

INNOVATING TOWARD NET-ZERO

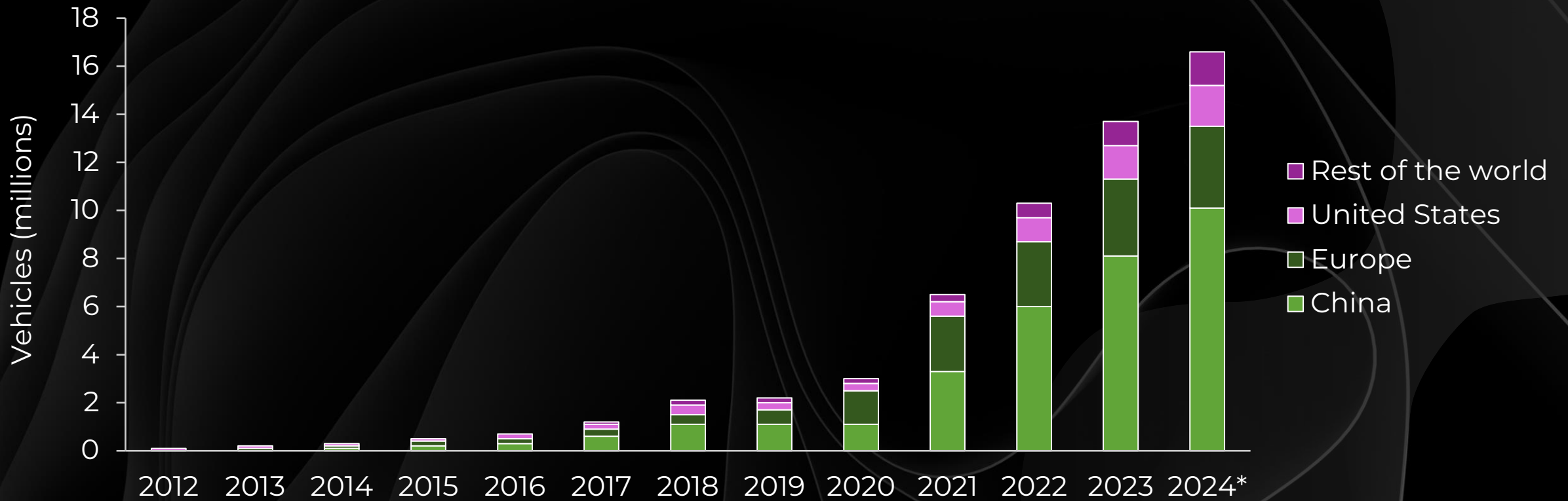
A Roadmap for Oil and Gas Companies



Christopher Robinson
Senior Director

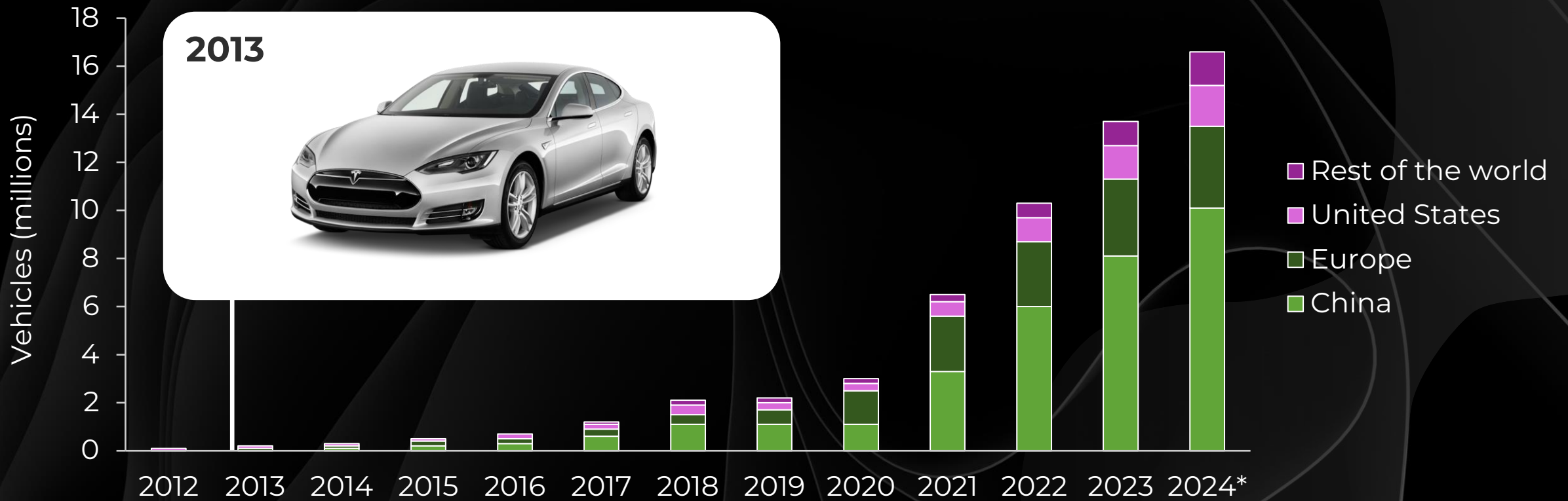
ELECTRIC VEHICLES (EVs) WERE THE RIGHT BET

Global EV Sales, IEA



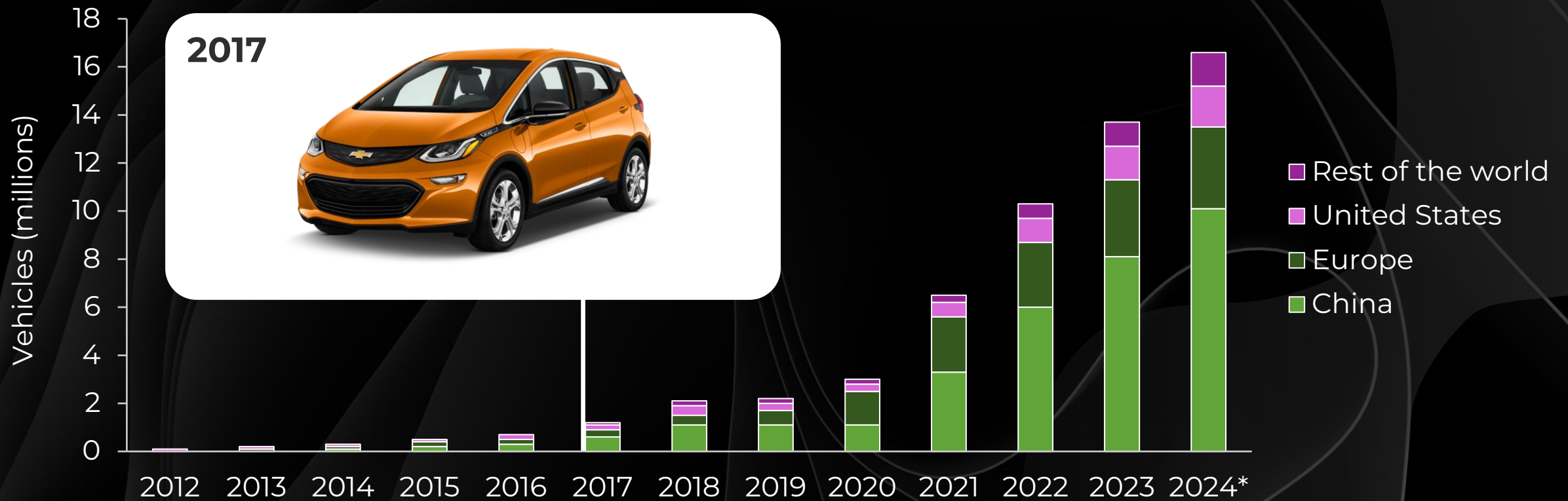
EVS WERE THE RIGHT BET

Global EV Sales, IEA



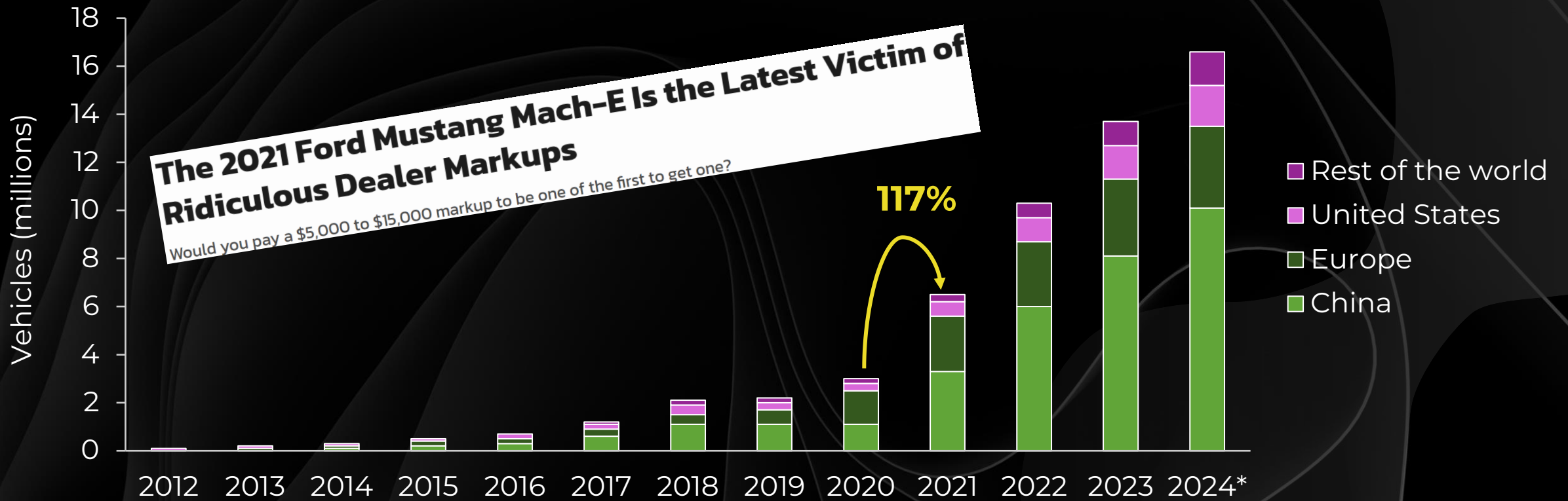
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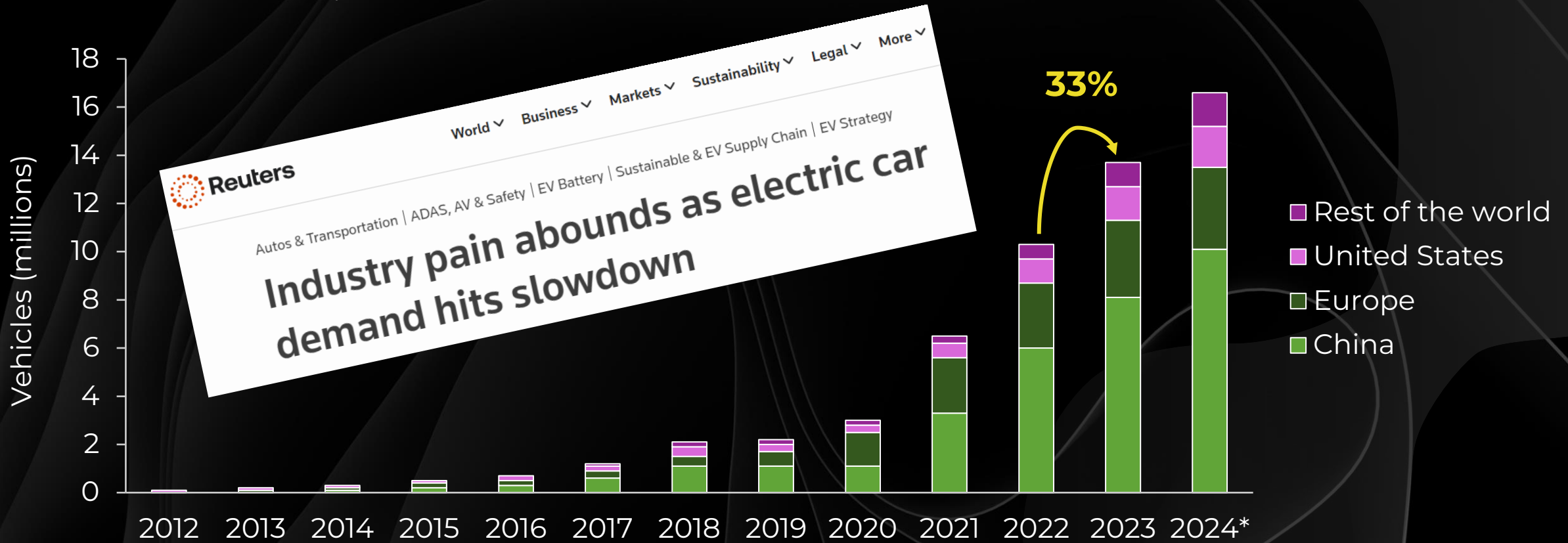
EVS WERE THE RIGHT BET

Global EV Sales, IEA



EVS WERE THE RIGHT BET

Global EV Sales, IEA



IS THE OIL AND GAS INDUSTRY STILL FOCUSED ON NET-ZERO?

LAST UPDATED: JULY 11, 2024

Shell suspends construction of biofuel plant in a massive blow to the SAF industry

LEAD ANALYST



Talia Schulman
Research Associate

[Very important](#) [Tag](#)

LAST UPDATED: FEBRUARY 20, 2024

Enerkem shuts down Canadian biorefinery in a sign of troubled times ahead

LEAD ANALYST



Runeel Daliah
Principal Analyst

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LAST UPDATED: SEPTEMBER 03, 2024

CarbonCapture pauses development of the largest DAC facility in the U.S. after failing to integrate renewable electricity

LEAD ANALYST



Mukunda Kaushik
Senior Analyst

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IS THE OIL AND GAS INDUSTRY STILL FOCUSED ON NET-ZERO?



World ▾ Business ▾ Markets ▾ Sustainability ▾ Legal ▾ More ▾

Climate & Energy | Sustainable Markets | Exploration & Production | Refining | Gas

Exxon forecasts 2050 oil demand to match today's, 25% above BP estimate



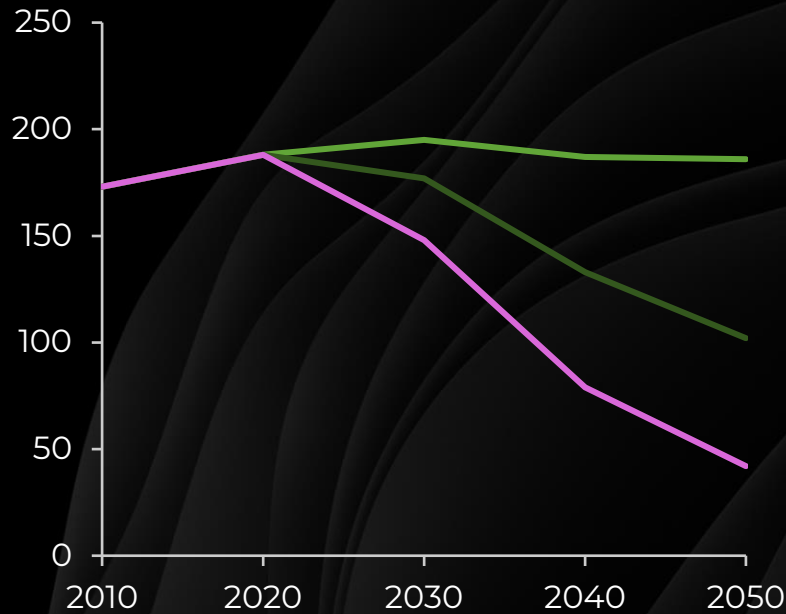
World ▾ Business ▾ Markets ▾ Sustainability ▾ Legal ▾ More ▾

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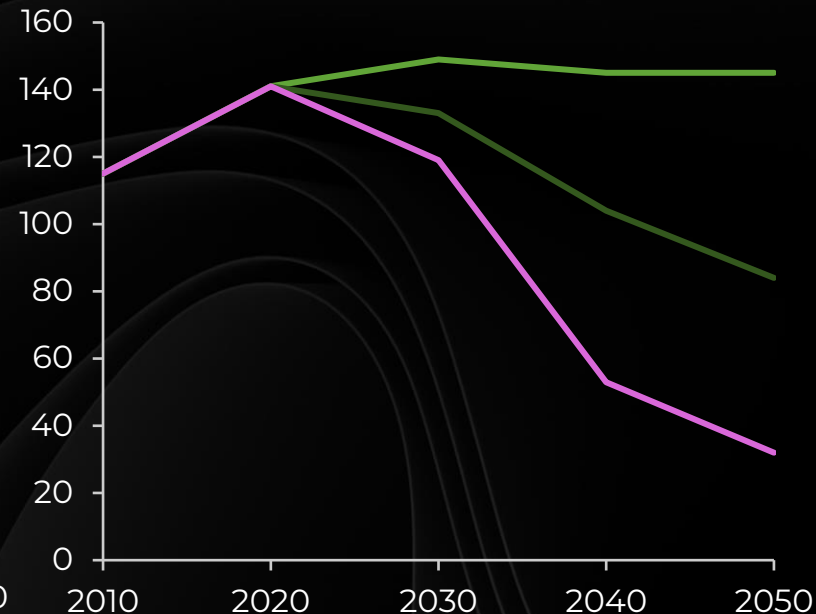
Shell weakens 2030 carbon emissions reduction target

A LONG-TERM NET-ZERO ROADMAP IS REQUIRED TODAY

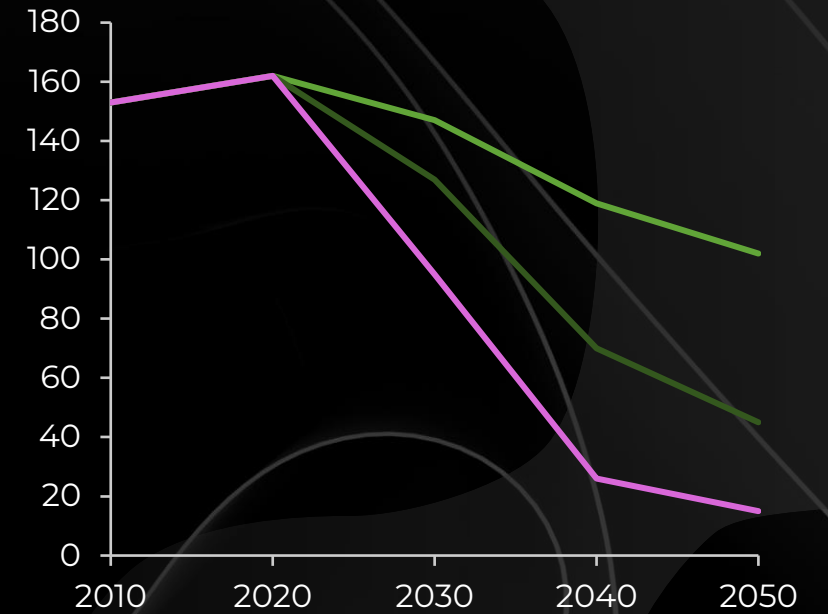
Oil



Natural gas



Coal



- Stated Policies Scenario
- Announced Pledges Scenario
- Net Zero Emissions by 2050



**THE STATUS QUO
STRATEGY**

CARRIERS:

Oil, gas



**THE NEW FUELS
STRATEGY**

CARRIERS:

Oil, gas,
biofuels,
electricity,
hydrogen



**THE CHEMICALS
STRATEGY**

CARRIERS:

Primary
and
specialty
chemicals



**THE SEQUESTRATION
STRATEGY**

CARRIERS:

CO₂



**THE POWER
STRATEGY**

CARRIERS:

Electricity



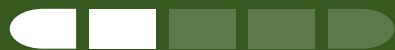
THE STATUS QUO STRATEGY

Operations don't change. It continues to focus on the extraction of hydrocarbons for both energy & chemicals.

CARRIERS:

Oil, natural gas

MARKET SIZE:



Trending:



Existing demand

There will always be a need for oil & gas



Asset maximization

Existing assets will be used to the end of their lifetime



Monopolization

Industry will grow less competitive



Peak oil (and gas?)

Market in permanent remission



Backlash

Viewed as doing "nothing"



Tech laggards

Miss out on emerging technology innovation



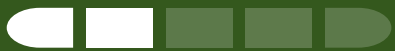
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CARRIERS:

Oil, natural gas

MARKET SIZE:



Trending:



Key Technologies

Methane detection Platform

electrification

CO₂ capture

CO₂ sequestration

Direct air capture

Direct ocean capture

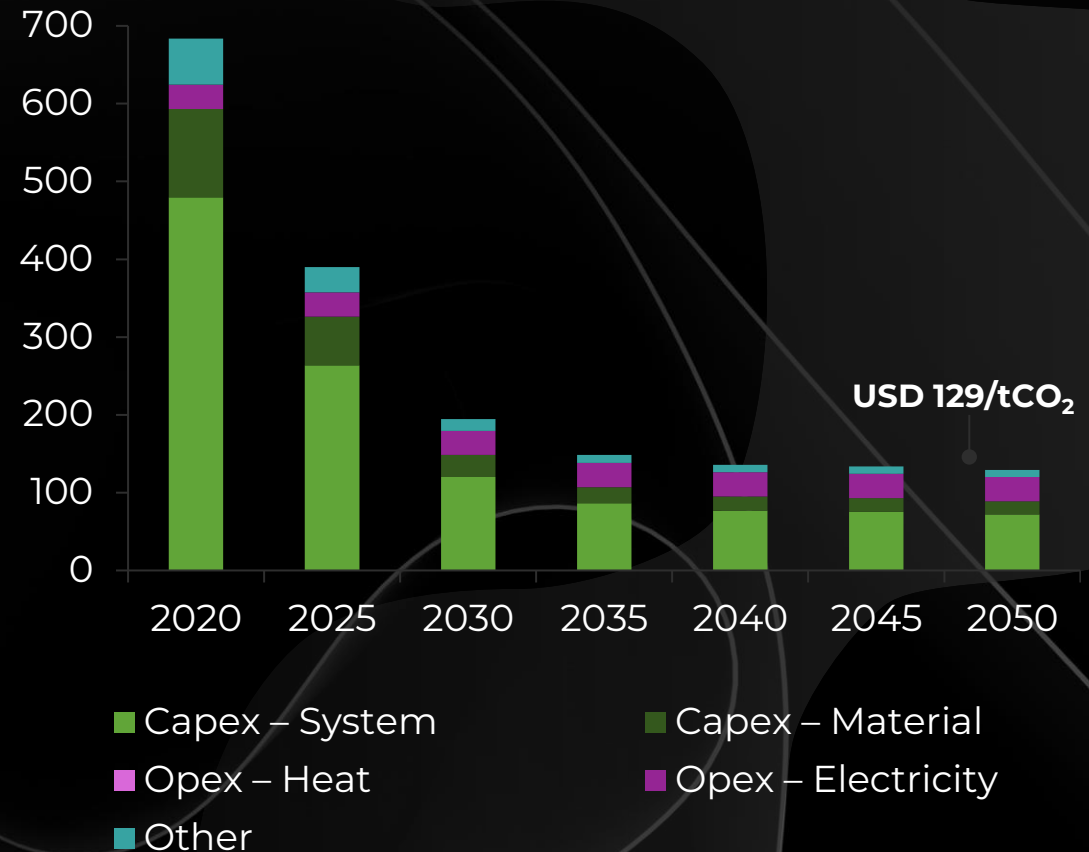
Blue hydrogen

Methane pyrolysis

Natural hydrogen

DAC Hybrid Electroswing

USD/tonne of CO₂





The New Fuels Strategy

Shifts focus to its largest market. Will invest in new energy carriers to service the mobility sector.

CARRIERS:

Oil, natural gas, electricity, biofuels, and hydrogen

MARKET SIZE:



Trending:



Largest market

Mobility has the largest demand for energy



Experience

Already involved in the mobility sector



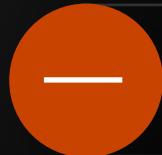
Stable demand

There will always be a need to move things and people around



Increased diversification

The carrier mix will include oil, gas, ammonia, biofuels, electricity, hydrogen, and methanol



Greater efficiency

More efficient vehicles lead to lower consumption of energy



Changing mobility habits

Car-free societies may drastically impact the mobility sector



The New Fuels Strategy

Shifts focus to its largest market. Will invest in new energy carriers to service the mobility sector.

CARRIERS:

Oil, natural gas, electricity, biofuels, and hydrogen

MARKET SIZE:



Trending:



Key Technologies

Sustainable aviation fuel

CO₂ capture

Direct air capture

Low-carbon methanol

Water electrolysis

Hydrogen dispensing

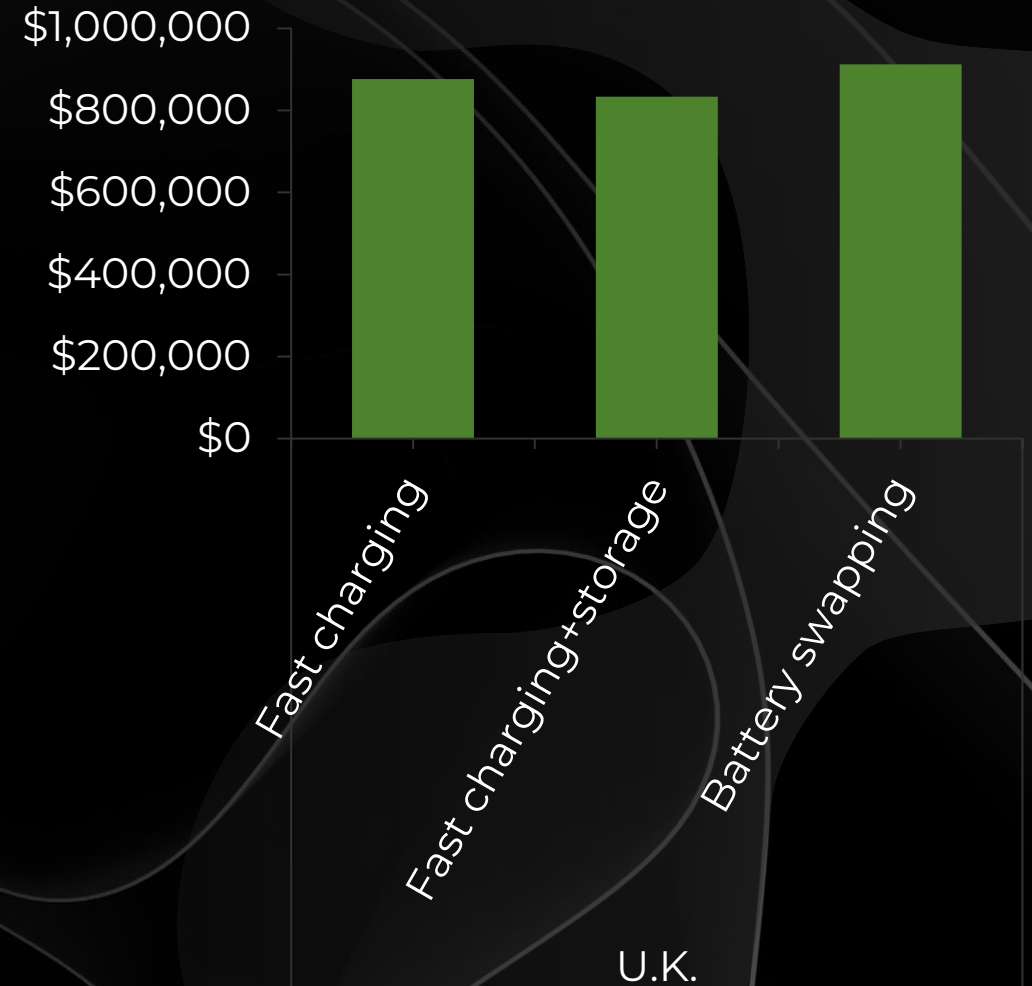
EV charging

Battery swapping

Synthetic fuels

Annual Equivalent System Costs

100-vehicle fleet, 10-year lifetime





THE CHEMICALS STRATEGY

Transforms itself into a chemicals company. Moves down the value chain to become a producer of specialty chemicals.

CARRIERS:

Primary and secondary chemicals

MARKET SIZE:



Trending:



More money

Can muscle out existing chemicals companies



Acquisition

Can acquire chemicals companies to kick-start transition



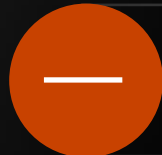
Control of supply chain

Can produce and refine own feedstock into specialty chemicals



Control of supply chain

Demand for chemicals is much lower than for energy products



Stagnant growth

Demand growth expected to be in single digits



More regulatory pressure

Exposed to broader regulations targeting environmental and human health impacts



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MARKET SIZE:

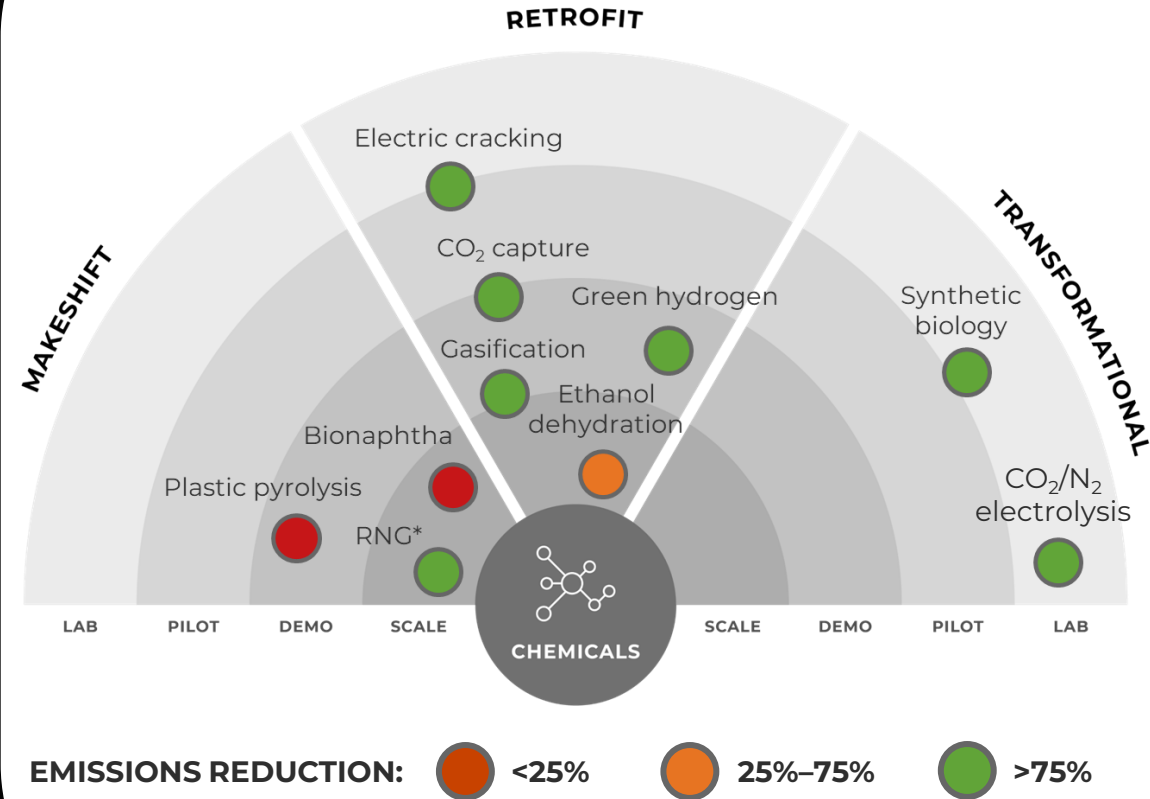


Trending:

Key Technologies

Plastic recycling
Biomass gasification
Electric crackers
CO₂ capture
CO₂ electrolysis
Cellulosic sugars
Biobased chemicals
Synthetic biology
Pyrolysis

Lux's Decarbonization Radar: Chemicals





THE SEQUESTRATION STRATEGY

Transforms itself into a carbon removal company. Will capture, transport, and sequester CO₂ from any source.

CARRIERS:

CO₂

MARKET SIZE:



Trending:



Existing expertise

Can leverage expertise in offshore operations



Asset retrofit

Can repurpose existing gas fields for sequestration



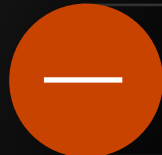
Customer-base expansion

Can work in previously untapped markets



Geographic constraints

Can target only localized markets



Societal backlash

Viewed as extending use of fossil assets



Tech laggards

Miss out on emerging-technology innovation



THE SEQUESTRATION STRATEGY

Transforms itself into a carbon-removal company. Will capture, transport, and sequester CO₂ from any source.

CARRIERS:

CO₂

MARKET SIZE:



Trending:



Key Technologies

CO₂ capture

Direct air capture

CO₂ leakage

monitoring

CO₂ liquefaction

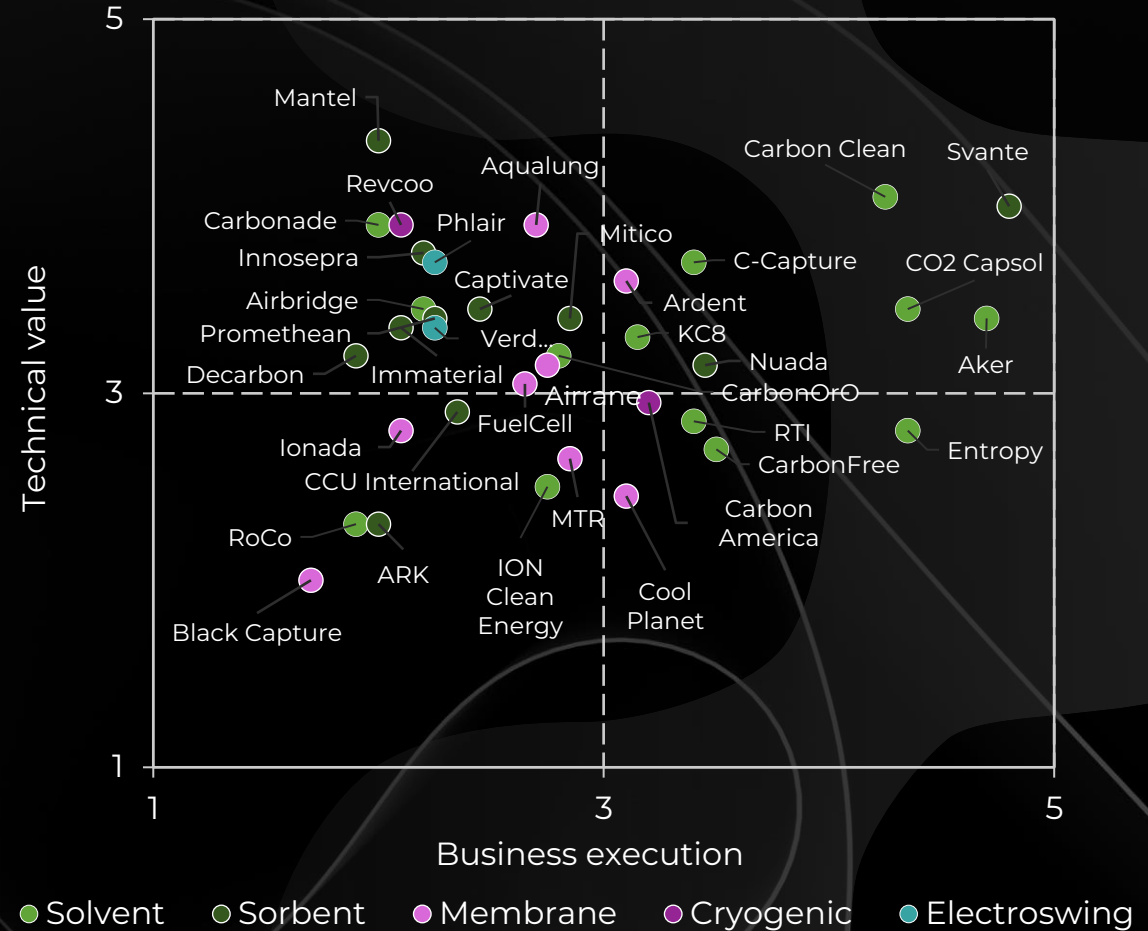
CO₂ pipelines

CO₂ to building

materials

Direct ocean capture

Lux Innovation Grid: Carbon Capture





THE POWER STRATEGY

Transforms itself into a utility. Will focus entirely on generating and distributing renewable electricity to the energy market.

CARRIERS:
Electricity

MARKET SIZE:



Trending:



Largest carrier

Electricity is the new oil



Acquisitions

Can acquire utility companies to kick-start transition



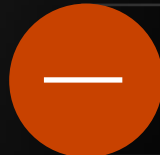
R&D capabilities

Can outmaneuver existing utilities through superior R&D prowess



Decommissioning

Total phase-out of fossil assets



Investor backlash

Radical transformation may spook investors



Reduced revenue

Selling electricity generates less money than oil and gas



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Electricity

MARKET SIZE:

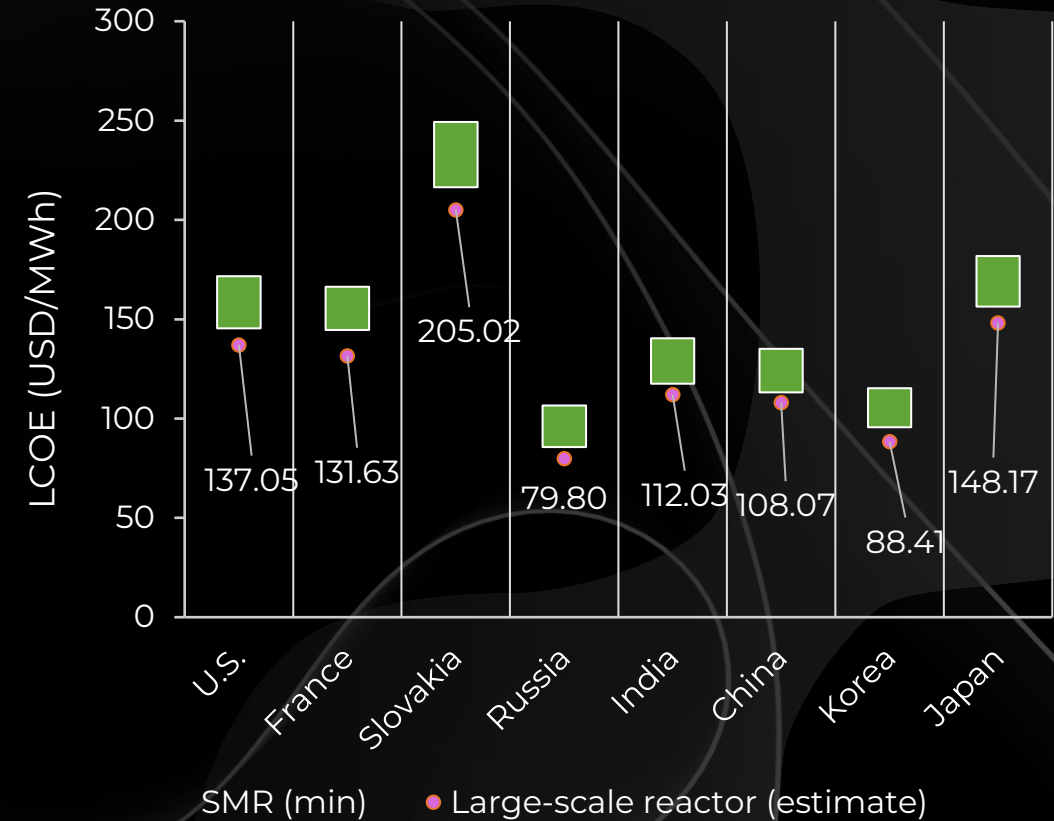


Trending:

Key Technologies

- Novel wind and solar
- Long-duration energy storage
- Novel combustion and fuels
- Li-ion batteries
- Microgrids
- Nuclear SMR**
- Novel geothermal power
- High-voltage direct current

LCOE Range of SMRs Across Various Countries





THE STATUS QUO STRATEGY



THE NEW FUELS STRATEGY



THE CHEMICALS STRATEGY



THE SEQUESTRATION STRATEGY



THE POWER STRATEGY

1. Assess your core expertise.
2. Reevaluate your geographical footprint.
3. Identify technologies aligned to your strategy and communicate your strategy.

KEY TAKEAWAYS

1

Net-zero targets are still relevant.

Keep a long-term vision and adjust tactics within that strategy to respond to short-term pressures.

2

Avoid the hype and pick winning technologies.

Cost models and decarbonization radars can work in tandem to prioritize your efforts on winning technologies.

3

Leverage academia and innovation clusters.

In a time when capital spending is attracting scrutiny, leverage relationships with accelerators, incubators, and academics for long-term opportunities.



THANK YOU



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