

# State of the EV Industry

2022: A record-breaking year

Evelina Stoikou

February 21, 2023

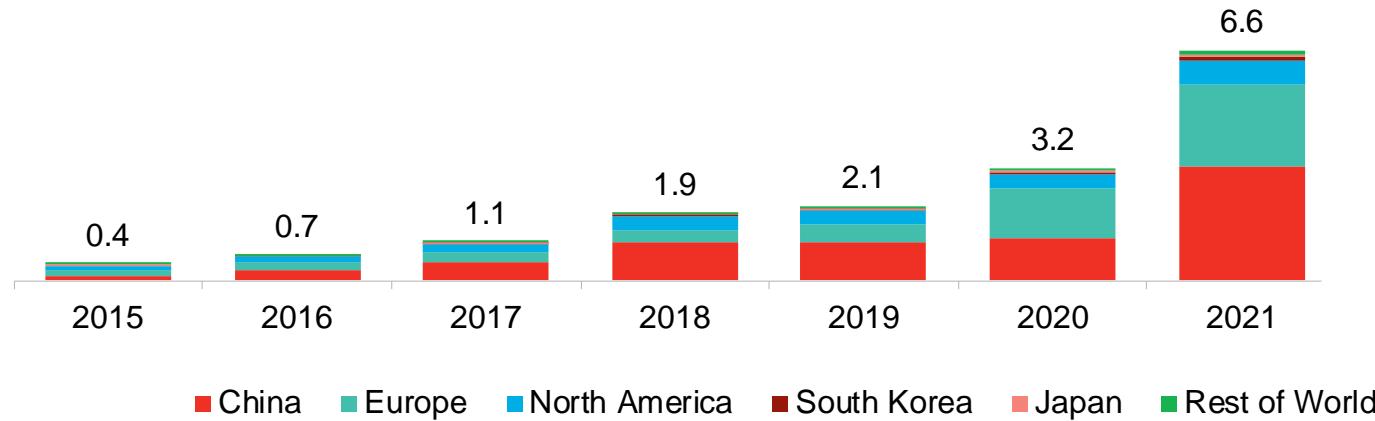
# The road traveled

Looking back at the EV and battery industry

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

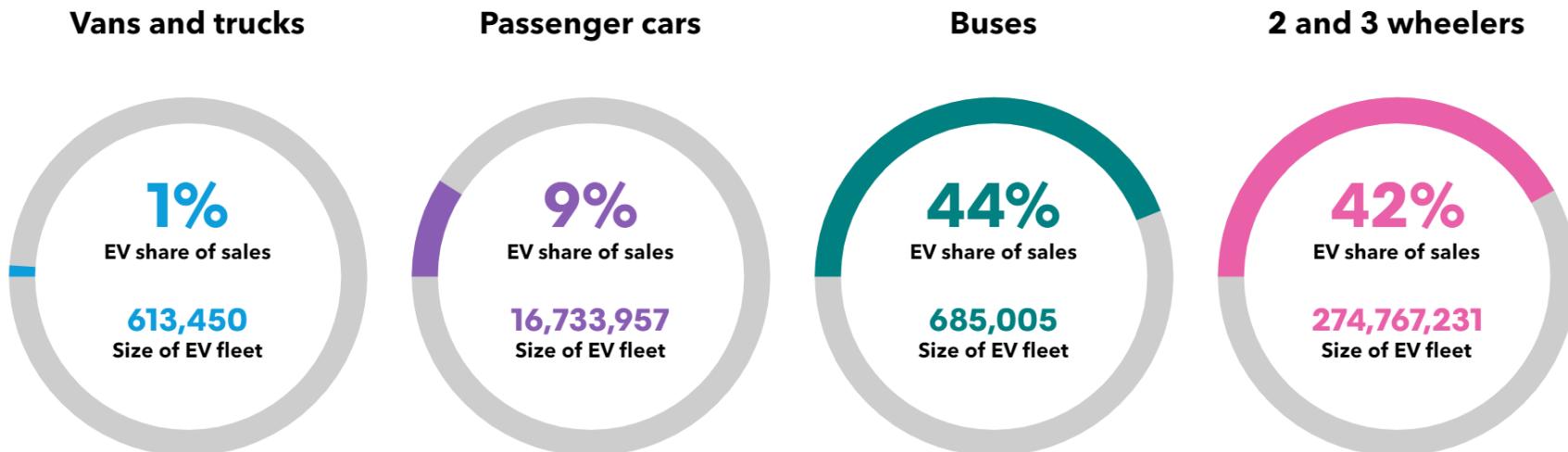
## Annual passenger EV sales by region

Million



Source: BloombergNEF, Marklines.

# The picture of the EV industry today

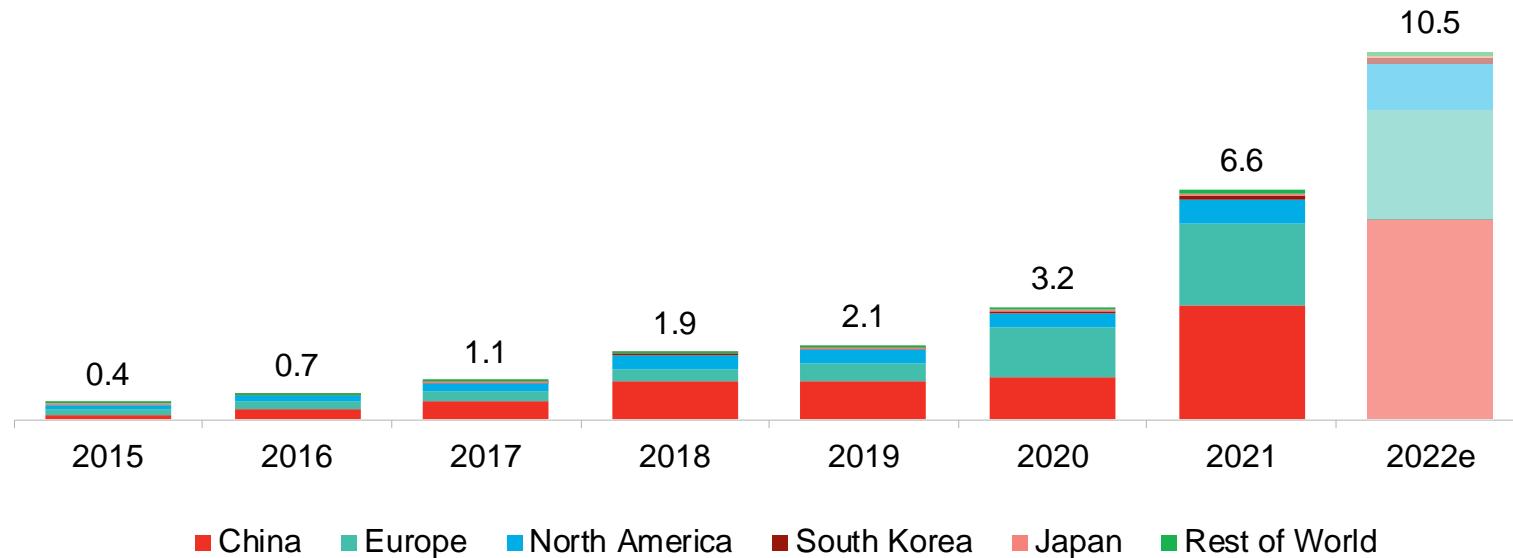


Source: BloombergNEF. All data as of end of 2021.

# 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

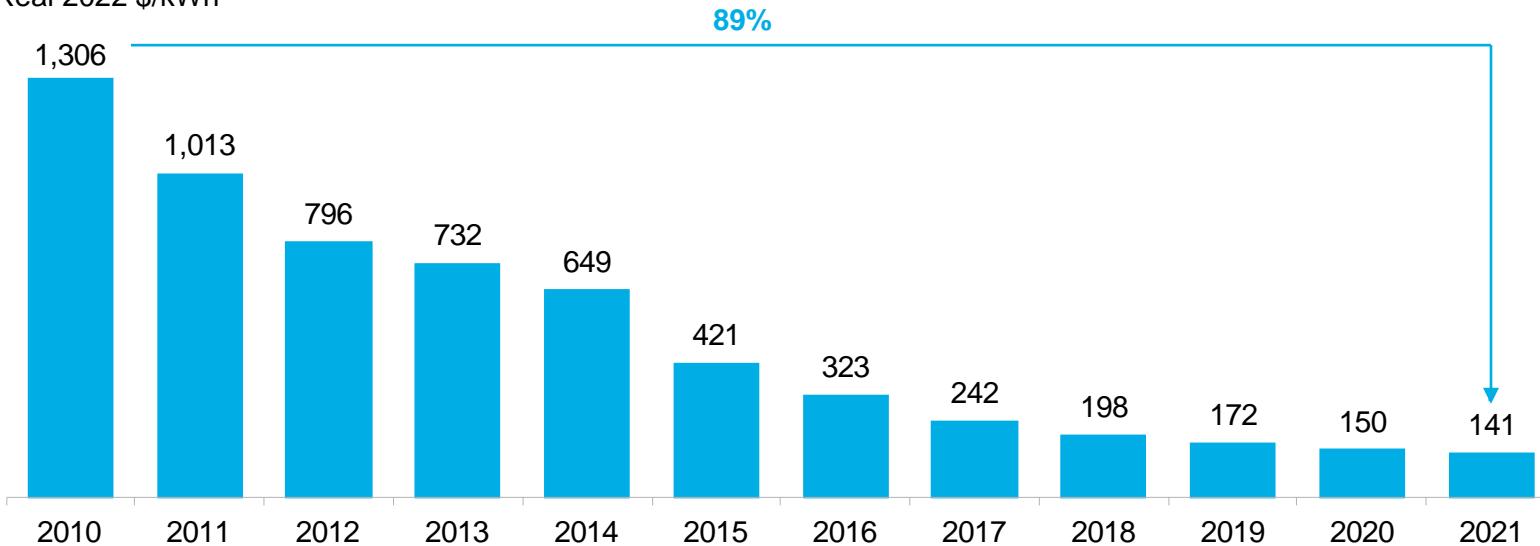


Source: Bloomberg

# Declining battery prices were key in lowering EV costs

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

Real 2022 \$/kWh

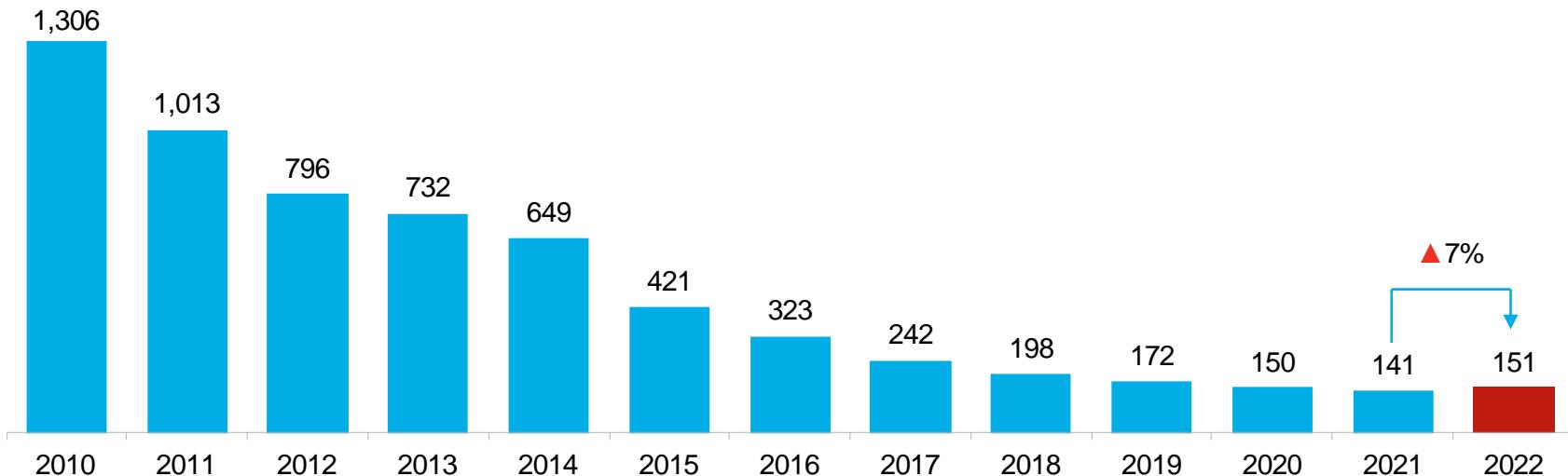


Source: BloombergNEF. Note: Historical prices have been adjusted using June 2021 to June 2022 inflation rates based on the US Consumer Price Index (CPI) index.

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

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

Real 2022 \$/kWh

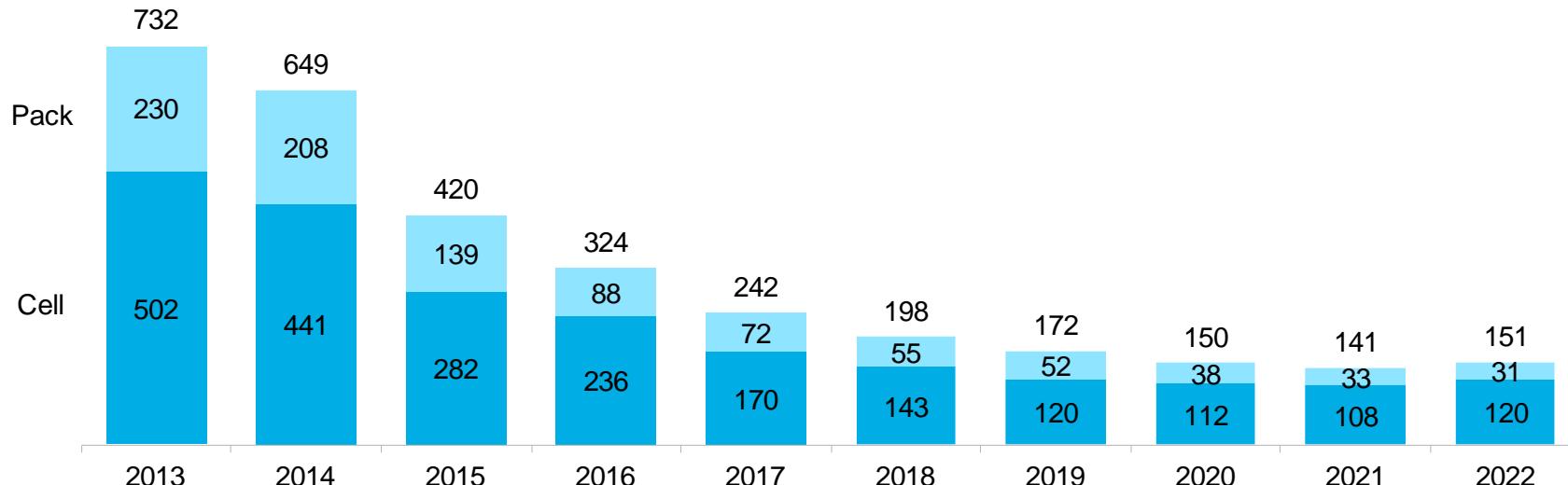


Source: BloombergNEF. Note: Historical prices have been adjusted using June 2021 to June 2022 inflation rates based on the US Consumer Price Index (CPI) index.

# 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

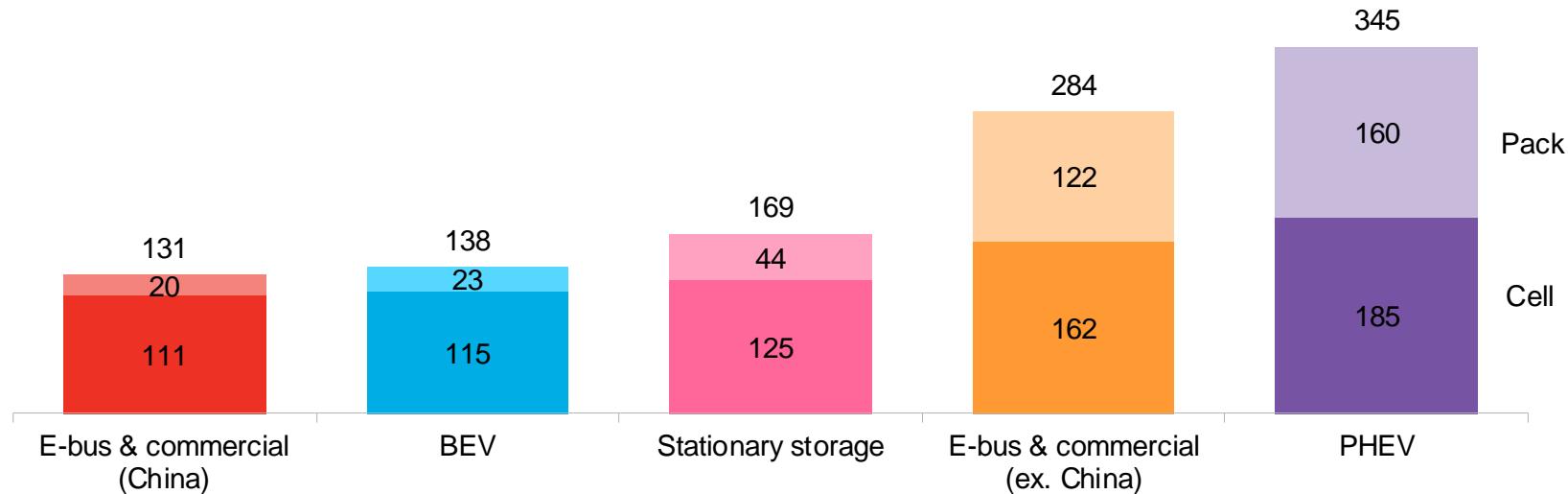


Source: BloombergNEF. Note: Historical prices have been adjusted using June 2021 to June 2022 inflation rates based on the US Consumer Price Index (CPI) index.

# 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



# Nickel



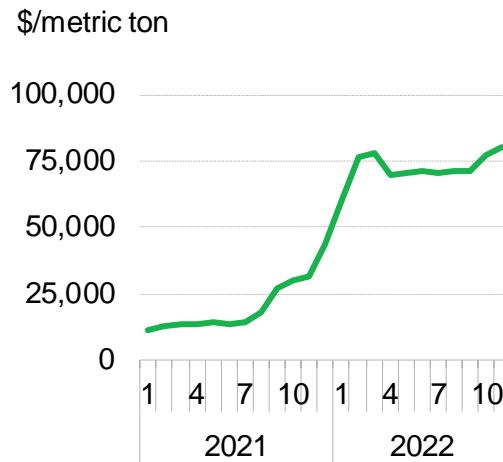
# Cobalt



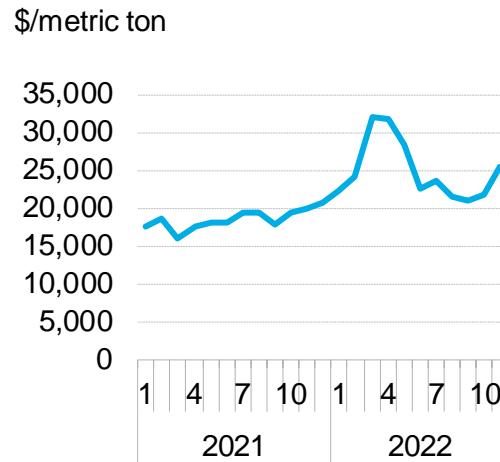
*Source: Bloomberg Mercury*

# Prices for key battery metals went up

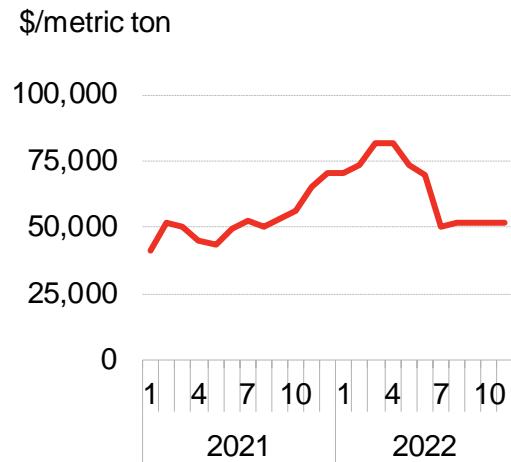
## Lithium carbonate prices



## Nickel prices



## Cobalt prices

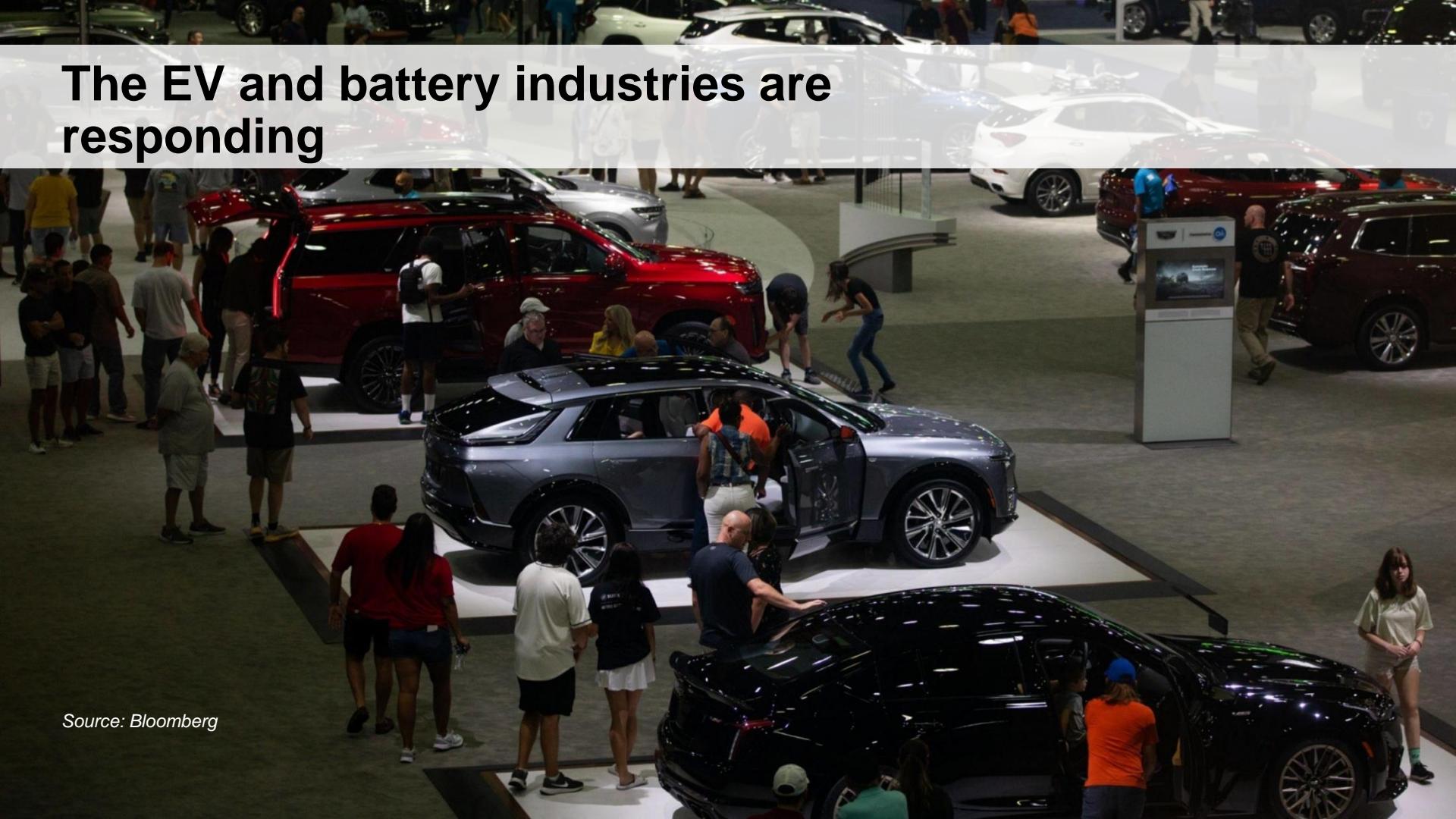


Source: BloombergNEF, Asian Metal. Note: Used China lithium carbonate 99.5% DEL and China lithium hydroxide monohydrate 56.5% DEL index.

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

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

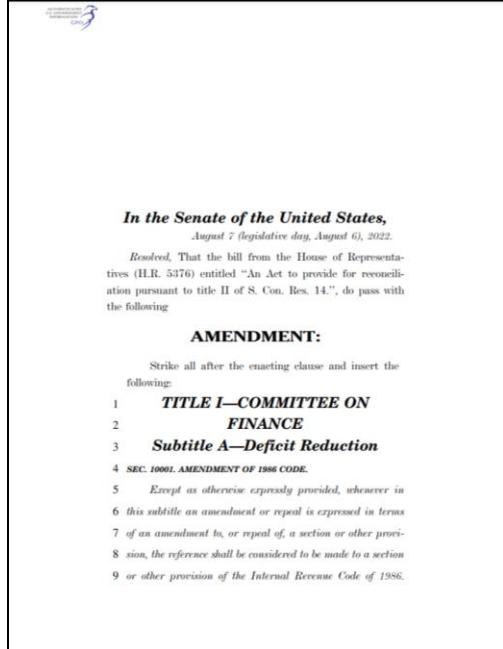
	Long-term agreement	Direct investment	Vertical integration
Battery makers	LG Energy Solution	SQM SIGMA AUSTRALIAN MINES LIMITED	QUEENSLAND PACIFIC METALS
	CATL		ALBEMARLE LITHIUM Pilbara 1st ergs GETI CMOC
	EVE		Dahu chemical HUAYOU COBALT
	Gotion	Jiangxi Gotion	Gotion Lithium carbonate production in Argentina
		GLENCORE MANAGEM Ganfeng Lithium	MANGROVE LITHIUM Lilac solutions
		LAKE iioneer RioTinto BHP Liontown VALE	
		gm	CONTROLLED THERMAL RESOURCES QUEENSLAND PACIFIC METALS POSCO CHEMICAL
	RENAULT	VULCAN ENERGY TerraFame MANAGEM	
	STELLANTIS	CONTROLLED THERMAL RESOURCES GME	VULCAN ENERGY Zero Carbon Lithium
	TESLA	ALBEMARLE GLENCORE Ganfeng Lithium Liqviv PIEDMONT CNGR 中伟 KIDMAN RESOURCES HUAYOU COBALT	Considers building lithium refinery in Texas

Source: BloombergNEF, company statements.

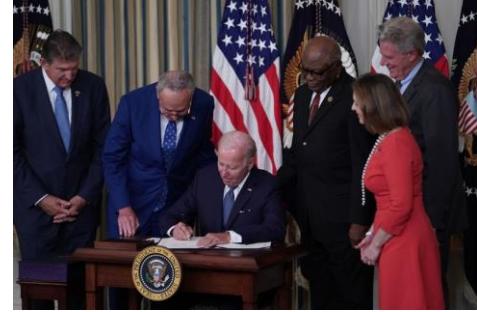
# The story in North America

EV and battery supply chains are emerging

# New US climate bill is a gamechanger



Source: BloombergNEF, Bloomberg



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Pages of energy/transport-related provisions in the bill

# Inflation Reduction Act

# 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

	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%

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

2023 > 2024 > 2025 > 2026 > 2027 > 2028 > 2029 > 2030 > 2031 > 2032



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.

# 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

2023 > 2024 > 2025 > 2026 > 2027 > 2028 > 2029 > 2030 > 2031 > 2032

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

40% 50% 60% 70% ← 80% →

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

50% ← 60% → 70% 80% 90% ← 100% →

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

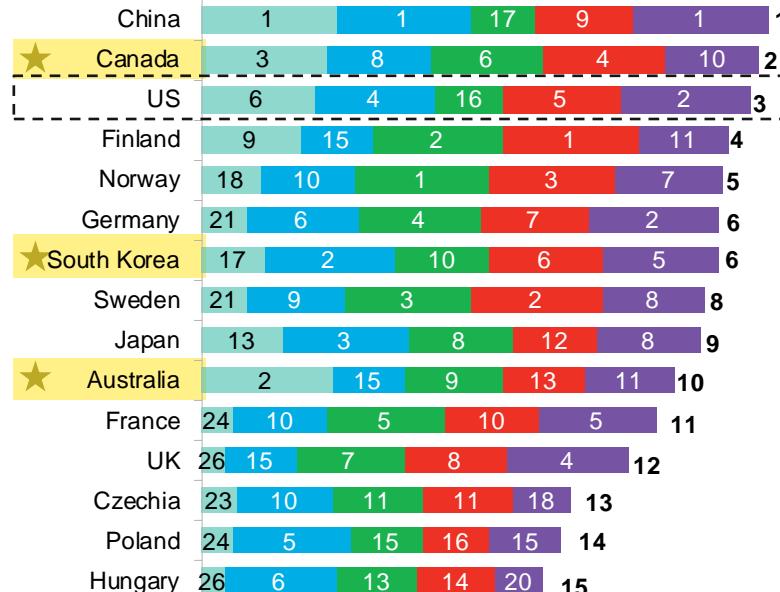
### EV tax credit

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
Battery component requirement	Recycled in:	 US	
		 Canada	
Manufactured or assembled in:		 Mexico	
Battery component requirement	Manufactured or assembled in:	 US	
		 Canada	
		 Mexico	

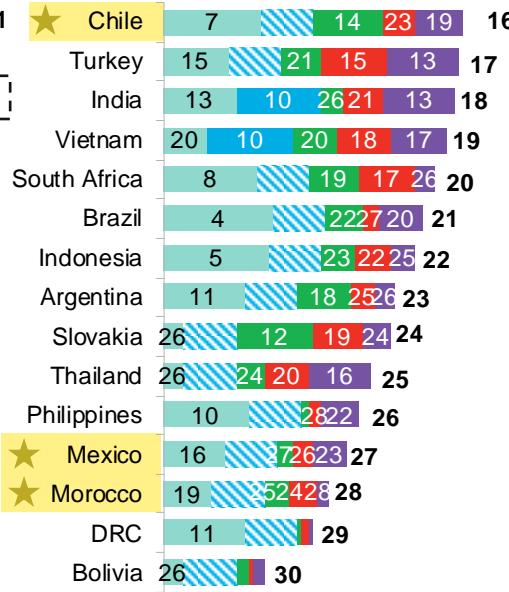
Source: BloombergNEF, state.gov. Note: \*US has free trade agreements (FTA) in force with 20 countries. \*\*Table includes selected large countries in North America region.

# Global battery supply chain rankings summary: 2022

## Top 15



## Rank 16 - 30



Raw materials



Battery manufacturing



Environment, social and governance



Industry, innovation and infrastructure

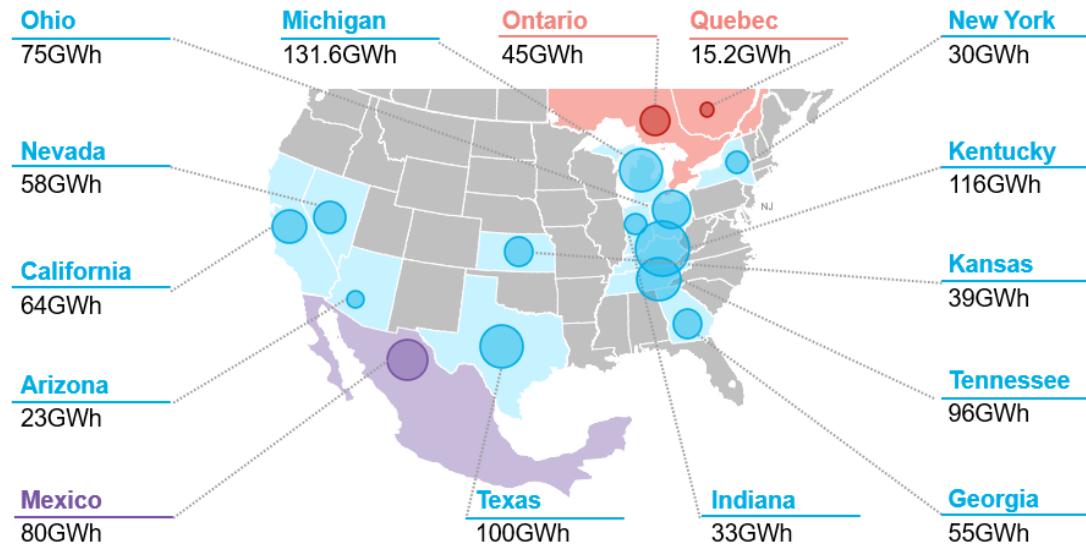


Downstream demand

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

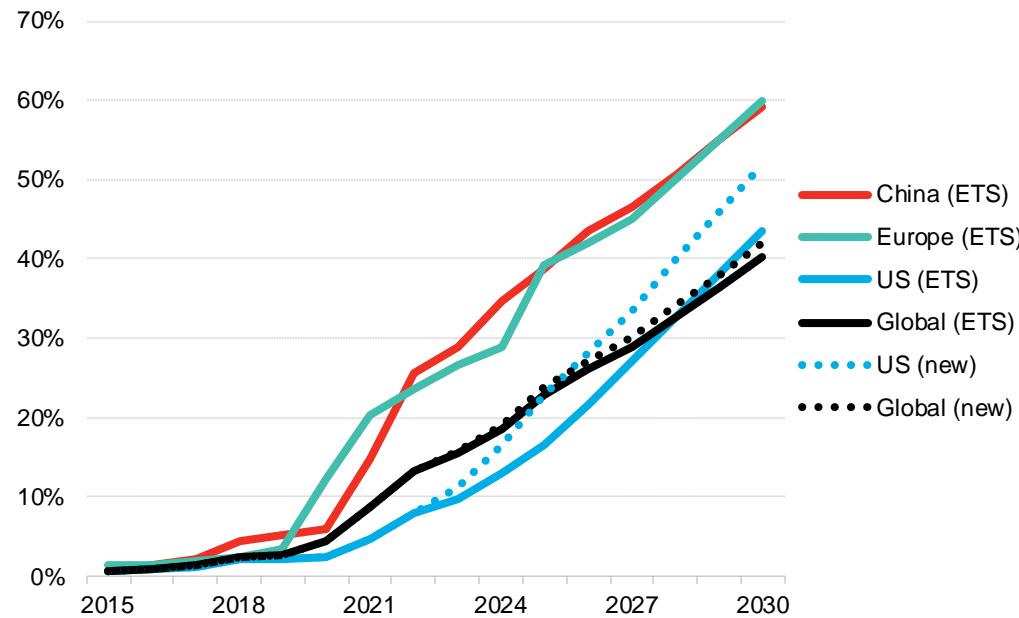
## North America's cell manufacturing activity



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

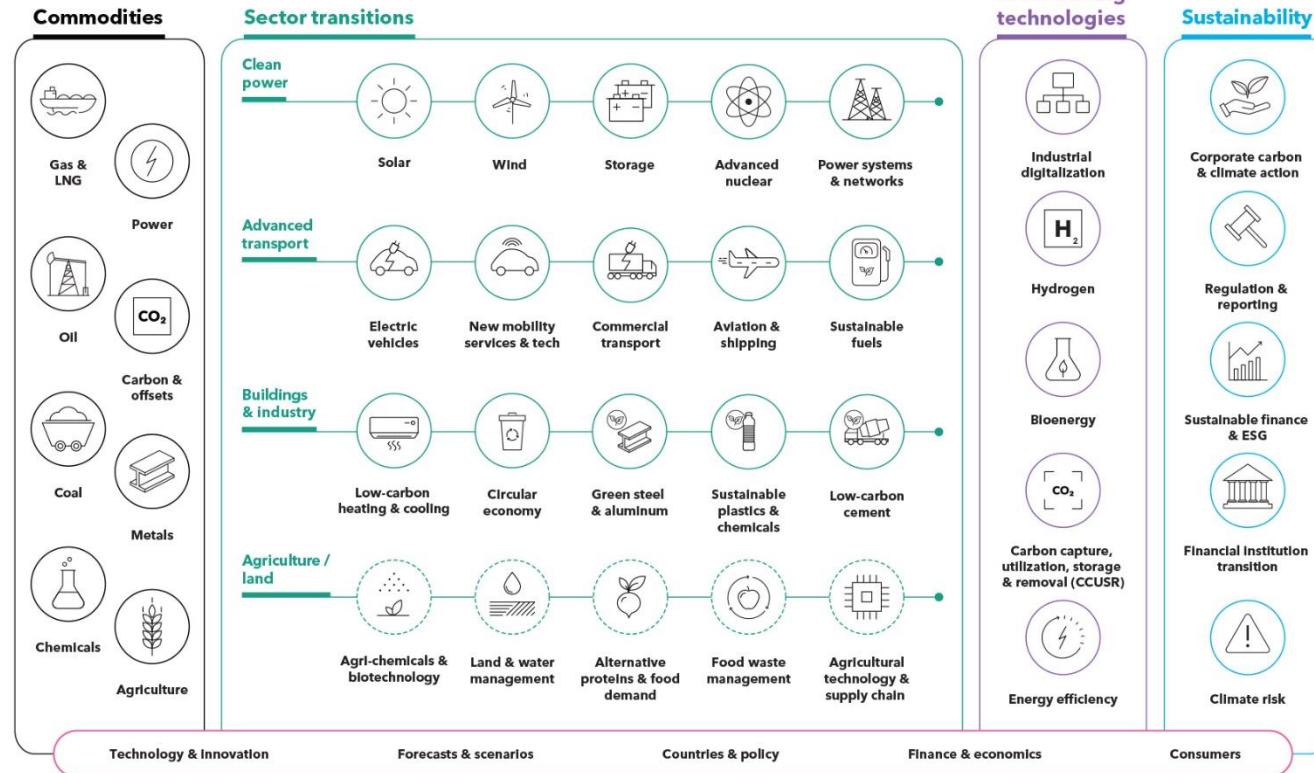
**Evelina Stoikou**

[estoikou@bloomberg.net](mailto:estoikou@bloomberg.net)

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Strategies for a cleaner, more competitive future

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Evelina Stoikou

[estoikou@bloomberg.net](mailto:estoikou@bloomberg.net)

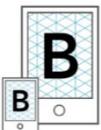
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