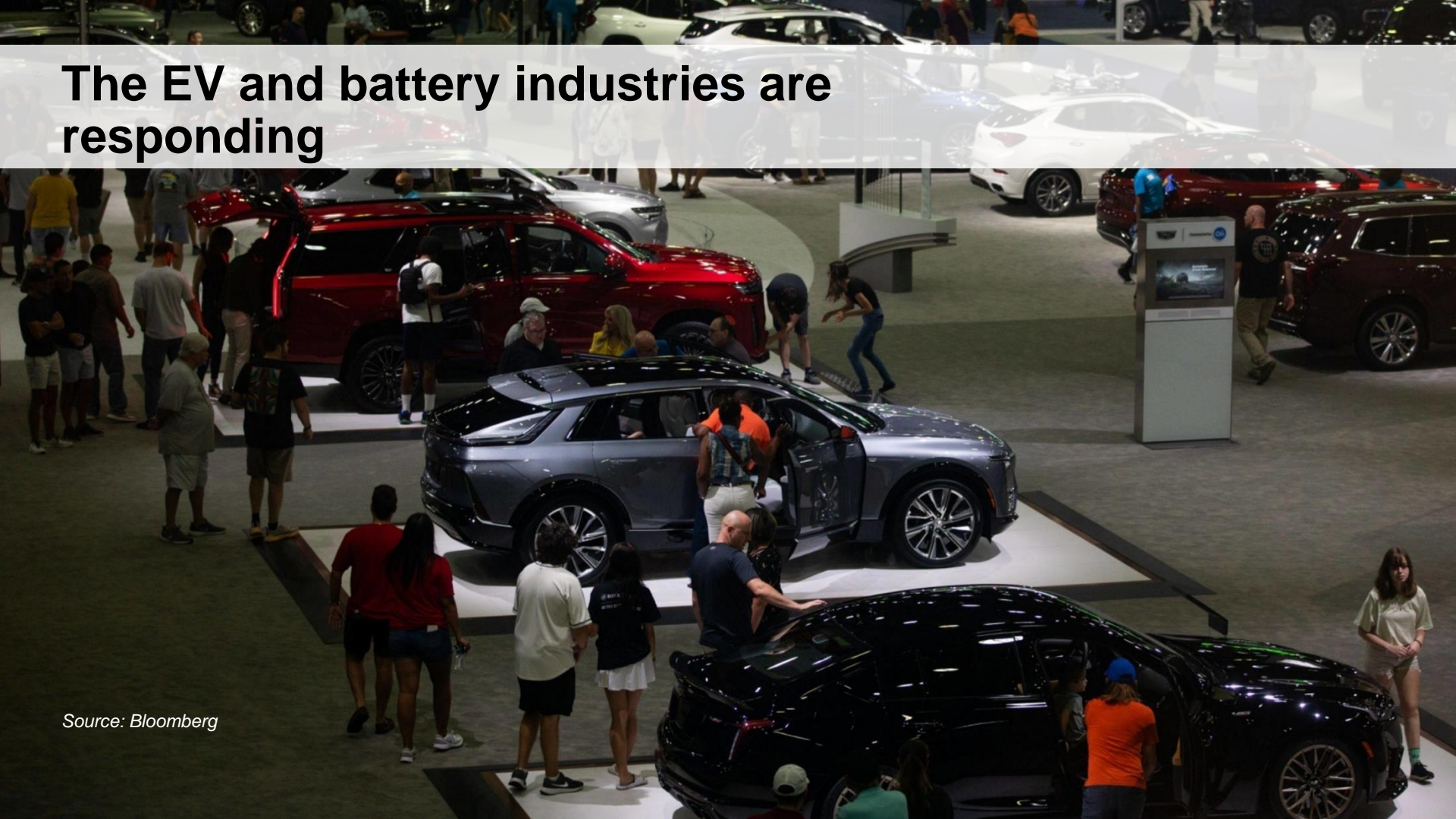
## Cobalt prices



Source: BloombergNEF, London Metal Exchange (LME). Note: Used LME Cobalt spot index.



# The EV and battery industries are responding



Source: Bloomberg

# Battery makers and automakers invest upstream

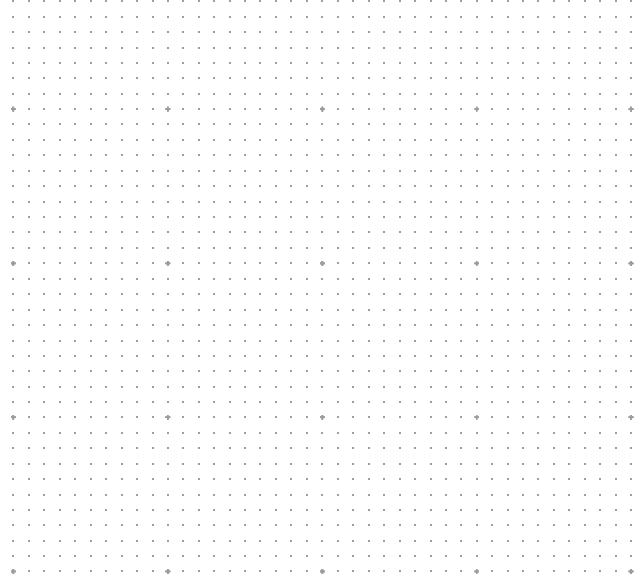
## Selected automaker and battery manufacturer raw material supply strategies

	Long-term agreement      Direct investment      Vertical integration		
Battery makers	LG Energy Solution SQM SIGMA LITHIUM AUSTRALIAN MINES LIMITED	QUEENSLAND PACIFIC METALS LITHIUM Pilbara GEI CMOC Dahua chemical 华友钴业 HUAYOU COBALT	
	Gotion 江新电机 江新电机 002170		Gotion      Lithium carbonate production in Argentina
Automakers	BMW Ford gm RENAULT STELLANTIS TESLA	GLENORE MANAGEM Livent GanfengLithium LAKE Ioneer RioTinto BHP Liontown VALE 华友钴业 HUAYOU COBALT Livent GLENORE VULCAN ENERGY Terraform MANAGEM CONTROLLED THERMAL RESOURCES GME ALBEMARLE GLENORE Livent KIDMAN PIEDMONT CNGR 华友钴业 HUAYOU COBALT	MANGROVE LITHIUM Unlocking a lithium-powered future Lilac CONTROLLED THERMAL RESOURCES QUEENSLAND PACIFIC METALS posco CHEMICAL VULCAN ENERGY Zero Carbon Lithium TESLA      Considers building lithium refinery in Texas

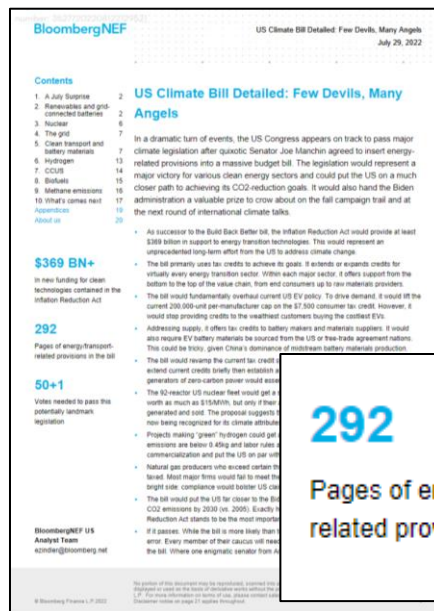
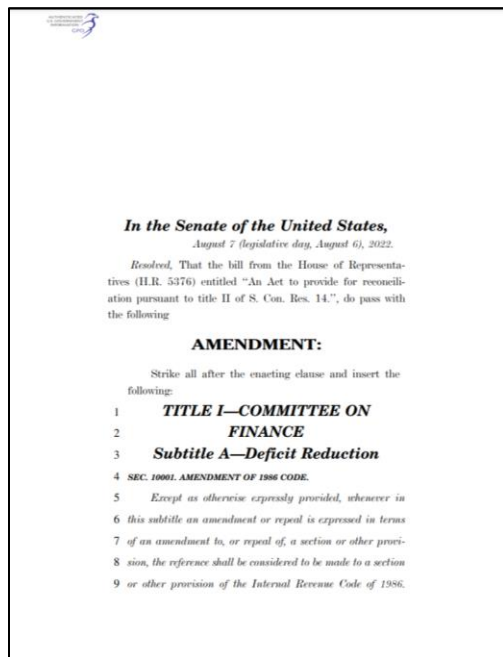
Source: BloombergNEF, company statements.

# The story in North America

EV and battery supply chains are emerging



# New US climate bill is a gamechanger



292

Pages of energy/transport-related provisions in the bill

Inflation Reduction Act

Source: BloombergNEF, Bloomberg



# IRA introduces multiple battery-related tax credits

## Tax credits

	Area	Tax credit
Input materials	Critical minerals*	10% of costs
	Battery electrode active materials	10% of costs
Batteries	Battery cells	\$35/kWh
	Battery modules**	\$10*/kWh
Applications	EVs***	\$7,500**
	Energy storage****	6% (base credit) Up to 30% + 10%

Source: BloombergNEF. Note: \*Critical minerals require mining or refining of the material in the US at specific purity levels. \*\* Battery module tax credit can go up to \$45/kWh for modules which do not use battery cells. \*\*\*EV credits include additional incentives for used clean vehicles and commercial clean vehicles, which are not directly tied to battery manufacturing in certain locations so have been removed from this table. \*\*\*\*Energy storage is eligible for additional credits of 10% energy community adder and 10% or 20% environmental justice adder, under specified provisions that will be further clarified by December 31, 2022.

# Select production tax credits are phased out in 2032

## Tax credits

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## Production tax credits' timeline for battery electrode active materials, cells and modules

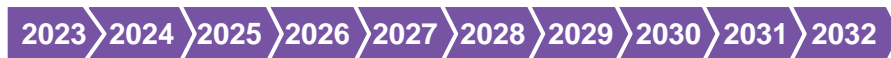


# To access the full \$7,500 EV tax credit, automakers need to satisfy two requirements

## Tax credits

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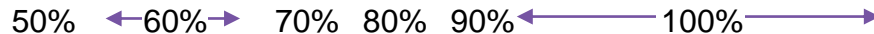
## Requirements to access EV credit



### Critical mineral req. (from North America and FTA countries)



### Battery component req. (from North America only)




Source: BloombergNEF. Note: \*Critical minerals require mining or refining of the material in the US at specific purity levels. \*\* Battery module tax credit can go up to \$45/kWh for modules which do not use battery cells. \*\*\*EV credits include additional incentives for used clean vehicles and commercial clean vehicles, which are not directly tied to battery manufacturing in certain locations so have been removed from this table. \*\*\*\*Energy storage is eligible for additional credits of 10% energy community adder and 10% or 20% environmental justice adder, under specified provisions that will be further clarified by December 31, 2022.

# The challenge: IRA origination requirements will be hard to meet

## Origination requirements for battery supply chain tax credits

### Production tax credits

Battery electrode active materials, cells and modules requirement      Manufactured in:  US

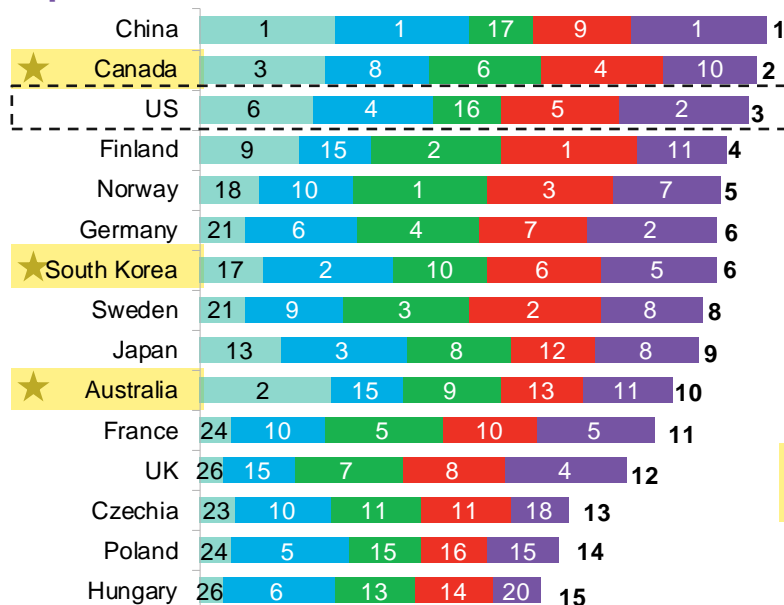
### EV tax credit

Critical mineral requirement	Extracted or processed in:	 US		
		 FTA countries*	Australia, Bahrain, Canada, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Israel, Jordan, Mexico, Morocco, Nicaragua, Oman, Panama, Peru, Singapore and South Korea	
	Recycled in:	 North America**	 US	
			 Canada	
			 Mexico	
Battery component requirement	Manufactured or assembled in:	 North America**	 US	
			 Canada	
			 Mexico	

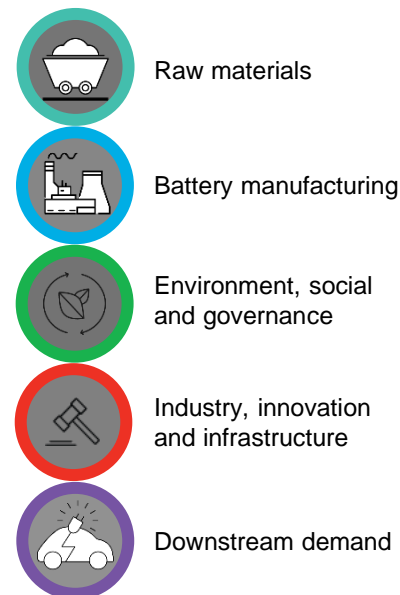
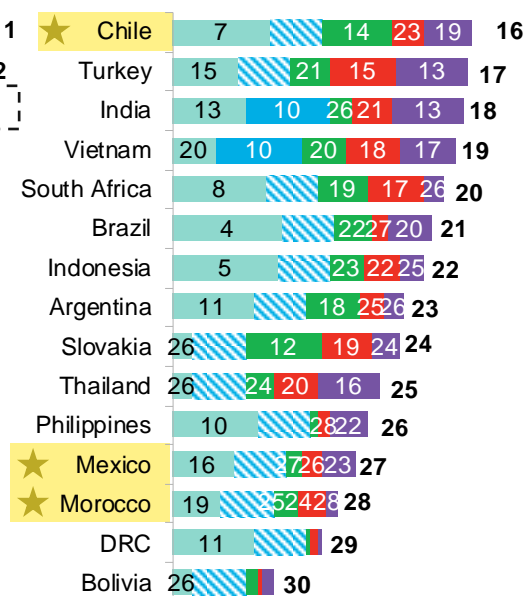
Source: BloombergNEF, state.gov. Note: \*US has free trade agreements (FTA) in force with 20 countries. \*\*Table includes selected large countries in North America region.

# Global battery supply chain rankings summary: 2022

## Top 15



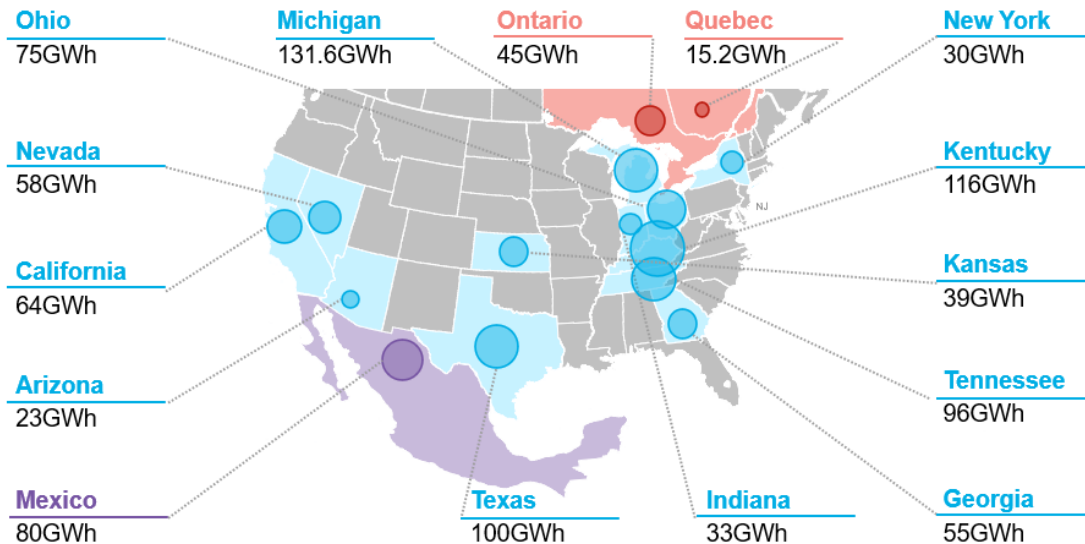
## Rank 16 - 30



Source: BloombergNEF. Note: Segment bars represent inverse of rankings, e.g. Rank 1= 30. Shaded areas for manufacturing indicate that the country has no capacity and comes joint last in the rankings with other countries. Final rankings are an average of the scores in the five categories and are indicated by the labels at the end of the bars. Starred countries have free trade agreements (FTAs) with the US.

# A North American EV battery supply chain is emerging

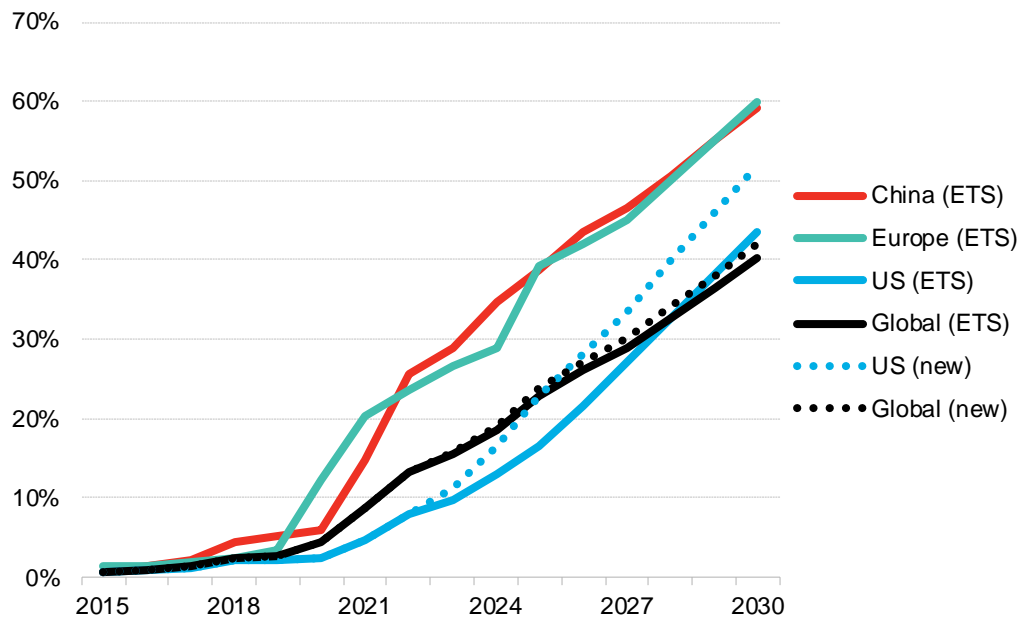
## North America's cell manufacturing activity



Source: BloombergNEF. Note: Capacity includes fully commissioned, under construction and announced battery manufacturing plants. Bubble size corresponds to total capacity commissioned, under construction and announced.

# ...Though the US still lags behind China and Europe

## Passenger EV share of sales outlook



Source: BloombergNEF. Note: ETS is the Economic Transition Scenario from BNEF's Long-Term EV Outlook 2022 ([web](#) | [terminal](#)).

# Thank you!

Get in touch with us

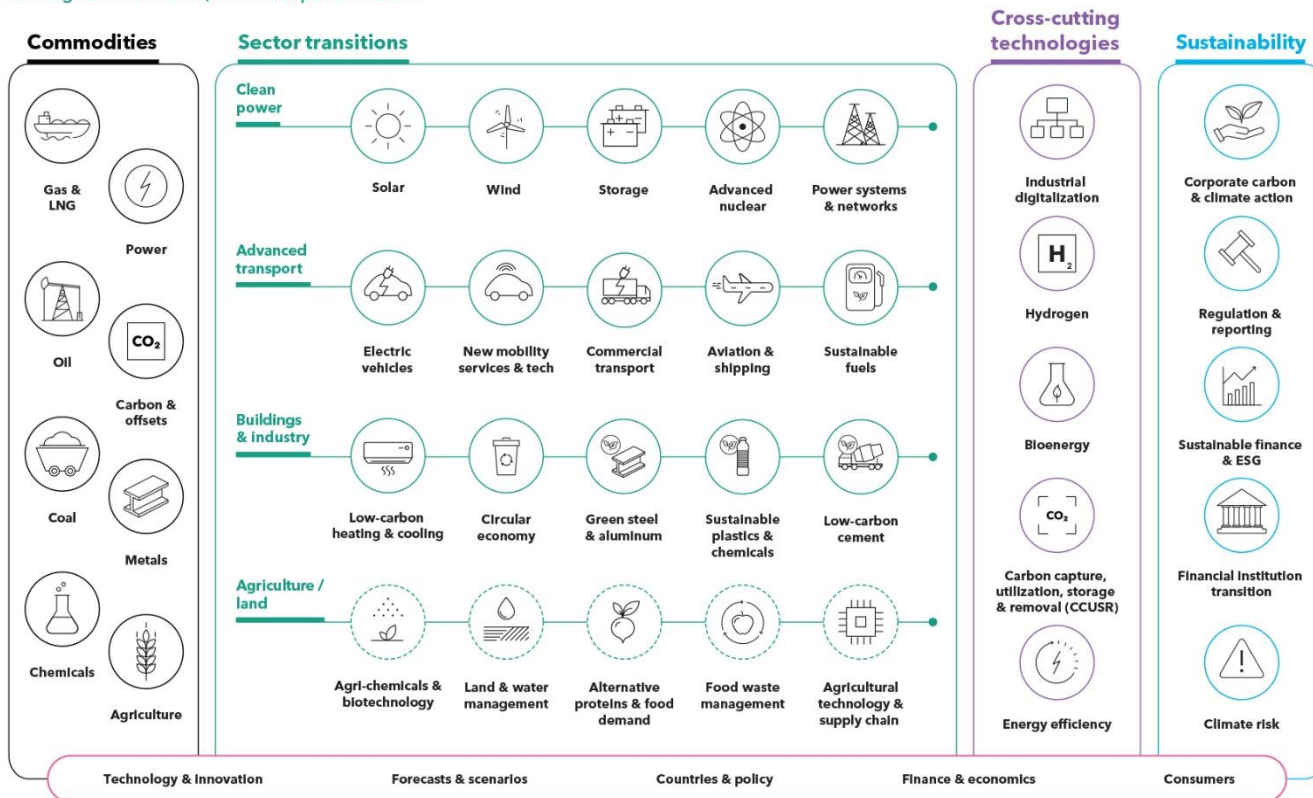
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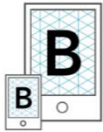
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