

Capital Markets Strategy

Essential inCights for the C-Suite

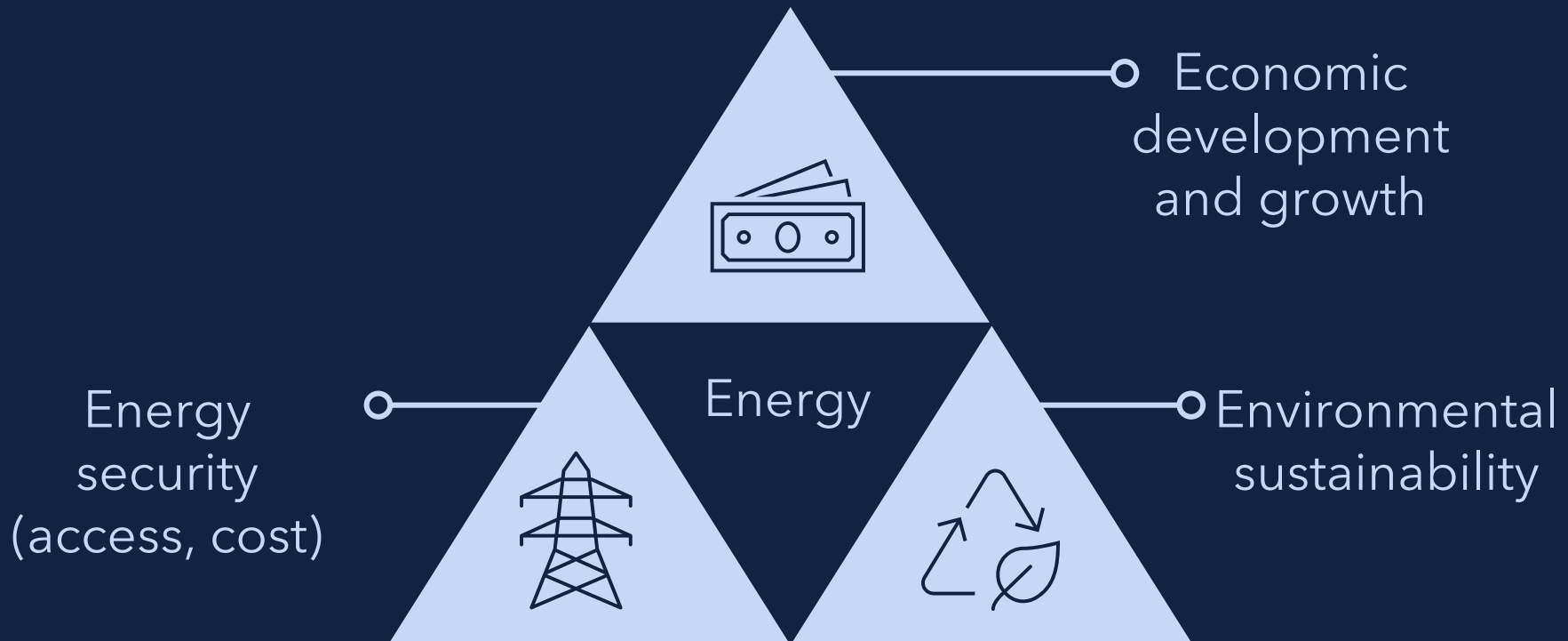


ESG in a Time of Energy (In)Security

SEP 2022

ESG's Balancing Act

The energy triangle describes the balancing act between supporting inclusive economic development and growth, providing secure and reliable access to energy, and promoting environmental sustainability. The Russian invasion of Ukraine has exacerbated supply constraints in global hydrocarbon markets and forced economies globally to focus on energy security over sustainability in the near term.



Source: World Economic Forum. Energy Transition Index.



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1 Energy (In)Security



Summary Conclusions

- 1 **European energy crisis:** A “perfect storm” of converging events has triggered an energy crisis across Europe: unusually cold and long winter 2020-2021; the pivot away from coal power; the pandemic recovery induced energy demand surge; the war in Ukraine and subsequent “weaponization” of energy policy; unusual weather patterns causing low wind speeds; emergency nuclear powerplant repairs; and crippling droughts.

- 2 **Natural gas at epicenter of geopolitical escalation:** The Ukraine crisis has become a geo-economic war between Russia and the West, with natural gas markets as the primary contagion channel going into year-end.

- 3 **Electricity prices surge on higher natural gas:** Natural gas prices, as a primary input for the electricity grid, are the marginal driver of electricity prices across the US and Europe. LNG substitution for pipeline gas limited by technology, costs, transportation and terminal capacity.

- 4 **Industry most exposed to rising energy costs:** Governments in the EU and UK are enacting numerous policies to support households and consumers and limit the damaging effects of rising energy prices. While corporate aid packages are being considered, industry is generally more exposed than consumers.

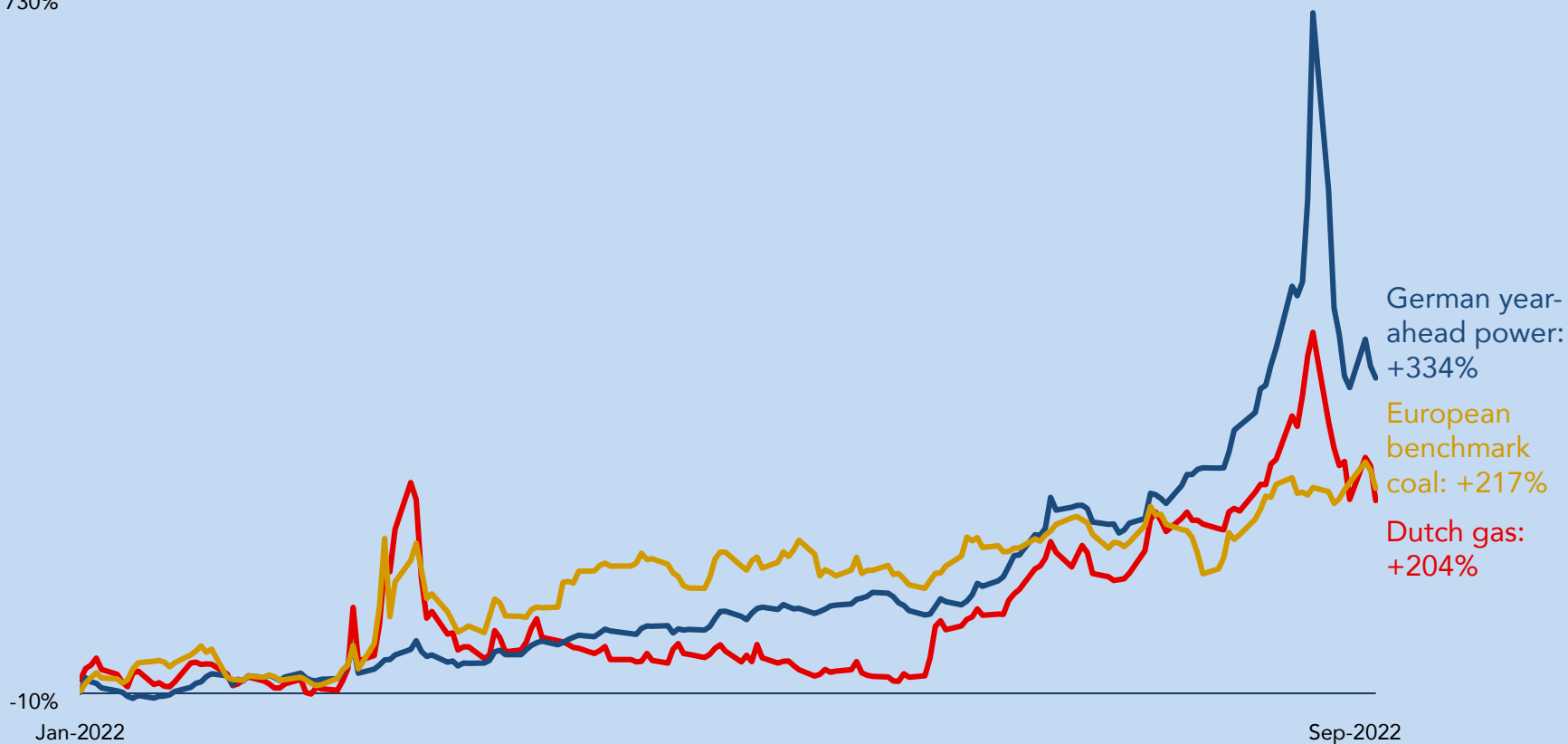
- 5 **Global contagion risk:** While Europe is the most exposed to energy insecurity, the market and economic challenges will increasingly spread to other regions globally with energy-import-intensive economics and currencies most exposed.

Europe's Historic Energy Crisis

As Europe grapples with the geopolitical fallout of the Russia-Ukraine crisis, necessary nuclear power plant repairs in France, and crippling droughts limiting hydropower in Germany, wholesale energy prices have surged 10x above their seasonal average over the past five years.

European energy prices, 2022 YTD

730%



Source: (1) Bloomberg. Data as of September 7, 2022. European benchmark coal is ICE Futures Rotterdam Coal. German year-ahead power is Phelix Baseload for all delivery days in the delivery year. Dutch gas is TTF.

Key Drivers of the Energy Crisis



Structural under-investment in fossil fuels; pivot from coal & nuclear



War in Ukraine, Western sanctions and Russia sanctions retaliation



Emergency nuclear power plant repairs



Colder winter 2020 - 2021; depleted natural gas inventories



Demand surge from pandemic recovery and record high temperatures

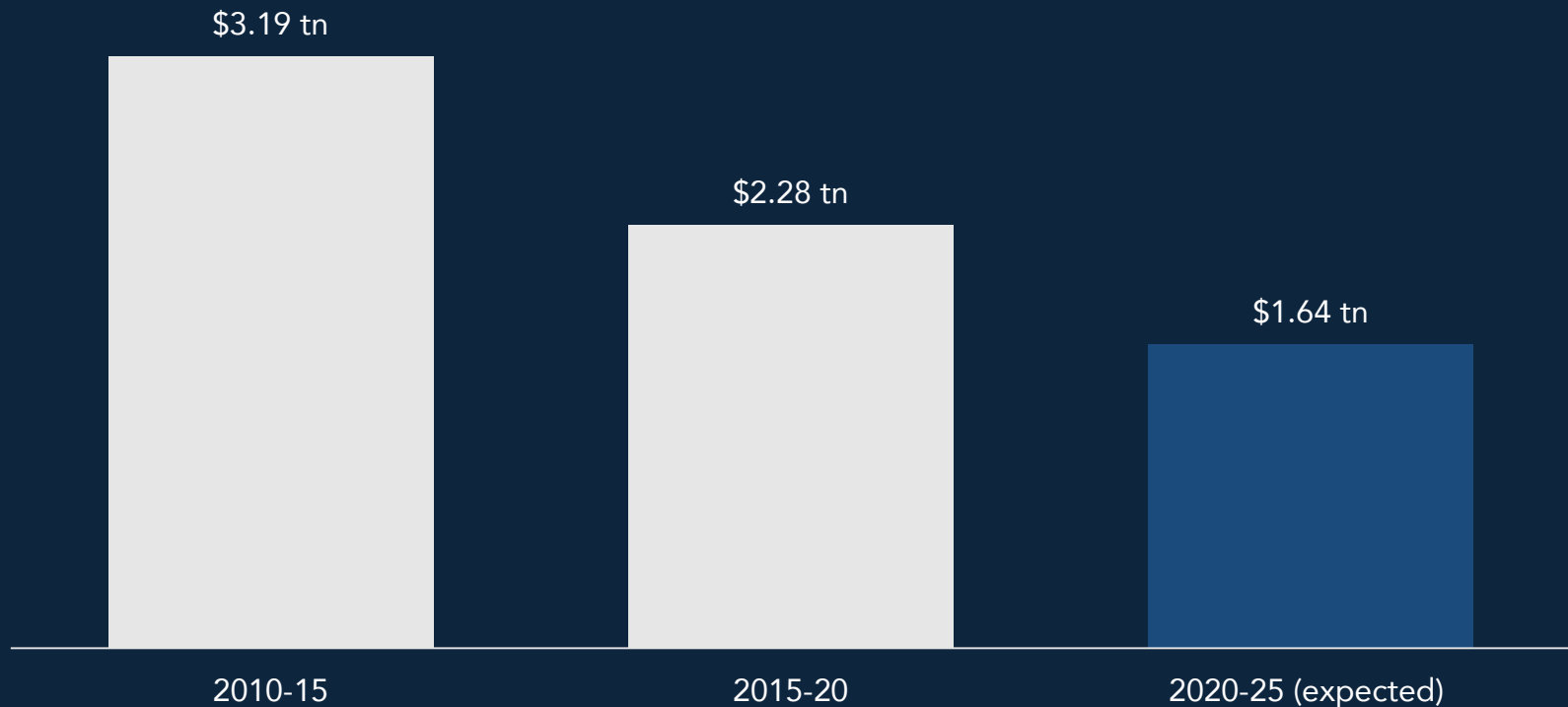


Unusual weather causing low wind speeds & droughts

Structural Under Investment in the “Old Economy”

As companies and policymakers globally moved rapidly toward energy transition, years of structural underinvestment in the capital intensive oil, gas and coal sectors soon followed due to a myriad of factors including: regulatory policy, ESG's acceleration, rising inflation within the sector, labor shortages, bank lending requirements and investor demands to return cash via buybacks and dividends. This, in turn, has contributed to Europe's energy crisis near term, and has initiated a multi-year commodities super cycle longer term.

Oil & gas exploration and development investment expected to decline >50%



Source: (1) WSJ, “Energy Prices May Keep Inflation High for Years” (July 30, 2022). IEA. BlackRock Investment Institute. Wood Mackenzie.

Russia "Weaponizing" Energy Policy

The Ukraine crisis has become a geo-economic war between Russia and the West, with natural gas markets as the primary contagion channel going into year-end

Main pipelines from Russia to Europe

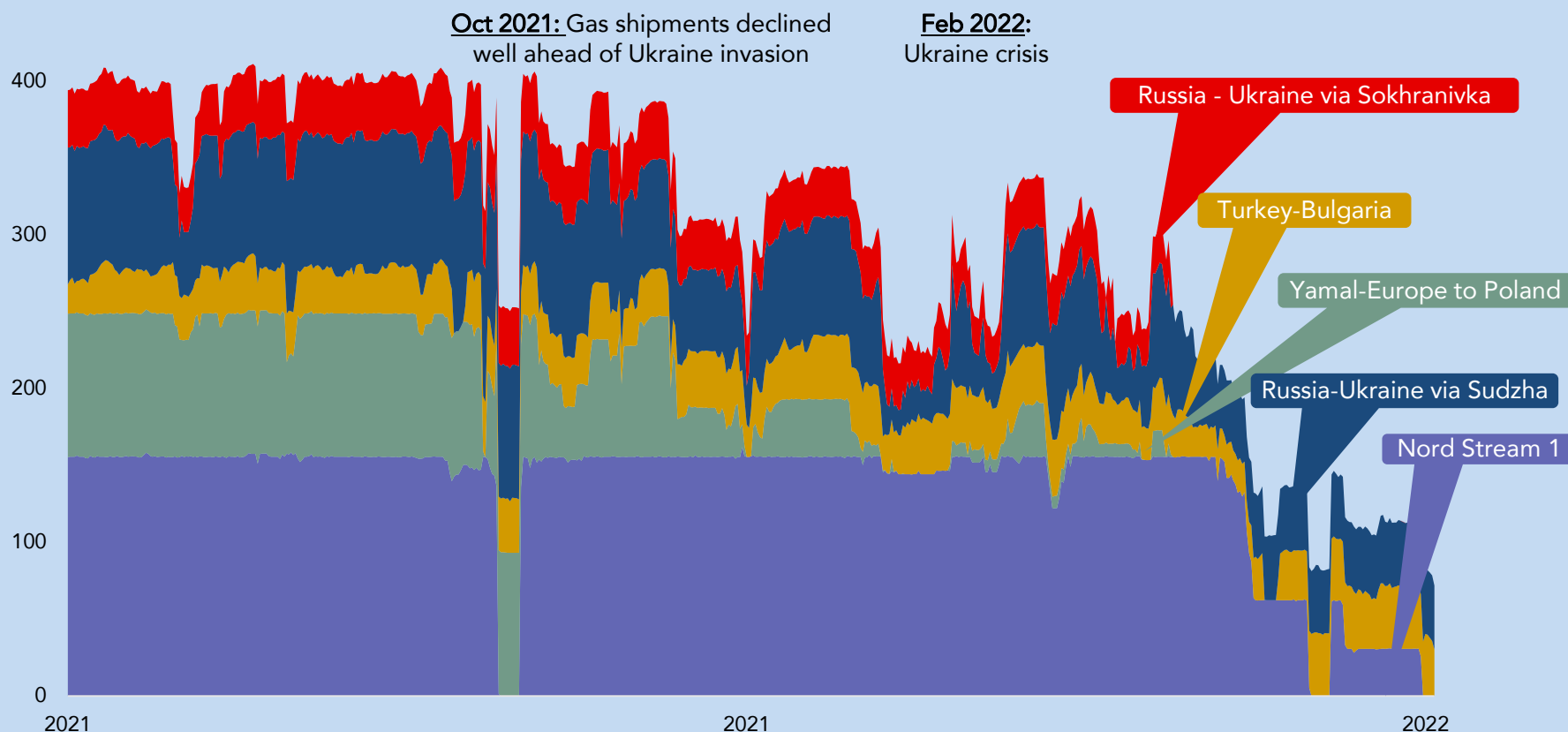


Source: (1) Oxford Economics, "Russia: Each Side Could Gain From Easing of Gas War" (August 16, 2022). European Network of Transmission System Operators for Gas. BBC.

Breaking Down the Russia Pipeline Gas Shutoff

Over the last 6 months, Germany has decertified NS2, while Russia has recently shut down gas flows through NS1. In aggregate, Russian gas exports to the EU via NS1 and the pipelines through Ukraine and Belarus are down over 90% y/y. Russia's gas exports via NS1 are unlikely to resume soon.

Russia piped natural gas supply to Europe (MCM/D)



Source: (1) Oxford Economics. Bloomberg. MUFG Commodities Weekly, "Russia Indefinitely Suspends Nord Stream Gas Pipeline Flows into Europe" (Ehsan Khoman). Data as of September 7, 2022.

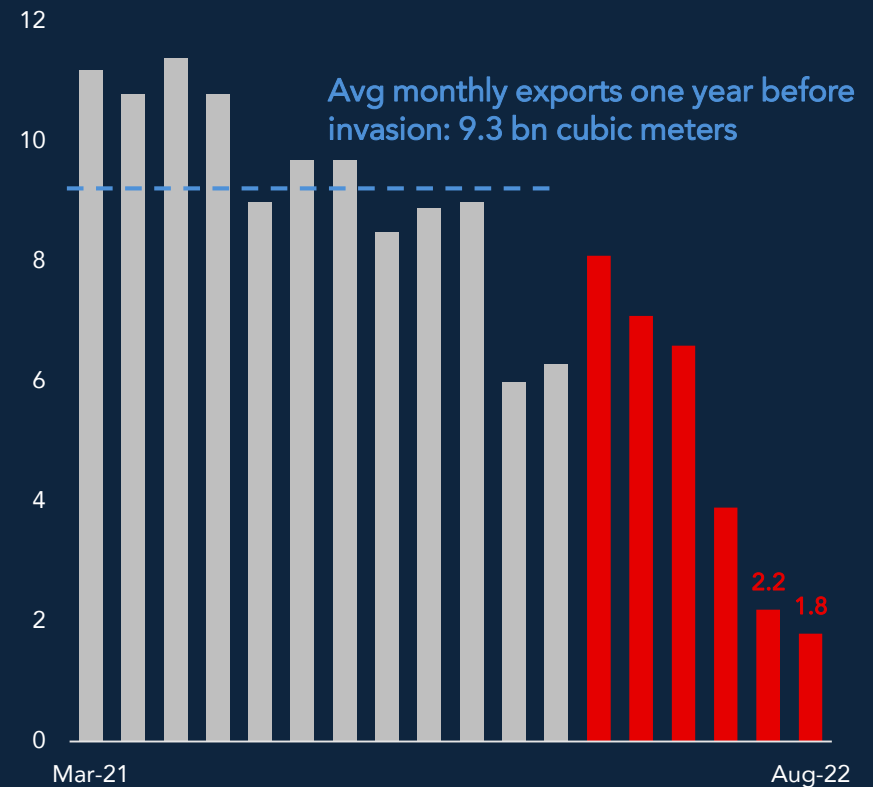
Russian Gas Exports to EU Declining

As the Russia-Ukraine crisis and related sanctions evolve, President Putin has sought to break European unity and public opinion. The recent shutdown of NS1 began with tapered flows months earlier as Putin aimed to slow Europe's accelerating gas storage efforts in advance of winter. By comparison to natural gas, oil is a much more global and mobile market by virtue of its global infrastructure (storage, transportation) and physical properties (conversion not required).

Key Takeaways:

- 1 European Russian gas dependency nearly 40% (pre-war)
- 2 EU sanctioning 2/3 phase out of Russian gas by YE 2022, 100% by YE 2030
- 3 European gas demand down > 20%
- 4 Russian pipeline exports down > 90%
- 5 More EU gov support for consumer than industry

Russian pipeline gas exports to the EU, bn cubic meters



Source: (1) Oxford Economics, "Russia: Each Side Could Gain From Easing of Gas War" (August 16, 2022). ENTSOG. Data updated as of September 8, 2022.

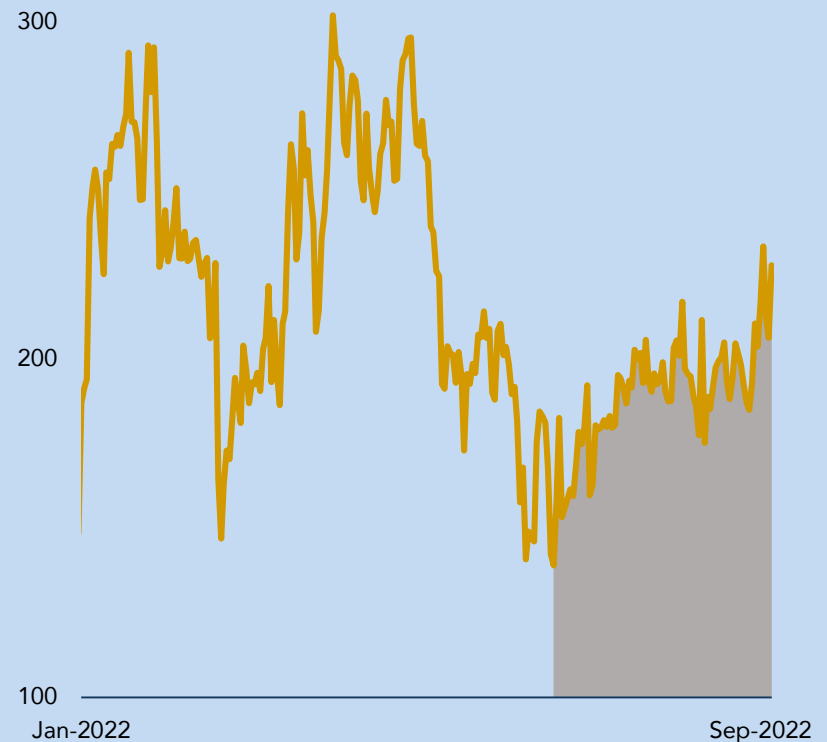
LNG Demand & Bottlenecks

In an effort to reduce Russian gas dependencies, MUFG's Ehsan Khoman notes the EU has increased LNG imports by 51% y/y. With LNG prices rising 5x by mid-2022, the endeavor has been costly. As prices soar, the largest LNG exporters in the world (US, Australia, Qatar, SE Asia) are increasingly shifting exports to the region, though bottlenecks remain on the ability to scale the effort given limited global supply, shipping and port facility bottlenecks.

Key Takeaways:

- 1 EU LNG imports up > 50%
- 2 Global supply limitations (US, Qatar, Australia, SE Asia)
- 3 Limited supply flexibility (technology, costs, transportation, terminal capacity)
- 4 Global demand competition (China more likely to look to coal than LNG at high prices)
- 5 Elevated LNG prices globally

LNG flows to northwest Europe, MCM / d



Source: (1) Bloomberg. Data as of September 7, 2022.

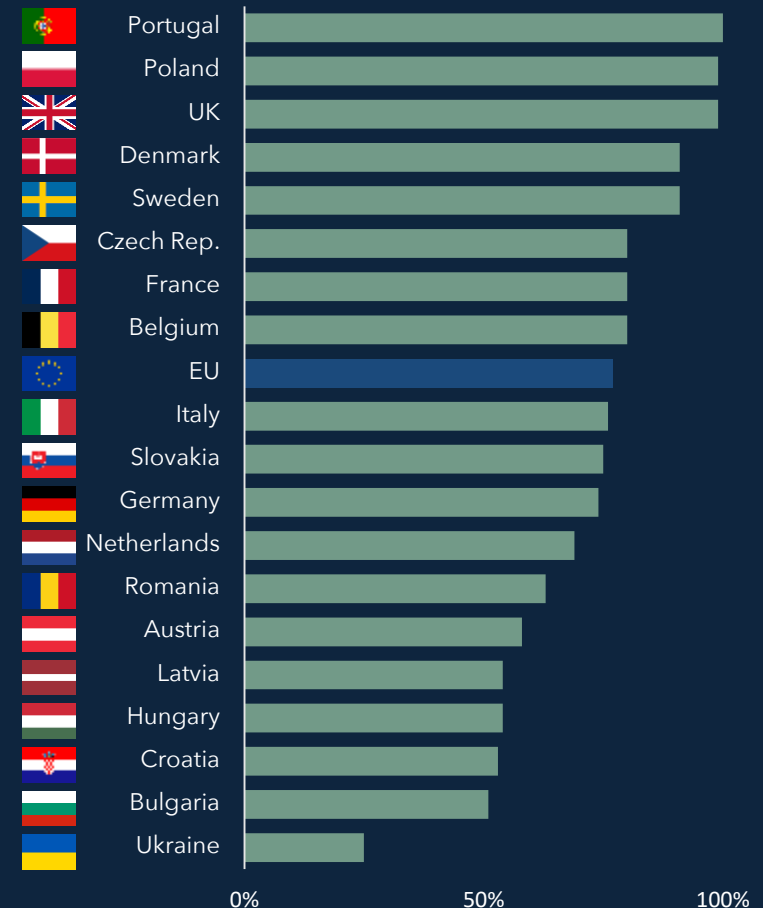
European Gas Storage Varies Widely

Even if Europe meets its 90% storage capacity targets by October, estimates vary widely on the length of time storage can meet European demand (i.e., 3-6 months). Winter temperatures will be a key variable in this regard.

Key Takeaways:

- 1 EU storage capacity nearing 80% (wide variance by country)
- 2 90% storage capacity achievable by end of October
- 3 Winter temperatures a critical variable
- 4 Alternative supply not sufficient in cold temp scenarios
- 5 Demand destruction needed to rebalance markets (already underway)

European gas storage levels (% of capacity)



Source: (1) MUFG Global Markets Research, Ehsan Khoman "Europe's Coming Winter Gastastrophe". Bloomberg, European Commission, Eurostat.

"Real" Electricity Prices Surging

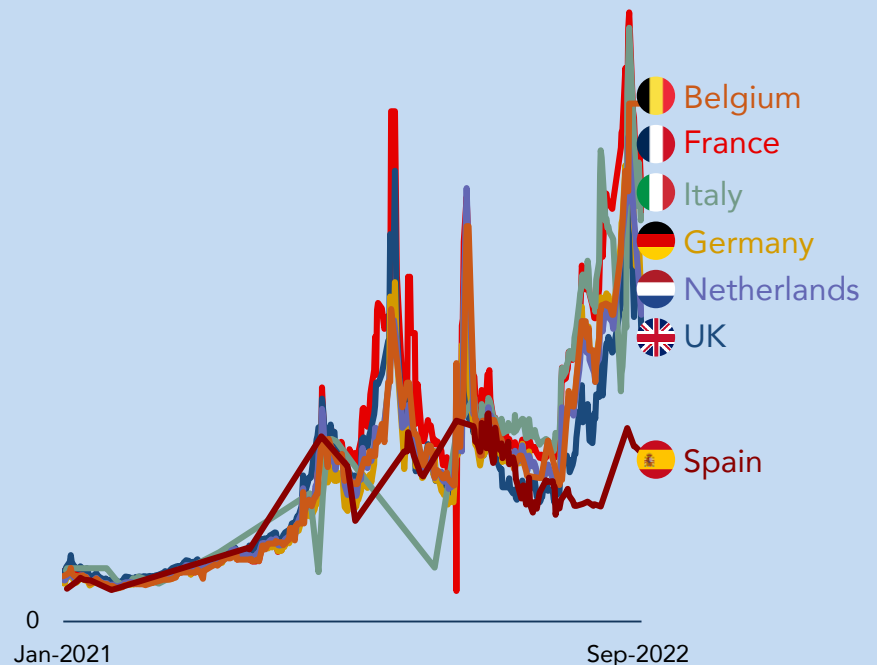
Natural gas prices, as a primary input for the electricity grid, are the marginal driver of electricity prices across the US and Europe. MUFG's Ehsan Khoman notes that a notably cold 2020-21 winter in Europe, combined with unusually low wind speeds, also contributed to a tripling in European electricity prices in 2H 2021. France, traditionally Europe's largest electricity exporter, has been importing electricity amidst higher prices and its aging nuclear infrastructure.

Key Takeaways:

- 1 Higher natural gas prices marginal driver of electricity
- 2 Cold 2020-21 winter
- 3 Unusually low wind speeds
- 4 France's aging nuclear infrastructure under-producing
- 5 Limited LNG supply flexibility

European electricity prices, 1m forward (EUR / MWh)

900



Source: (1) Bloomberg. Data as of September 7, 2022. Energy prices are base load electricity prices for major European countries, 1 month forward. MUFG Global Markets Research, Ehsan Khoman "Europe's Coming Winter Gastastrophe". Bloomberg, European Commission, Eurostat.

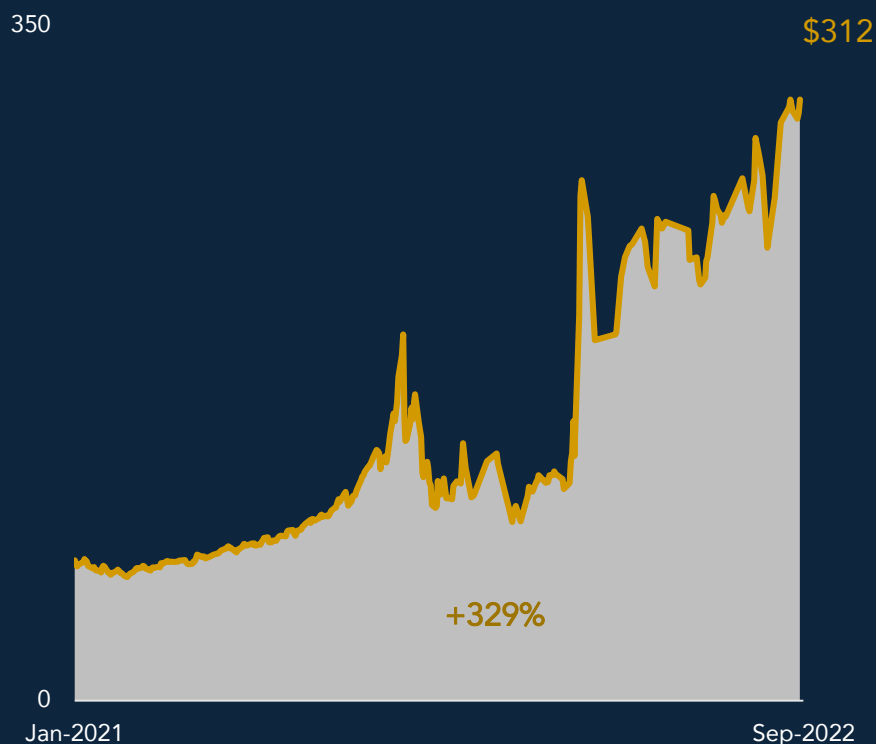
Europe Revisiting Coal, For Now

The EU reduced hard coal production by 79% between 1990-2021, but has since increased coal production by 15% in the 1H 2022. MUFG's Ehsan Khoman emphasizes two notable implications: (i) following EU Russian coal ban in August, a sharp increase in demand for alternative coal imports (Australia, Indonesia); and (ii) more demand and price appreciation for LNG increasing China and EM demand for coal. This pivot to coal is a multi-year phenomenon.

Key Takeaways:

- 1 Global coal generated electricity production at record highs (+9% in 2021)
- 2 EU coal production up 15% in 1H 2021
- 3 Increased EU demand for coal imports (Australia, Indonesia)
- 4 Increased China and EM demand for coal (as LNG prices rise)
- 5 Coal prices have tripled since Jan 2021; doubled since Jan 2022

European Coal Prices, 1 Yr Forward (\$/tonne)



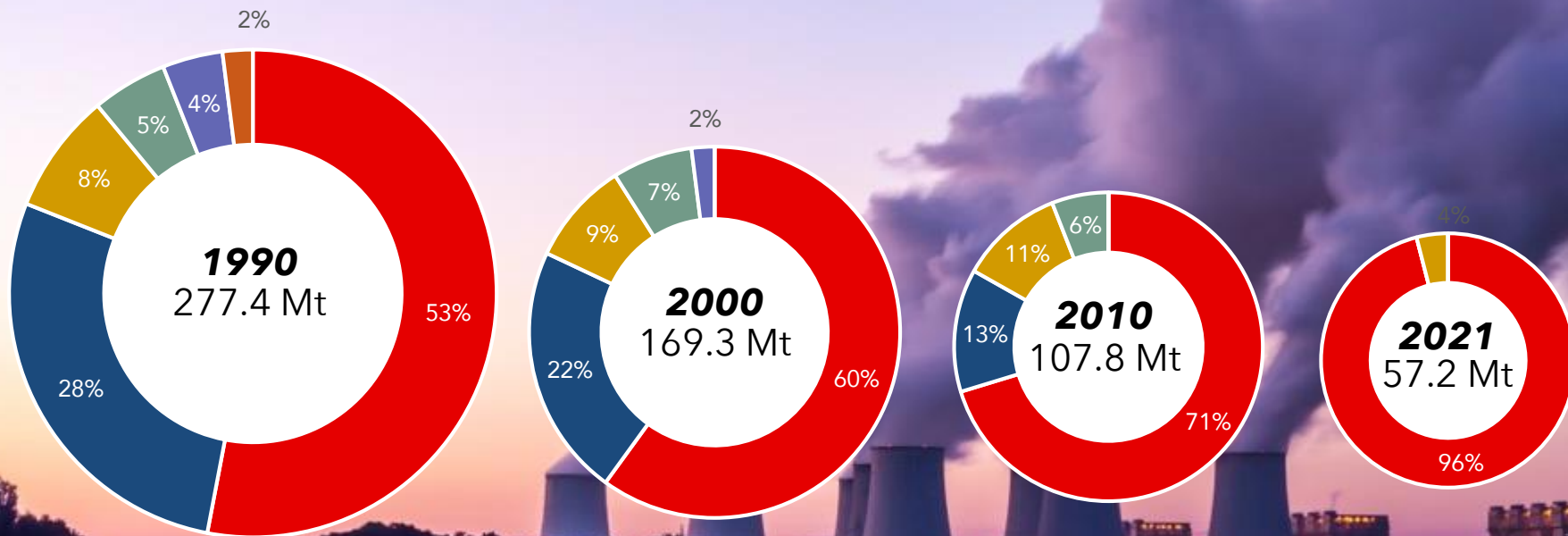
Source: (1) Bloomberg Data as of September 7, 2022.

Europe Revisiting Coal, For Now



Production of hard coal in the EU, million tonnes

● Poland ● Germany ● Czech Rep. ● Spain ● France ● Other



"The EU's 2030 and 2050 targets remain fully intact ... while we may temporarily increase our use of coal, the long term direction is clear."

Elina Bardram, European Commission acting director for International Affairs and Climate Finance

Source: (1) Eurostat. Data might not add up to 100% due to rounding. The 2021 figures are based on cumulated monthly data.

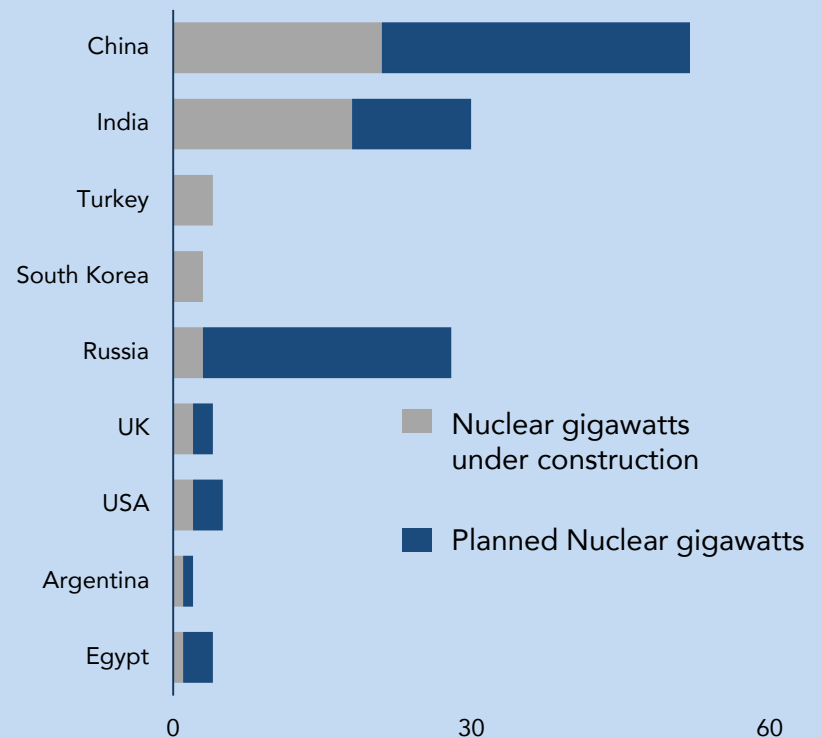
Revisiting Nuclear: Politically Complex, Requires Investment

Since the 2011 Fukushima Dai-Ichi nuclear meltdown in Japan, nuclear power has fallen out of favor with governments and consumers around the world. Germany, for example, had planned to phase out nuclear power by year end 2022. However, the ongoing energy crisis has brought new life to the nuclear power industry.

Key Takeaways:

- 1 EU added nuclear to “green taxonomy” while Germany delays YE 2022 nuclear phase-out
- 2 France’s aging nuclear infrastructure under-producing
- 3 US Inflation Reduction Act includes provisions supporting existing and new nuclear
- 4 Japan bringing several plants back online
- 5 China & India building more reactors

Nuclear gigawatts planned or under construction



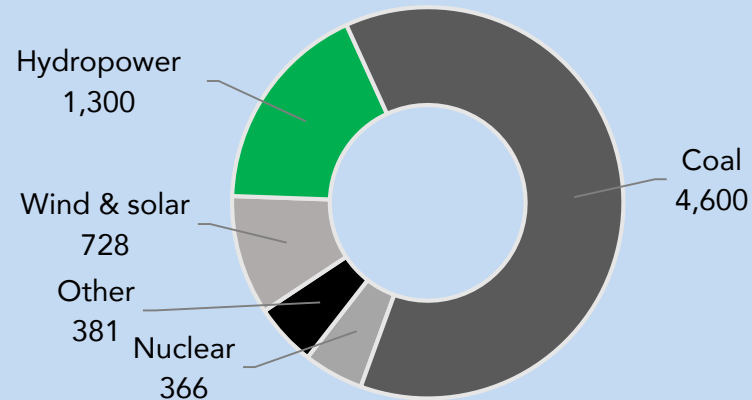
Source: (1) World Nuclear Association. BloombergNEF, “Global Energy Crisis Spurs a Revival of Nuclear Power in Asia” (August 29, 2022) “Germany Edges Closer to Using Nuclear to Plug Russian Gas Gap (August 23, 2022). Financial Times “Japan turns back to nuclear power in post-Fukushima shift” (August 24, 2022).

Droughts Exacerbating Global Energy Crunch

China

- China's Yangtze River, a critical provider of hydropower, is at its lowest level for this time of year since records began in 1865
- Hydropower provides 18% of China's power generation
- Lack of consistent power has caused intermittent factory shutdowns. Reliance on coal has kept the crisis from spreading to additional provinces.

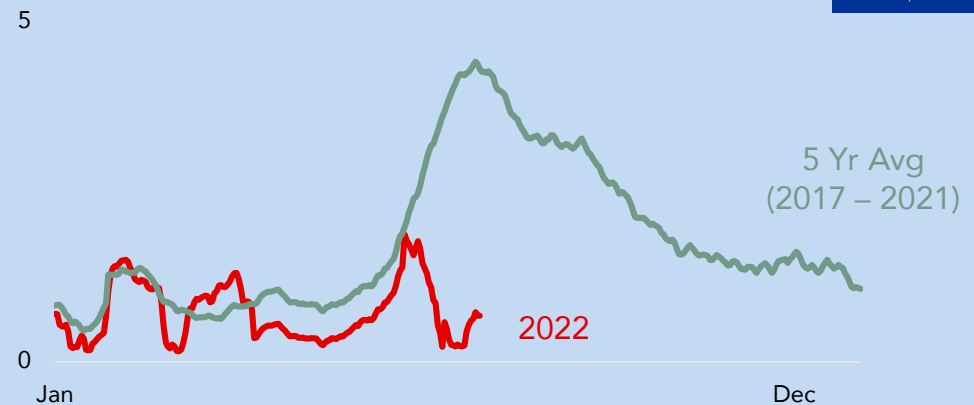
China's sources of power generation (KGWh)



Europe

- The Rhine River water level in Germany has fallen to below 40 cm in some key areas making it impossible to navigate for distribution of coal, petrol, wheat and other key commodities
- Hydropower generation has been significantly reduced
- Germany, historically an energy exporter, will be challenged by the production shortfall

German water-reservoir power generation (GWh)



Source: (1) Bloomberg. Data for China is 2020. (2) MUFG Ehsan Khoman, Head of EM Research, "Europe's Coming Winter Gastastrophe" (August 24, 2022). Bloomberg. Eurostat.

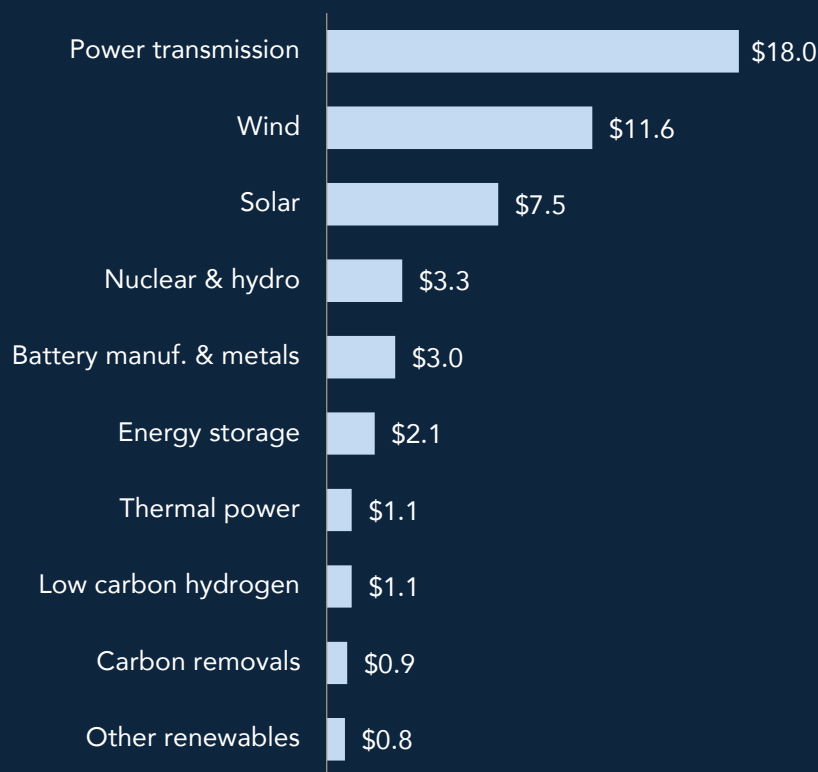
Renewables Will be Slow to Close the Gap

The EU launched its RePowerEU strategy in March 2022 to reduce Russian energy dependency, with clean energy a critical component of the plan. Interestingly, a more rapid adoption of “renewables” is critical to both Europe’s energy security and sustainability objectives. However, the current technology (i.e., batteries), regulatory (permits, approvals) and economic bottlenecks for renewables are too formidable to close the short term gaps in Europe’s energy requirements.

Key Takeaways:

- 1 Energy security over sustainability near term
- 2 Renewables important to BOTH energy security and sustainability
- 3 Technology, regulatory and economic bottlenecks to acceleration
- 4 Key mineral demand also a challenge (copper, rare earths, nickel, lithium, graphite)
- 5 Gov’t policy, subsidies & tax incentives expanding

Estimated cumulative spending by category to get to net zero emissions by 2050, USD tn



Source: (1) WSJ. Wood Mackenzie. net zero emissions by 2050 also based on world limiting global warming to 1.5 degrees Celsius above pre-industrial levels.

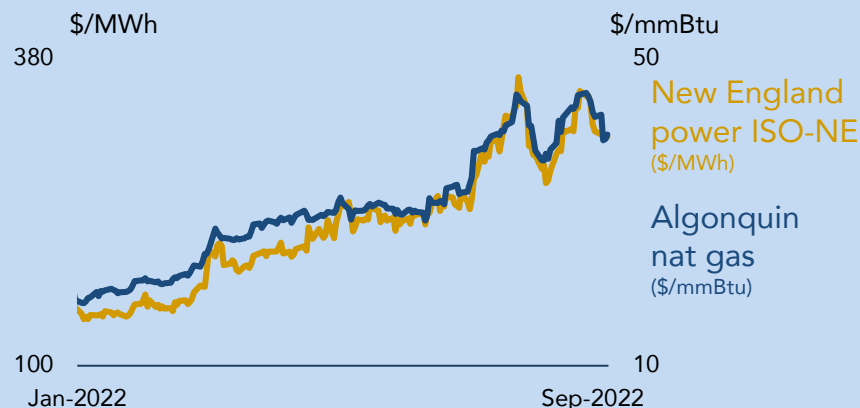
US Importing Europe's Energy Crisis

For the US, the energy crisis is more about "price" than "access." Power prices in the Northeast of the US are expected to reach record levels this winter due to Europe's energy crisis. The Northeast, which, in winter, is more reliant on LNG rather than pipeline gas, will be directly impacted by the global surge in prices.

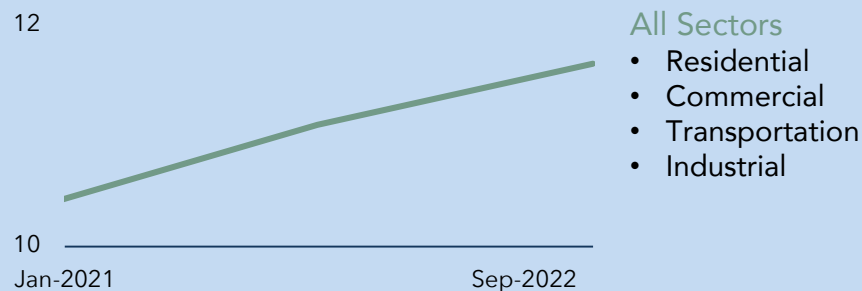
Key Takeaways:

- 1 Super-tight US energy markets on structural under-investment (regulatory, ESG, labor shortages, inflation, investors demanding cash & dividends)
- 2 Nat gas majority heating fuel in US; also drives electricity prices
- 3 Hurricane season and winter temps will be key variables
- 4 Northeast US reliant on LNG in winter (2 under-supplied pipelines)
- 5 Finite US export capacity at outer limits

January 2023 fair values for New England gas and power



Average electricity prices (kilowatt-hour)



Source: (1) Bloomberg NEF. Waves from European Energy Crisis Set to Hit Northeast US. Bloomberg. Data as of September 8, 2022. TTF converted into Btu. (2) WSJ, "America's New Energy Crisis" (August 1, 2022). Bloomberg. Data as of September 7, 2022. EIA.

2 Path to Net Zero "Off Track"



Summary Conclusions

- 1 Renewable revolution slow, challenged:** While a renewable energy revolution is underway, it won't happen fast enough to replace fossil fuels or avoid the worst of the energy crisis in the coming years

- 2 Significant financing needs:** Roughly \$1 trillion / year investment between now and 2030 is needed to get the energy transition "on track" to meet the Paris aligned 1.5°C climate warming scenario

- 3 Renewable power advances, integration & deployment challenges:** In some regions, renewable power generation is less expensive than traditional fossil fuel power generation. However, significant investment is still needed to scale renewable technologies and integrate them into existing power systems.

- 4 Significant technological advancement needed:** There are numerous "paths" to a Net Zero economy, but all of them rely on technology that either does not yet exist, or needs further development on scale and affordability. Carbon capture and storage technology, for example is a necessary component of reaching Net Zero, but the technology requires further advancement for broad adoption.

- 5 Supply chain and sanctions challenges:** The mineral supply chain will be a key bottleneck to the transition to Net Zero. Demand for lithium, cobalt, nickel and graphite, for example, is expected to increase between 3x and 40x in the next two decades and more sustainable mining practices must be developed to meet demand. Many of these key minerals are currently sourced from Russia.

Technological Adaptation for Net Zero

In order to reach a Paris Aligned scenario, and keep global temperatures below 2°C, global emissions need to be cut by 30% vs. 2019 levels by 2030 and 75% by 2040.

New wind power per
year to 2030

505

GW

Solar PV per year
to 2030

455

GW

Batteries per year
to 2030

245

GWh

EVs added to the road on
average each year to 2030

35

Million

Sustainable aviation
fuels make up

18%

of aircraft fuel in 2030

Heat pumps deployed
per year to 2030

18

Million

Increase electricity use for
lower temp. heat in industry

71%

from 2019 levels in 2030

By 2030 retire
up to around

70%







of coal-fired power

Source: (1) BloombergNEF, "New Energy Outlook 2021."

Energy Transition Off Track

The global energy transition is “off track” according to the International Renewable Energy Agency. In order to meet the Paris aligned 1.5°C scenario, over \$1 trillion per year must be invested into renewable energy by 2030 to dramatically change the trajectory on the use of electric vehicles, green hydrogen, and carbon capture technology.

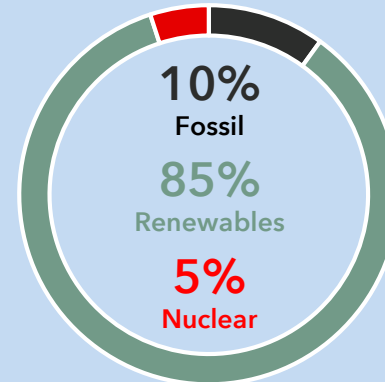
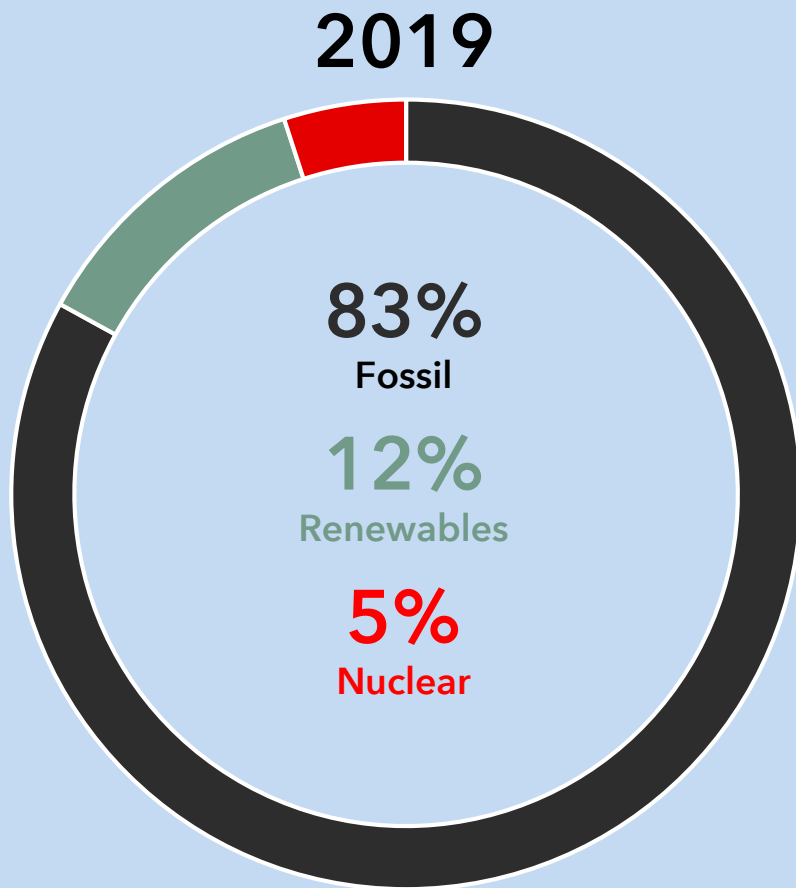
Tracking progress of key energy system components

	Indicators	Recent Years	2050	Off / On track
Renewables	Share of renewables in electricity generation	26%	90%	
	Modern bioenergy consumption	18 EJ	58 EJ	
Energy Efficiency	Investment needs for energy efficiency	0.3 USD Trillion/year	1.5 USD Trillion/year	
Electrification	Passenger electric cars on the road	7 million/year	147 million/year	
Hydrogen	Clean hydrogen production	0.8 MT	614 MT	
CCS and BECCS	CCS and BECCS to abate emissions in industry	0.04 GtCO ₂ captured/yr	8.4 GtCO ₂ captured/yr	

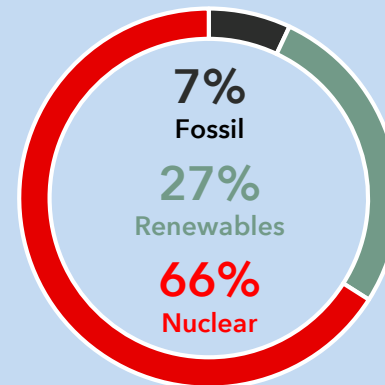
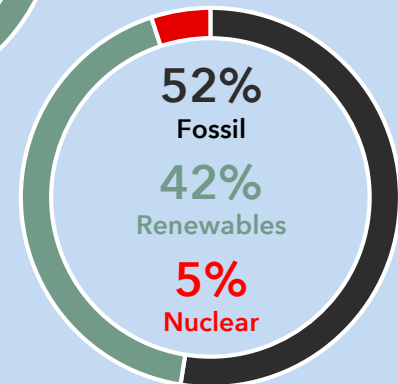
Source: (1) IRENA, “World Energy Transitions - Outlook 2022” (March 2022).

The Path to Net Zero

BloombergNEF outlines three scenarios for achieving Net Zero by 2050. In the “Gray Scenario”, where fossil fuels remain over 50% of energy supply, heavy use of carbon capture technology must be used; a technology that is not currently available in a scalable and affordable format.



**2050
Gray Scenario**

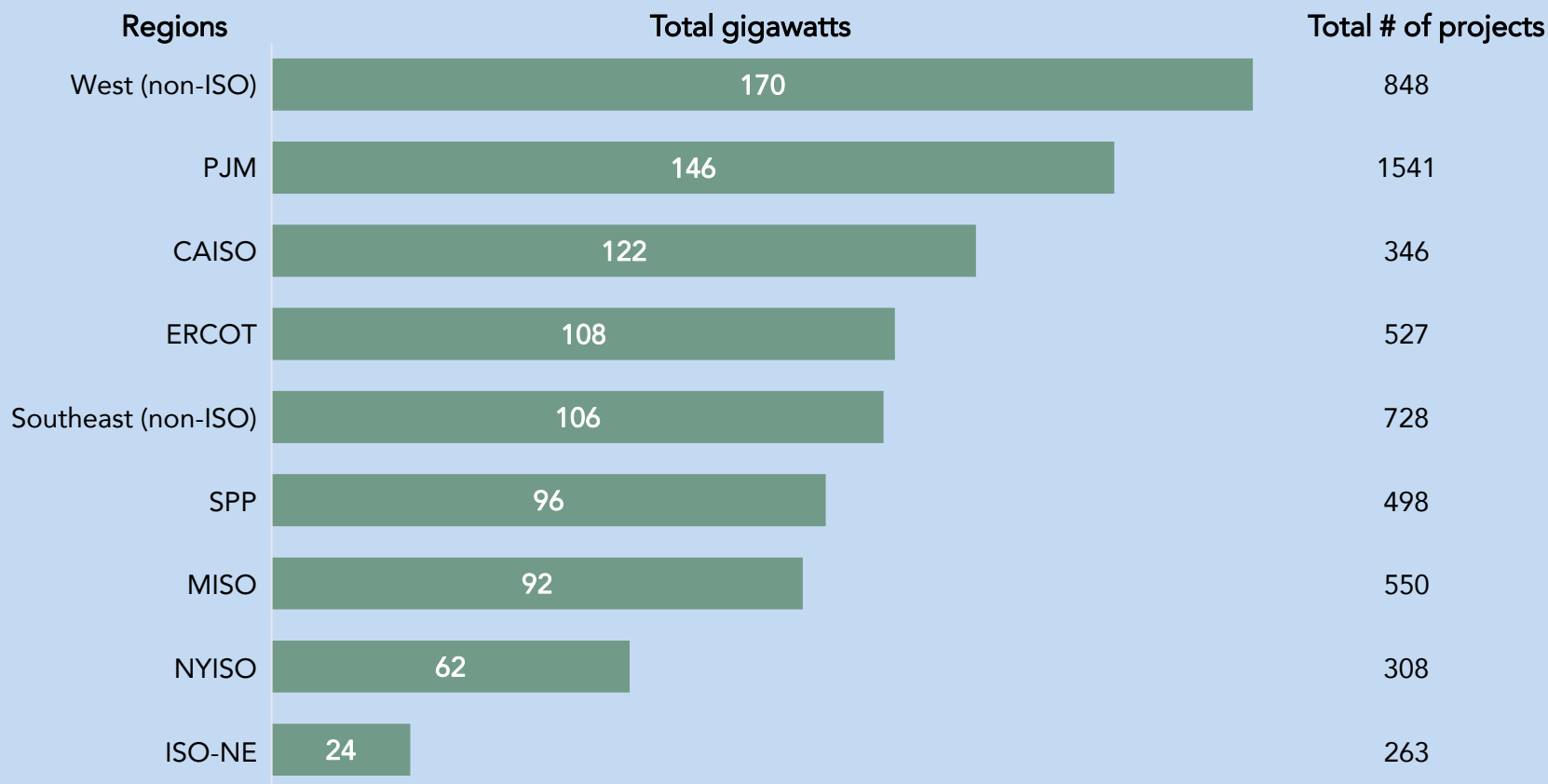


Source: (1) BloombergNEF, “New Energy Outlook 2021.”

Energy Grid Gridlock

In addition to generating new renewable energy, clean energy sources need to be connected to the power grid to be integrated and deployed. An estimate by Princeton University shows that to integrate and deploy clean-energy, electricity transmission systems must expand by 60%.

Outstanding projects, including renewables and storage, waiting to be connected to power grid

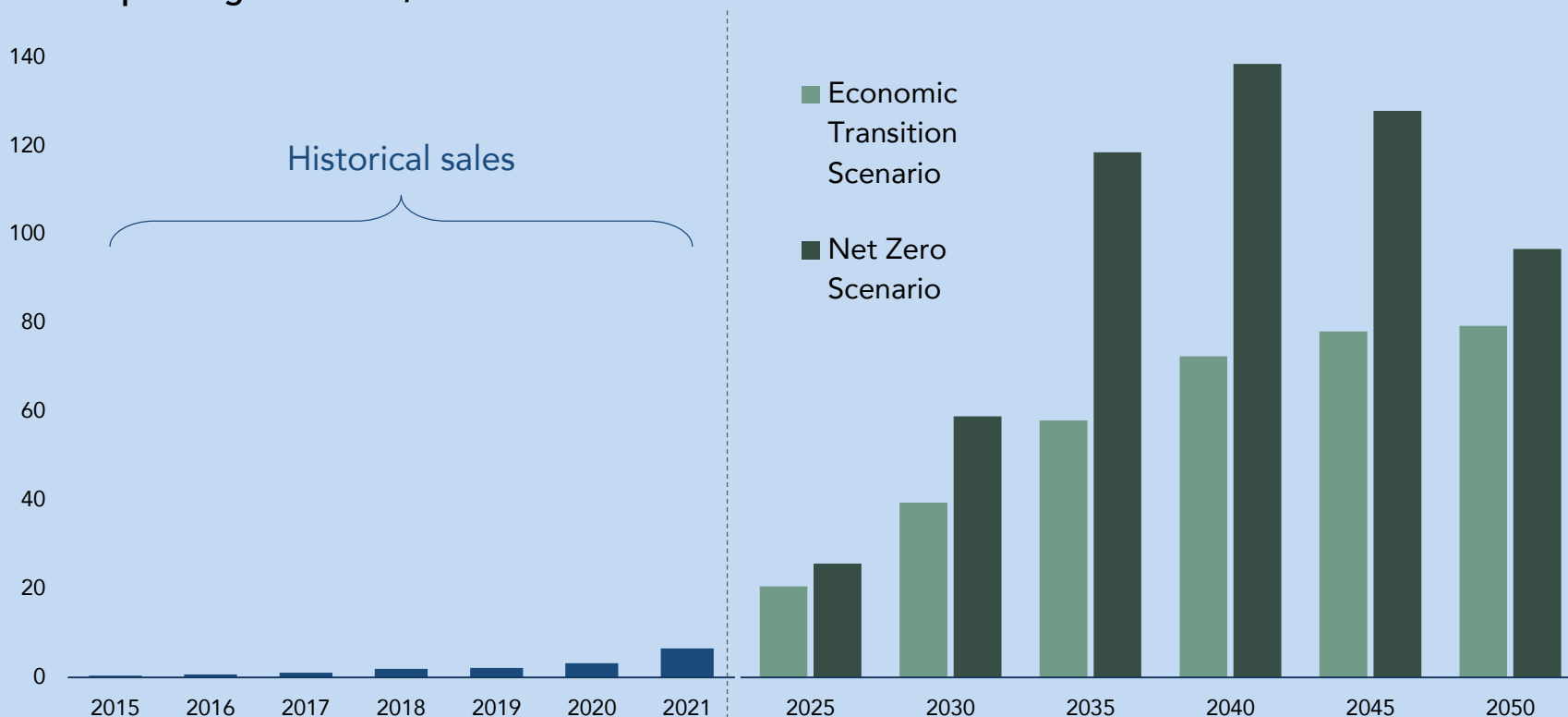


Source: (1) McKinsey "Upgrade the grid: Speed is of the essence in the energy transition" (February 2022).

Electric Vehicles and Zero Tailpipe Emissions

In 2021, nearly 6.6 million electric vehicles were sold bringing the number of EVs on the road to almost 20 million. Under BloombergNEF's Economic Transition Scenario, annual passenger EV sales are expected to rise to 80 million in 2050, representing roughly two-thirds of passenger vehicles on the road. In order to reach zero tailpipe emissions by 2050, annual EV sales must increase to nearly 140 million by 2040.

Annual passenger EV sales, millions

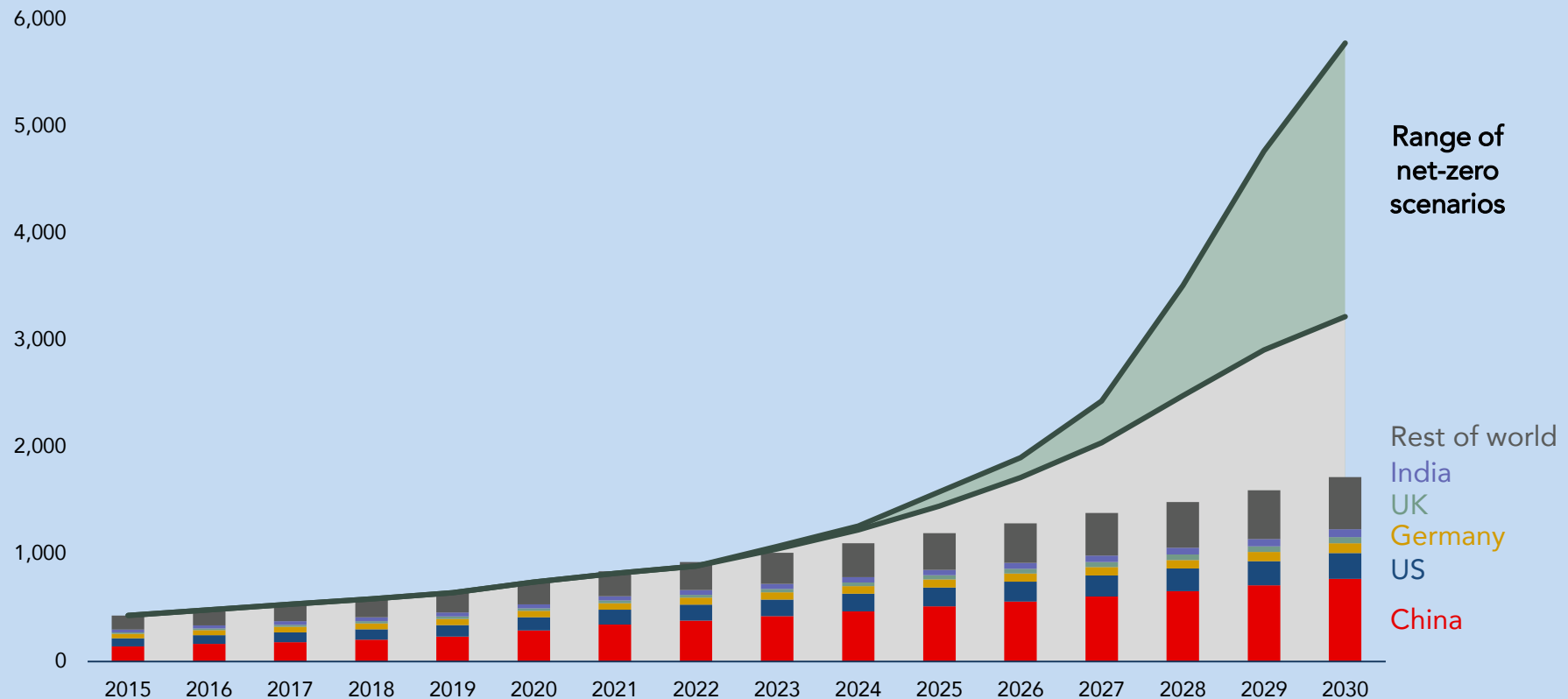


Source: (1) BloombergNEF, "Long-Term Electric Vehicle Outlook for 2022."

Wind Power Falling Short

In 2021, nearly 100 gigawatts of wind power were installed globally, for total capacity of over 840 gigawatts. Increased capacity in the US and China will likely bring global wind capacity to over 1,700 gigawatts in 2030. However, BloombergNEF estimates 5,700 gigawatts of wind power must be installed by 2030 to reach Net Zero by 2050.

Cumulative wind capacity, gigawatts

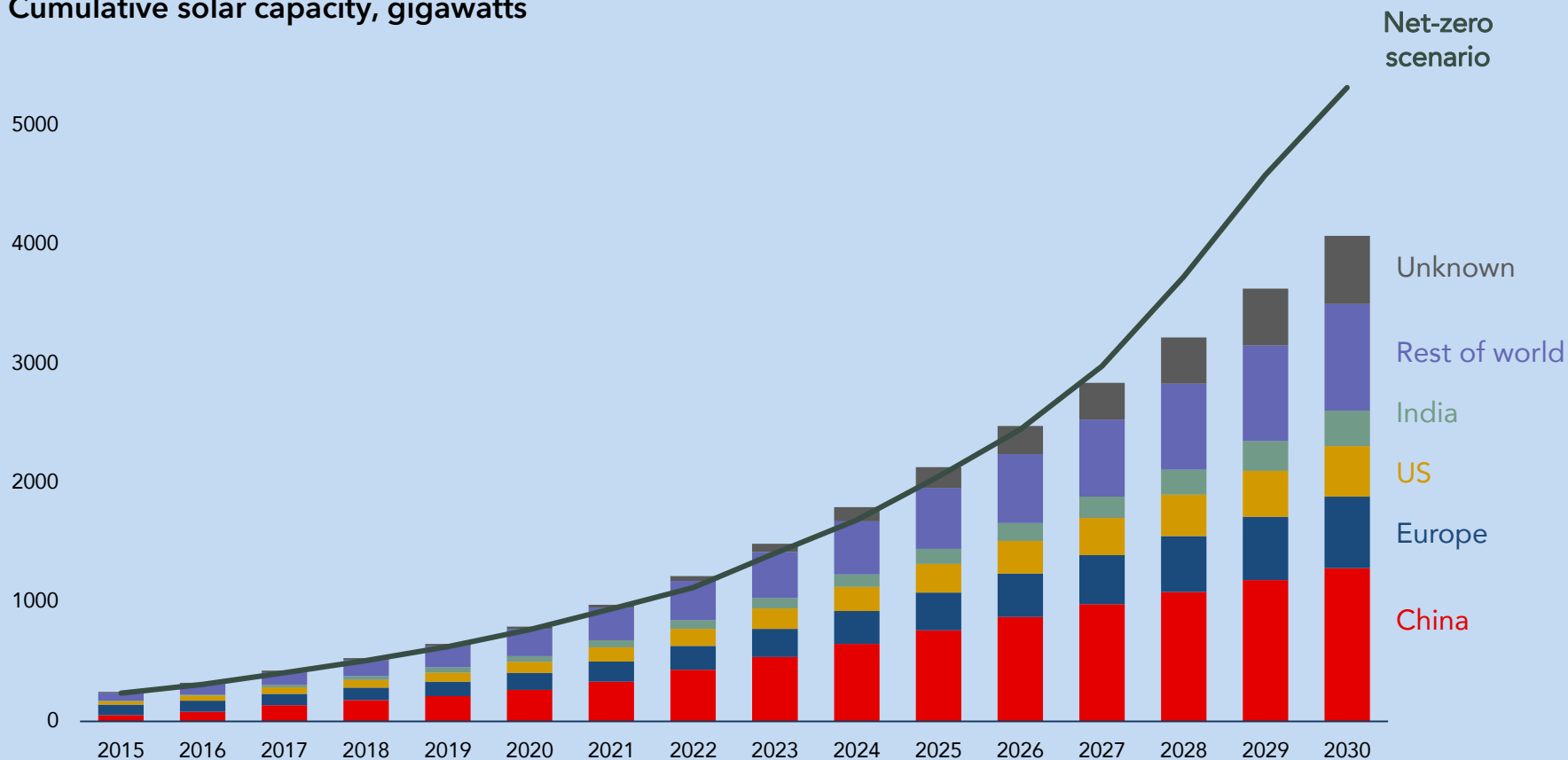


Source: (1) BloombergNEF, "New Energy Outlook 2021." Short-Term Cumulative Wind Capacity Forecast. The upper band of the net-zero scenario range is the Green Scenario, a renewables and green hydrogen-led pathway to net-zero.

Record Solar Build Out Still Behind

Solar installations are projected to more than double between 2021 and 2030 with cumulative capacity reaching over 4,000 gigawatts. The path to Net Zero requires solar capacity of 5,300 gigawatts by 2030.

Cumulative solar capacity, gigawatts

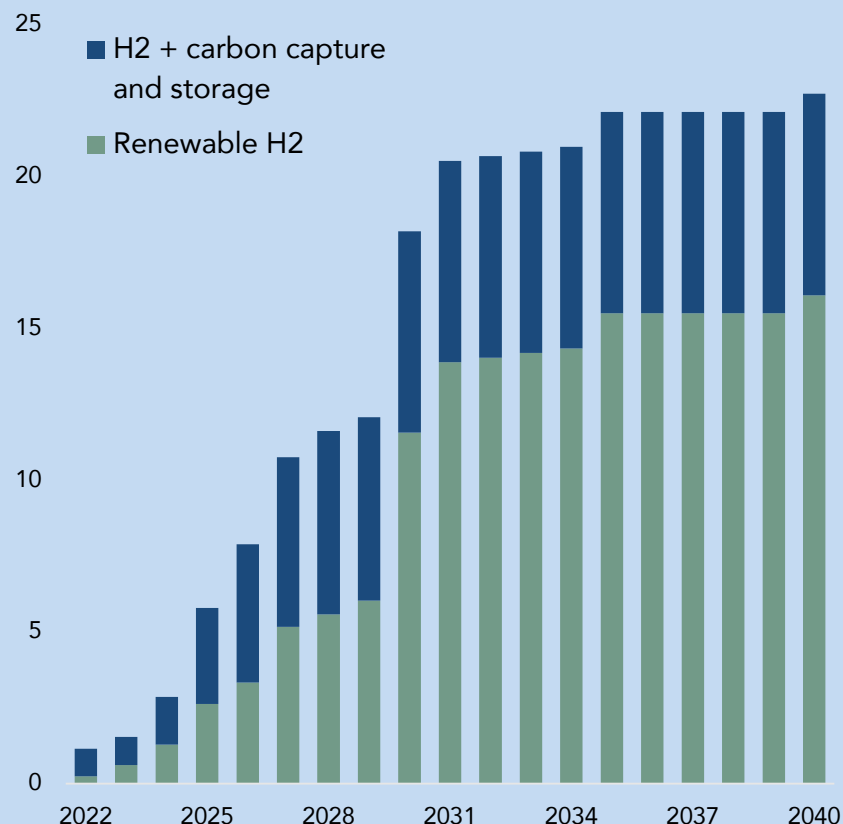


Source: (1) BloombergNEF, "New Energy Outlook 2021." Net zero green scenario is utility and small-scale PV. BNEF Short-term Cumulative Solar Capacity Forecast.

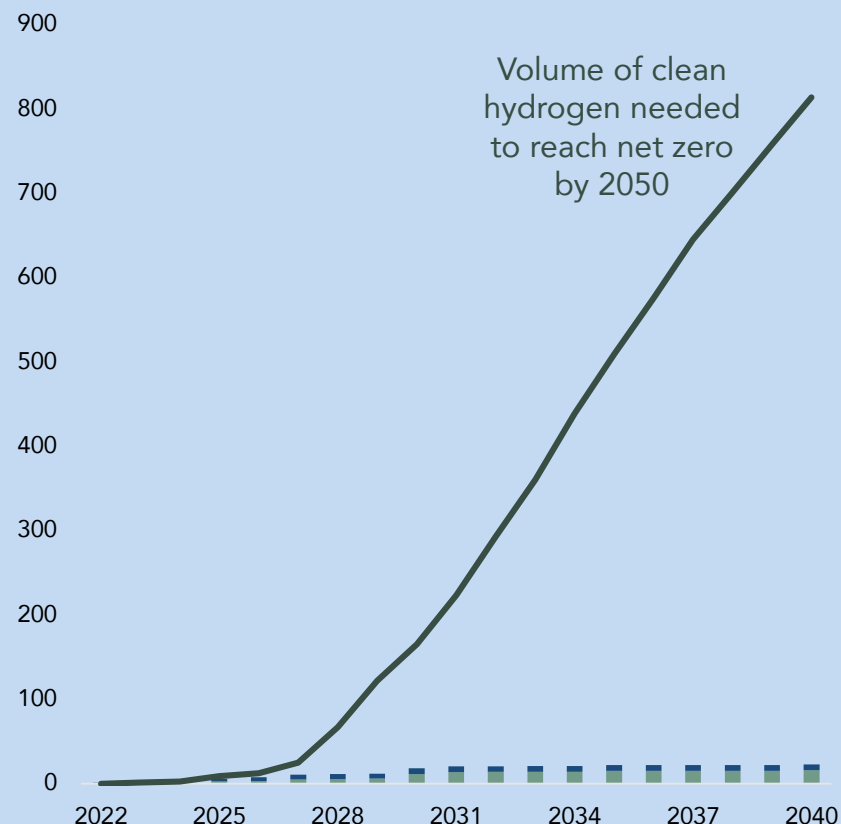
Clean Hydrogen Ramp Up Still Necessary

Lowering emissions in hard to abate sectors such as steelmaking requires advances in clean hydrogen. In 2021, under one million tons of clean hydrogen were produced. While production is expected to grow to 23 million tons by 2040, the industry needs to reach over 800 million tons of annual output by 2040 to achieve net zero in the global economy.

Million metric tons of H₂ per year



Million metric tons of H₂ per year

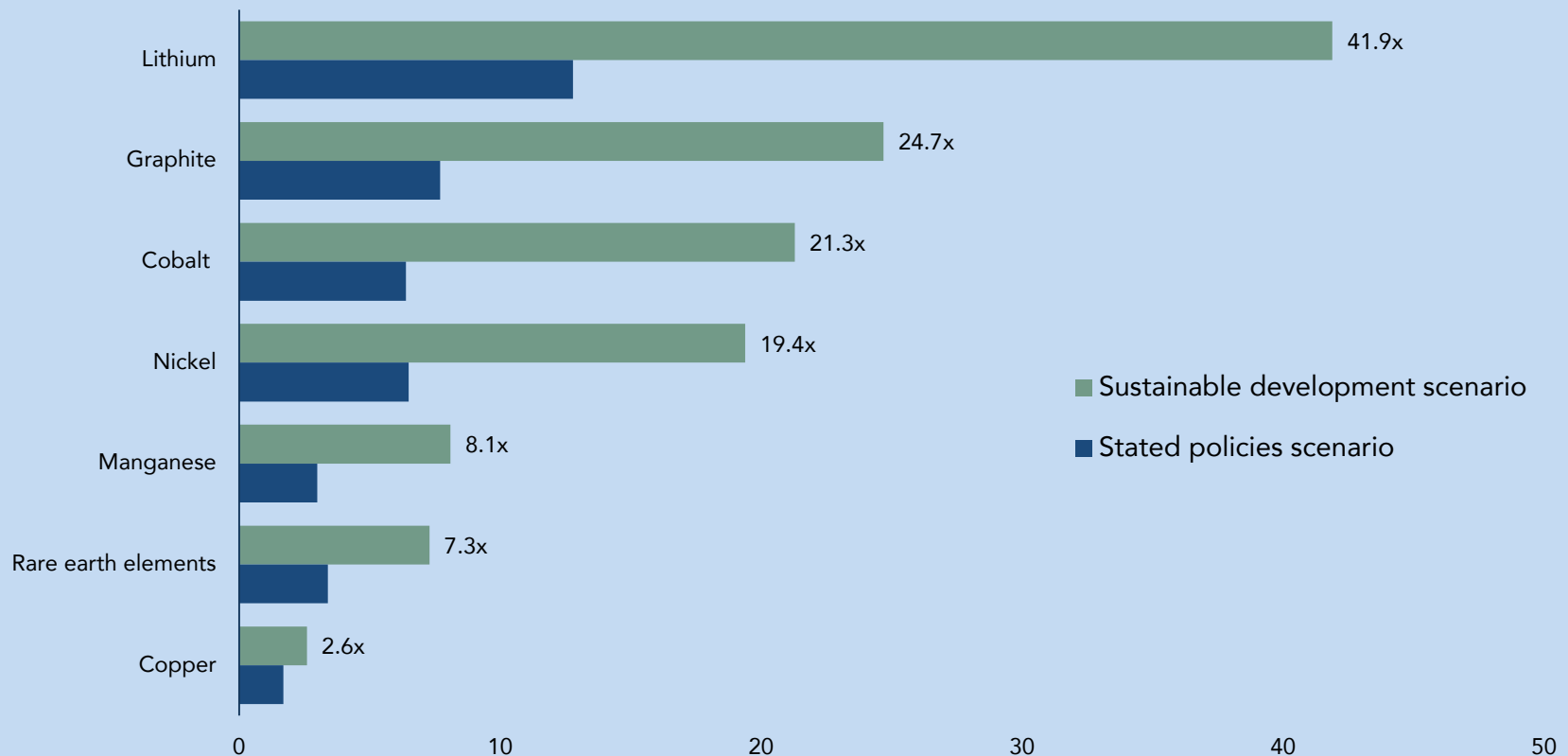


Source: (1-2) BloombergNEF, "New Energy Outlook 2021." Net-zero line is the Green Scenario BNEF Hydrogen Supply-Demand Model: Supply.

Key Minerals a Bottleneck for ESG Adoption

The mineral supply chain will be a key bottleneck to the transition to Net Zero. Demand for lithium, cobalt, nickel and graphite, for example, is expected to increase between 3x and 40x in the next two decades and more sustainable mining practices must be developed to meet demand.

Projected growth in demand from clean energy technologies, 2040 relative to 2020



Source: (1-2) WSJ, "Energy Prices May Keep Inflation High for Years" (July 30, 2022). IEA. BlackRock Investment Institute. Wood Mackenzie.

Supply Chain Vulnerabilities

Many of the key minerals required for low carbon infrastructure are sourced from Russia, which will make the net zero transition more challenging

Key minerals needed for the clean energy transition

	Energy Storage	Nuclear	Wind	Solar PV	Hydro	Geothermal	Carbon capture & storage	Solar Concentrated
Copper								
Nickel								
Chromium								
Molybdenum								
Manganese								
Zinc								
Lead								
Aluminum								
Titanium								
Silver								
Vanadium								
Cobalt								
Indium								
Iron								
Rare Earths								
Lithium								
Graphite								

Source: "The Demise of ESG is Much Exaggerated," Federation Hermes Limited. ASR Limited.

3 Government Policy: Two Steps Forward, One Step Back



Summary Conclusions

1

Robust but “off track” country pledges: Over 130 countries, representing 83% of global greenhouse gas emissions, have made Net Zero pledges. However, very few of those countries are “on track” to meet pledges.

2

Energy crisis requiring “one step back”: In the near term, Europe must prioritize energy security over sustainability (though notably, “renewables” are critical to both strategic imperatives). However, longer term, European clean energy ambitions have been accelerated. Clean / renewable energy sources are viewed as the bloc’s pathway to energy independence.

3

Disjointed US approach to ESG: At the federal level, President Biden has adopted a “whole of government approach”, instructing regulators to incorporate climate considerations into every policy. However, at the state level, numerous governors and lawmakers are pushing back on the green agenda.

4

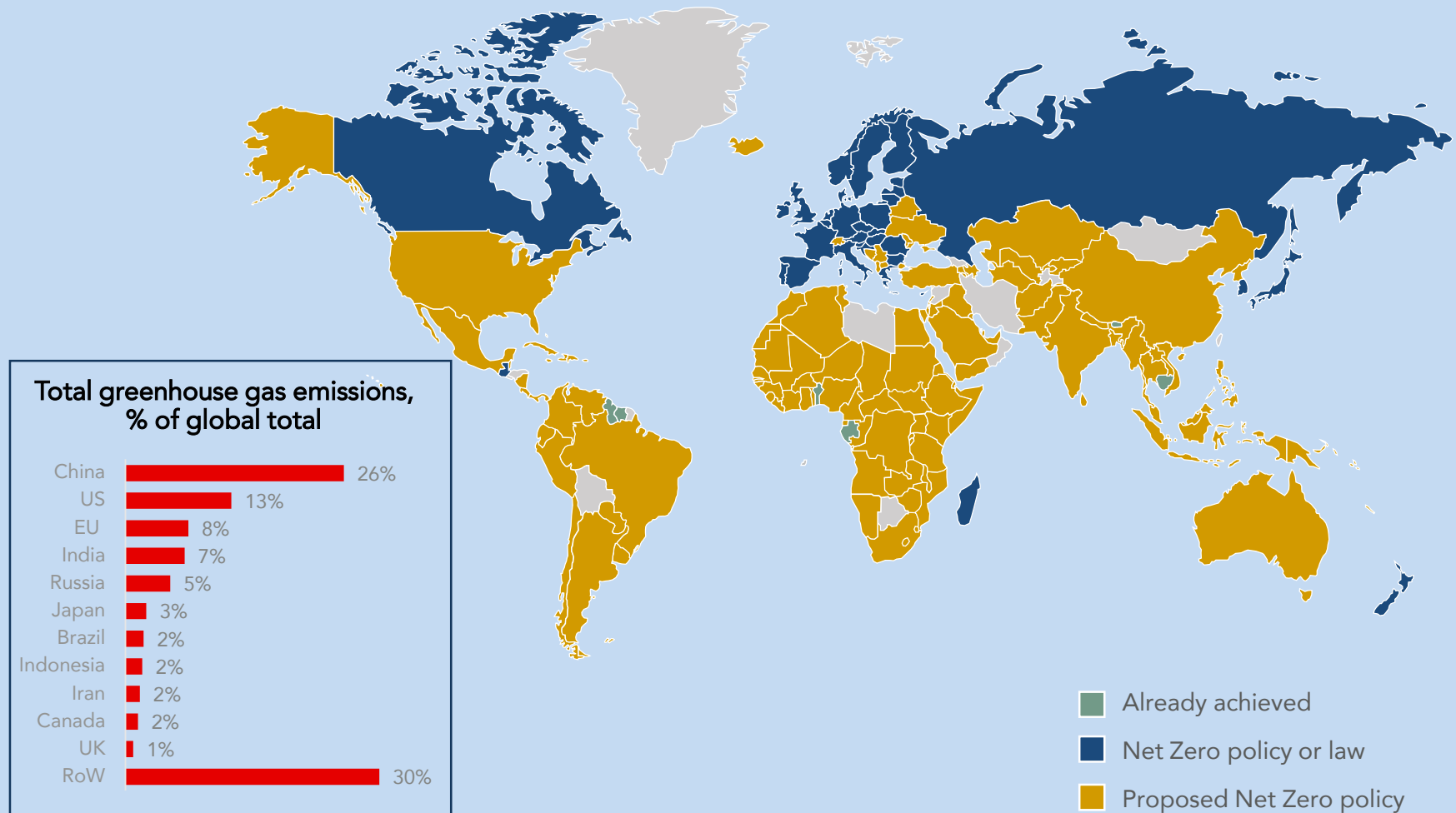
US Inflation Reduction Act: The US Congress passed a landmark climate bill that could cut US greenhouse gas emissions by 40% vs. 2005 levels by 2030. However, the bill ties renewable energy to fossil fuel drilling leases, drawing criticism from some climate experts.

5

Nuclear reacceleration faces challenges: Governments throughout Europe and Asia are revisiting nuclear power as a source of relatively clean and low cost energy. However, nuclear reacceleration remains politically challenging and will take time.

Country Commitments to Net Zero

According to the United Nations, over 130 countries representing 83% of global emissions have made Net Zero pledges

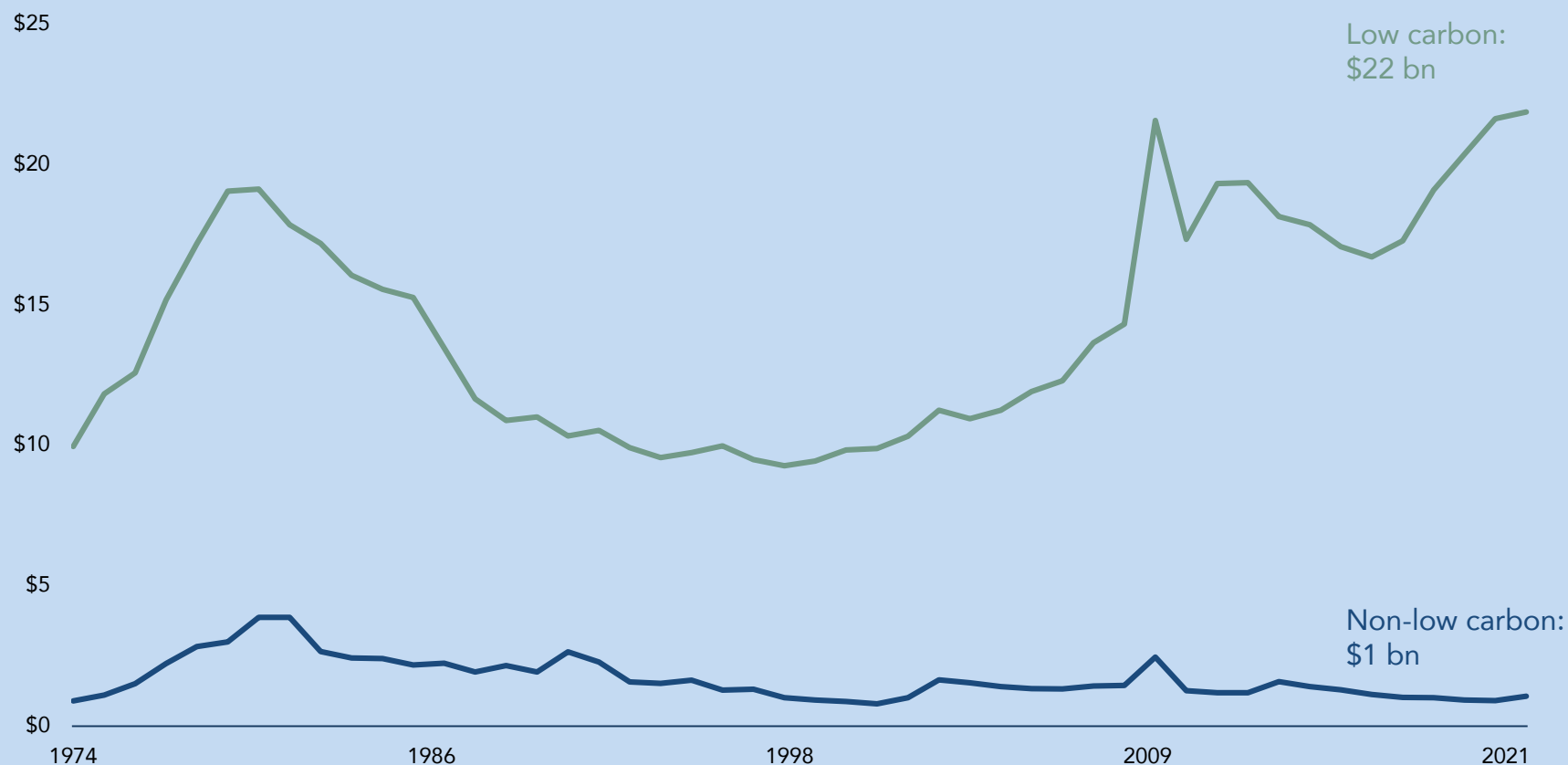


Source: Net Zero Tracker. CAIT Climate Data Explorer. WRI. Greenhouse gas emissions data is 2018.

Public Investment in Low Carbon Energy

Public investment in low carbon energy technology Research Design & Development (RD&D) reached a record 22 billion in 2021, representing 95% of total public energy RD&D budgets. Non-low carbon RD&D also increased in 2021 for the first time since 2013.

Public low-carbon energy research design & development budget in IEA member countries, USD bn



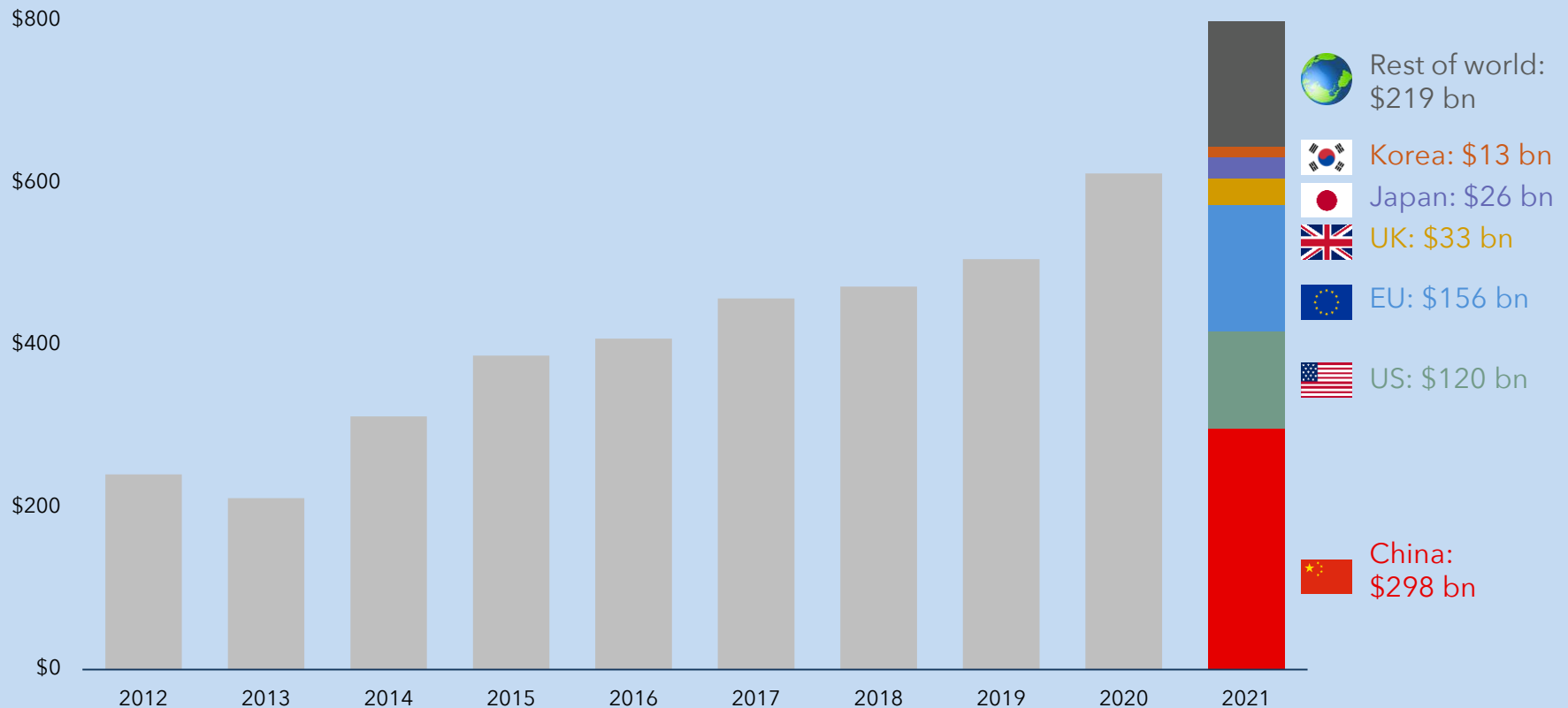
Source: (1) IEA. Energy Technology RD&D Budgets: Overview - Low-Carbon RD&D.

China Leads "Old" & "New" Economy Energy Policy



China is a global leader in both "old economy" energy (coal provides 60% of China's energy needs today) and "new economy" renewable energy spending. In 2021, China spent \$298 bn on energy transition, nearly double Europe's \$156 bn investment and the US' \$120 bn.

Public and private investment in global energy transition, USD bn



Source: (1) BloombergNEF, "Energy Transition Investment Trends 2022."

The Inflation Reduction Act



The Inflation Reduction Act, which was signed into law in August, includes \$386 billion of funding for climate and energy over the next decade. While the law is expected to reduce emissions in the US by 40% vs. 2005 levels by 2030, it also includes numerous opportunities for traditional fossil fuels.

Clean energy provisions in the IRA:



\$237B

Carbon-free Energy

- Adoption of renewable & nuclear electricity
- Increased energy efficiency



\$71B

Manufacturing

- Low carbon domestic manufacturing incentives



\$41B

Transportation

- Accelerated EV adoption



\$35B

Clean Tech

- Incentives for research and innovation in technology for hard to abate emissions

Selected oil & gas provisions in the IRA:

- **Onshore leasing:** Requires Department of the Interior (Dol) to host **onshore oil and gas lease sale** within four months of issuing new onshore wind or solar Rights of Way
- **Offshore leasing:** Dol required to **award bidders leases from Gulf of Mexico lease sale from 2021** and requires **new lease sales** in Alaska and the Gulf of Mexico in 2022 and 2023. Requires one offshore oil and gas lease sale in the year prior to a new offshore wind sale.
- **Permitting:** Provisions in the IRA to **streamline permitting** of major infrastructure projects (including fossil fuel projects). Sets two year maximum timeline for environmental review for major projects.

Source: BCG "US Inflation Reduction Act: Climate & Energy Features and Potential Implications" (August 2022).

US Federal Regulation Accelerating Quickly



Despite the challenges of the unfolding global energy crisis, the Biden administration has remained committed to advancing the climate agenda through the regulatory channel. In May 2021, the White House issued an executive order entitled "Climate-Related Financial Risk" which kick started actions from numerous regulatory bodies.

2022 Climate Risk Scorecard: More than 230 public actions by federal financial regulators to address climate-related financial risk

		FED	FDIC	OCC	NCUA	SEC	MSRB	CFTC	FHFA	Treasury
1	Publicly affirm climate as a systemic risk	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Produce research and data on climate change	—	—	—	—	✓	—	✓	—	✓
3	Assess climate risks on "financially vulnerable communities"	—	—	—	✗	✗	n/a	✗	✓	—
4	Appoint senior staff to focus on climate change	✓	—	✓	—	✓	—	✓	✓	✓
5	Improve climate-related disclosure	✗	✗	✗	✗	✓	—	—	—	—
6	Include climate risk in supervision and regulation	✗	—	—	—	✓	✗	✗	—	—

✓ Notable progress or action completed — Some progress ✗ No progress n/a Not applicable

Source: Ceres "2022 Climate Risk Scorecard".

Selected US Federal ESG Regulation



Financial Stability Oversight Council



- Committee led by the US Treasury Secretary with members representing a dozen of the country's most senior financial regulators
- Nov 2021: FSOC released report with over **30 specific recommendations for regulators** to identify and respond to physical and transition risks

Office of the Comptroller of the Currency



- Dec 2021: Published draft principles for banks on **managing climate-related risks**
- Jan 2022: Climate risk management survey including questions on maturity of climate **risk management frameworks** and **impact on credit and pricing**

Federal Reserve Board



- Sep 2022: Announced 2023 launch of assessment of long-term **climate-related financial risks**

Federal Deposit Insurance Corporation



- Mar 2022: Draft principles for banks on **managing climate-related risks**

Securities and Exchange Commission



- Numerous actions to both enhance existing climate-related disclosure requirements and propose new, more specific, rules
- **Enhanced Enforcement:**
 - Sep 2021: Announced **step-up in enforcement** of the 2010 Commission Guidance Regarding Disclosure Related to Climate Change
- **Corporate Climate Disclosure:**
 - Apr 2022: Released highly anticipated proposed **climate-related disclosure rule** for corporate issuers
 - Oct 2022: **Expected final ruling** release after prolonged comment period
- **ESG Investors:**
 - May 2022: Proposed rule amendment to address **naming practices for ESG funds**
 - May 2022: Proposed rule amendment to enhance **disclosures by investment advisors and funds** on ESG practices
- **Human Capital Management:**
 - Oct 2022: **New rule** expected addressing **Human Capital Management**

Source: SEC. Office of Information and Regulatory Affairs Office of Management and Budget.

US State Level Regulation Mixed

While some states, such as California, have led the charge on emissions regulations and climate standards, others, such as Florida, West Virginia, and Texas have implemented regulations aimed at slowing ESG adoption and integration. In Texas, companies and investment funds found to be “boycotting” the energy industry will face restrictions in the state. In Florida, state pension funds have been prohibited from screening for ESG criteria.

FT

“Texas has declared that BlackRock and nine listed European financial groups “boycott” the fossil fuel industry, a designation that could lead state pension funds with billions of dollars under management to divest shares held in the groups.”

“Florida and Texas this week moved to block state fund managers from investing in funds or companies that make investment decisions based on environmental, social, or governance factors.”

B

FT

“Florida on Tuesday passed a resolution banning its pension fund managers from taking ESG considerations into account with their investing strategies.”

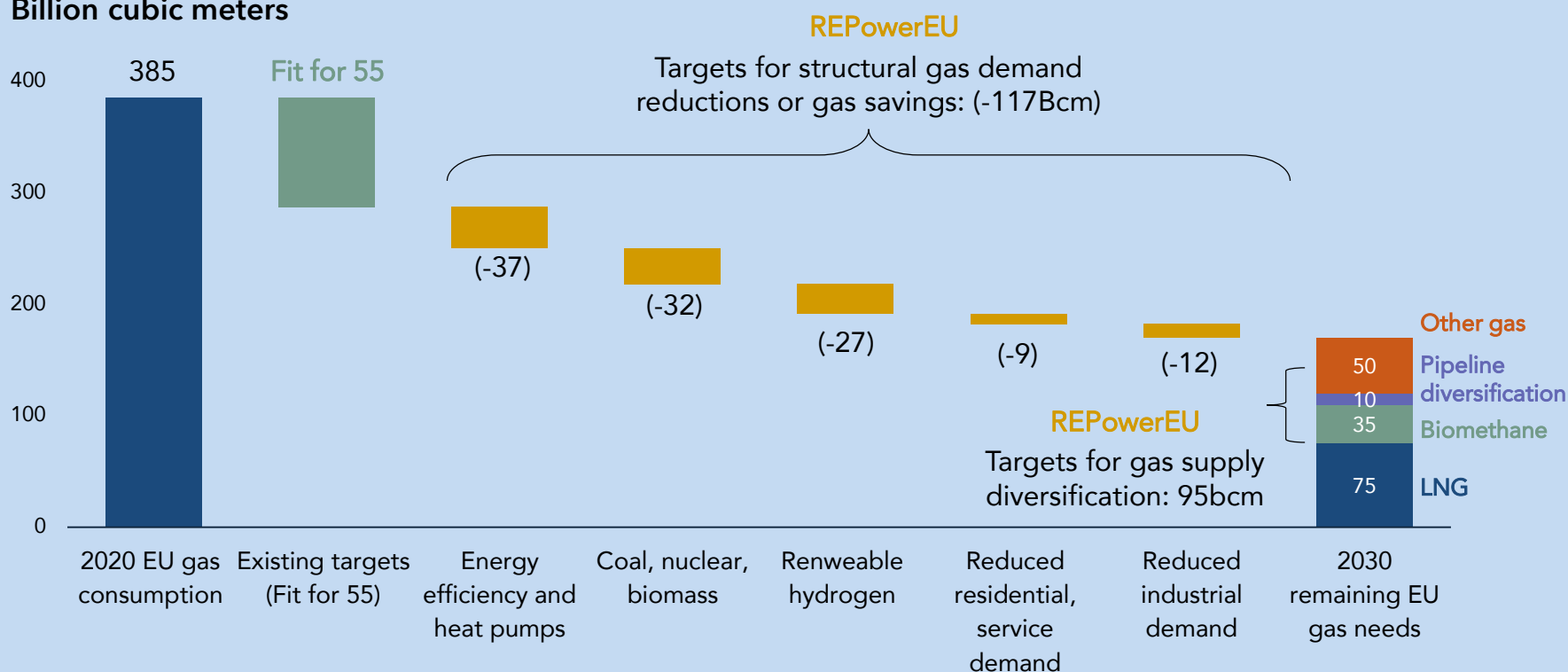
Source: FT. Barrons.

REPowerEU



On May 18, 2022, in response to Russia's invasion of Ukraine, the European Commission formally proposed the REPowerEU plan with the goal of accelerating the EU's transition away from Russian gas. REPowerEU, in conjunction with the EU's already adopted Fit for 55 plan, targets reducing European gas consumption by 56% between 2020 and 2030. Notably, in an effort to move away from Russian gas, the plan may inadvertently drive demand for alternative fossil fuels, such as coal.

Billion cubic meters



Source: (1) BloombergNEF, "EU's Russian Gas Phase-Out Hinges on Clean Energy" (June 1, 2022).

A photograph of an offshore oil rig in the distance, viewed from a rocky coastline. The foreground is filled with dark, jagged rocks and some yellowish-green vegetation. A seagull is perched on a rock in the middle ground. The sky is overcast and grey.

4 Investor Approach: Embracing “All In” Energy Policy

Summary Conclusions

1

Rapid growth in sustainable AUM: Between 2018 and 2020 US sustainable assets under management rose 42% while global sustainable AUM grew 15%. In addition, the UN PRI now has over 5,000 signatories and sustainable investment inflows outpace the broader market.

2

Majority of AUM in Europe in sustainable funds: Europe's Sustainable Finance Disclosure Regulation requires sustainable classifications for every fund. In Q2 2022, the AUM of "sustainable" funds outpaced products that do not incorporate sustainability objectives.

3

Further US investor regulation to come: In an effort to combat greenwashing, the SEC has proposed amendments to two rules which will impact US investors and funds. One of the proposed rulings would require fund classifications similar, in principle, to Europe's SFDR.

4

Shareholder engagement high but discerning: In the 2022 proxy season, shareholders filed a record number of ESG related proposals across the E, S and G dimensions. However, proposal approval ratings fell dramatically from 2021.

5

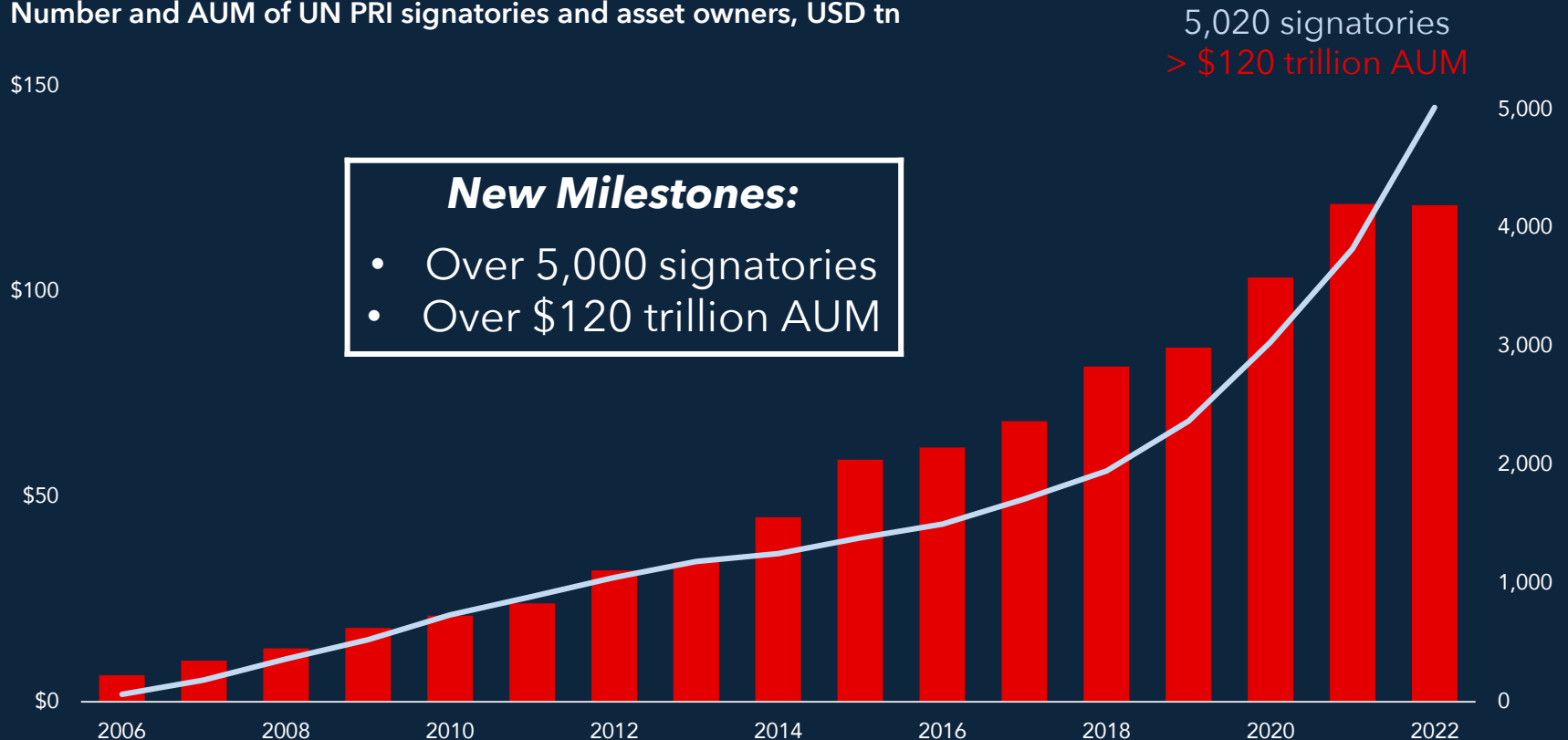
Market Performance: The global commodities boom has slowed the "ESG Outperformance" narrative of recent years. However, numerous "sustainable" markets still keep pace with or marginally outperform their "vanilla" peers.

Over \$120 Trillion Committed to ESG



Over 5,000 signatories and asset owners, representing over \$120 trillion in global AUM, have joined the UN Principles for Responsible Investment (PRI) and agreed to incorporate ESG factors into their investment and ownership decisions. Signatories are required to report annually on their responsible investment activities, with those who fail to do so delisted from the initiative.

Number and AUM of UN PRI signatories and asset owners, USD tn

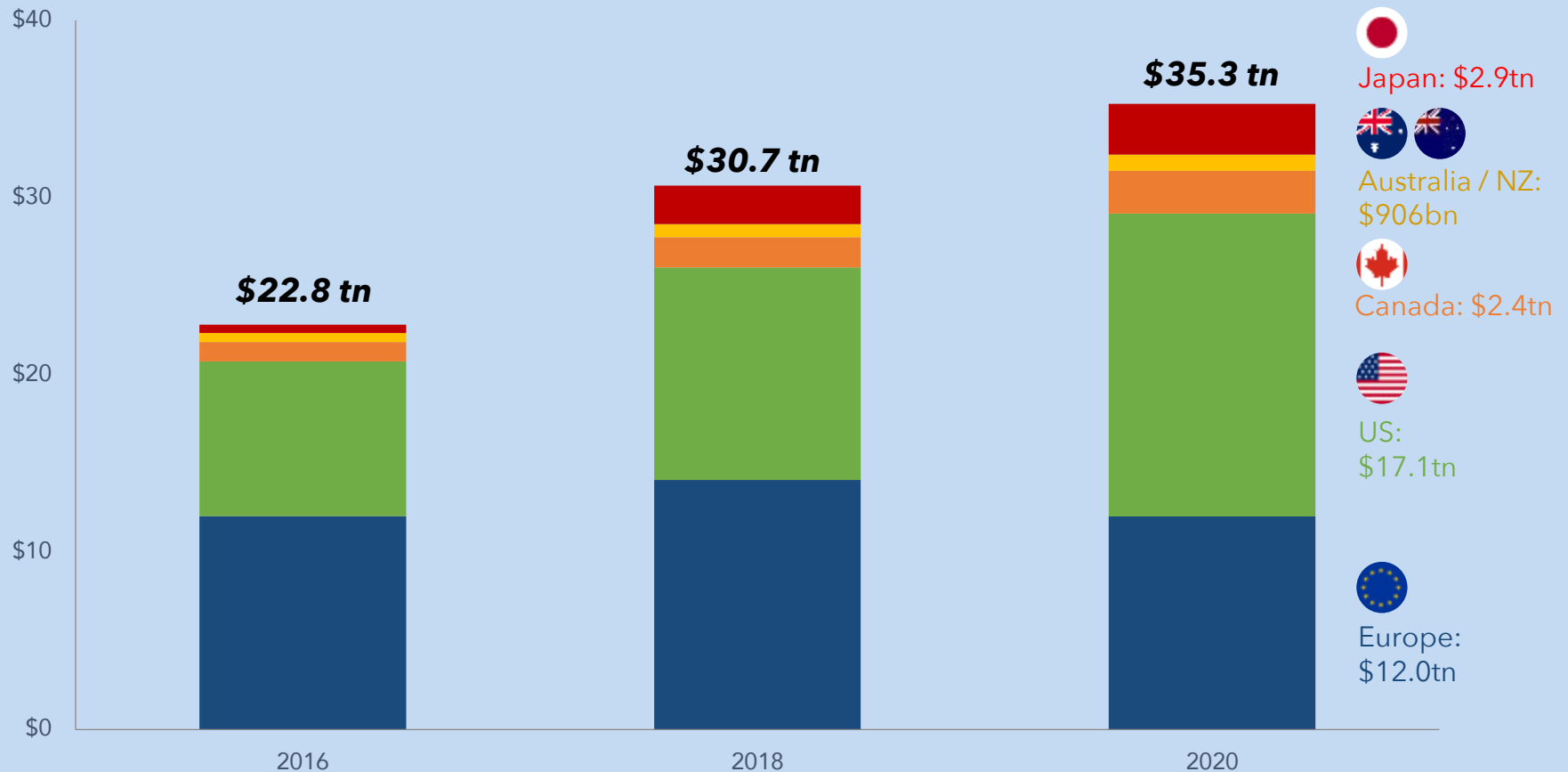


Source: (1) UN PRI. Total Assets under management (AUM) include reported AUM and AUM of new signatories provided in sign-up sheet that signed up by end of March of that year. Total AUM since 2015 excludes double counting resulting from subsidiaries of PRI signatories also reporting, and external assets managed by PRI signatories. AUM for previous years include some element of double counting. Includes AUM and asset owners. Quarterly Signatory Update - April to June 2022.

Over \$35 Tn of Sustainable AUM Globally

Between 2018 and 2020, assets under management in the US sustainable investment market rose 42% to \$17 trillion, just under half of global AUM tracked in the GSIA's biannual report

Global sustainable investing assets, USD tn

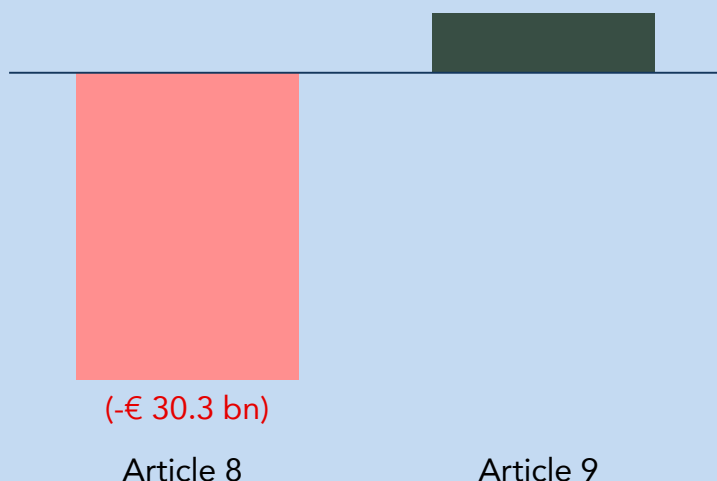


Source: (1) Global Sustainable Investment Alliance, "Global Sustainable Investment Review 2020." (July 2021).

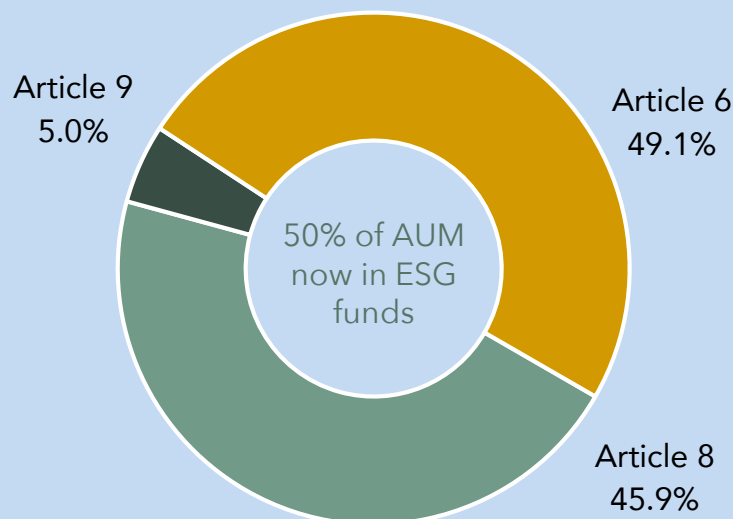
European Fund Flows into Top Quality ESG

Europe's Sustainable Finance Disclosure Regulation requires European asset managers and financial advisors to categorize their products into sustainability classifications. In a recent report, market researcher Morningstar found that 23% of European investment funds claiming to "promote" sustainability characteristics (i.e., Article 8 funds) did not meet the applicable standards, stripping them of their ESG labels. Morningstar data also shows an influx of assets into the most stringently labeled ESG funds.

Q2 2022 fund flows for Article 8 & 9 funds
€ 5.9 bn



European fund assets by SFDR type



SFDR Classification

Article 6: products that do not integrate any kind of sustainability objectives into investment process

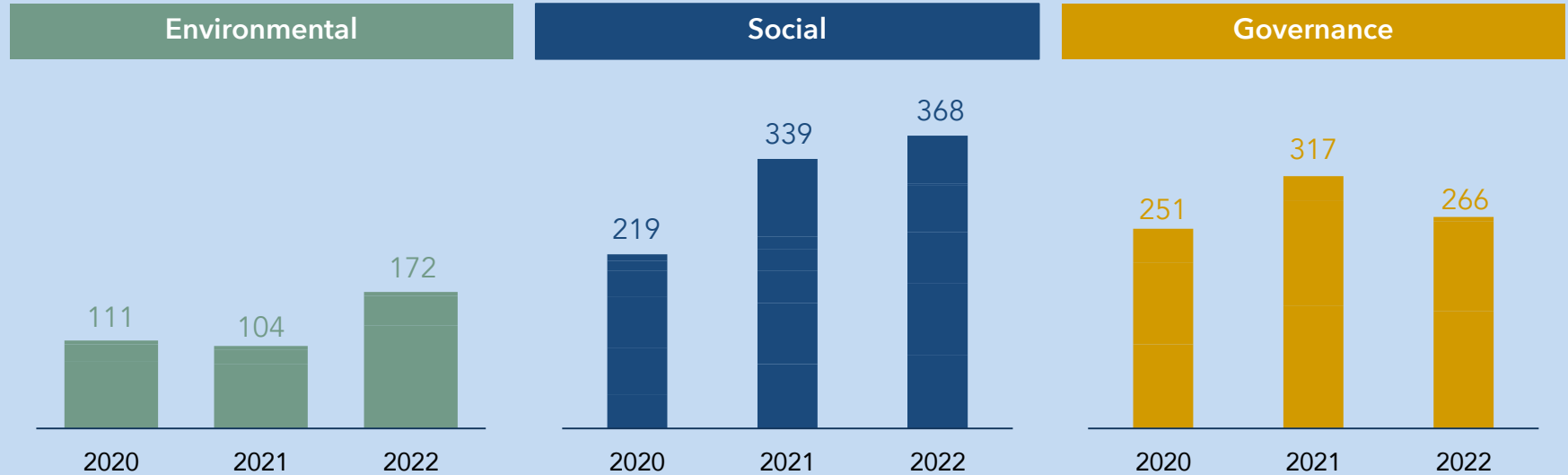
Article 8: products that promote Environmental or Social characteristics provided good Governance practices are also in place

Article 9: products with a sustainable investment objective and an index designated as a reference benchmark

Source: (1-2) Morningstar, "SFDR Article 8 and Article 9 Funds: Q2 2022 in Review" (July 28, 2022).

Shareholder Engagement at Record Levels

In the 2022 US proxy season, shareholders filed a record number of ESG related proposals



Key topics for shareholder engagement

Environmental:

- Climate change
- GHG Emissions
- Recycling / Sustainable Packaging
- Pollution
- Climate Lobbying
- Pesticide Use
- Say on Climate

Social:

- Human Rights
- Diversity - Board / Workforce
- Racial Equity Audit
- Employee Rights and Safety
- Pay Disparity - Gender / Race / Ethnicity
- Lobbying

Governance:

- Independent Board Chair
- Declassified Board
- Shareholder Nominees Election
- Shareholder Rights

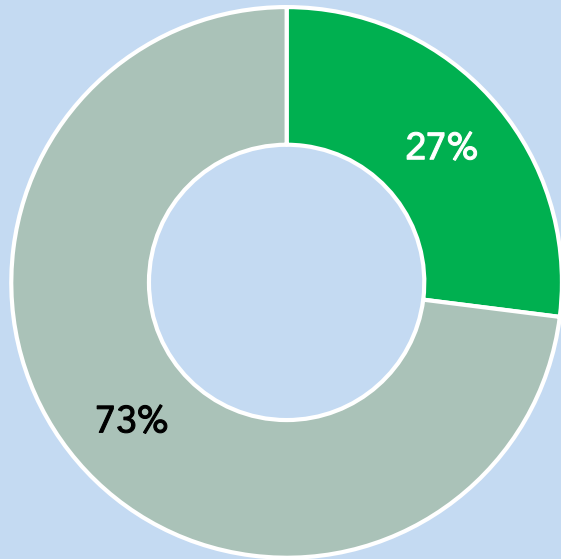
Source: (1) Freshfields "Trends and Updates from the 2022 Proxy Season". ISS. Harvard Law Review

More Selective Engagement

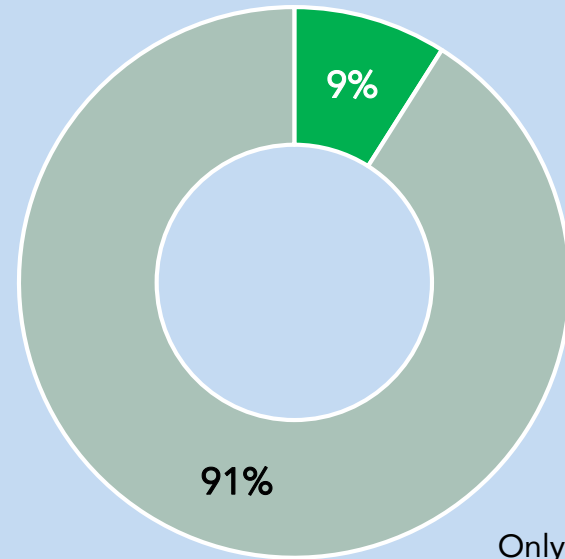
While the volume of ESG shareholder proposals increased in 2022, support declined significantly from 2021. Proposals that were supported, tended to be tailored and core to a company's business. In 2022, an ESG counterpoint movement also emerged with some parties pushing for an "anti-ESG" focus.



Percentage of Russell 3000 shareholder proposals with majority support:

2021, based on 131 shareholder proposals



2022, based on 208 shareholder proposals



 > 50% support
 < 50% support

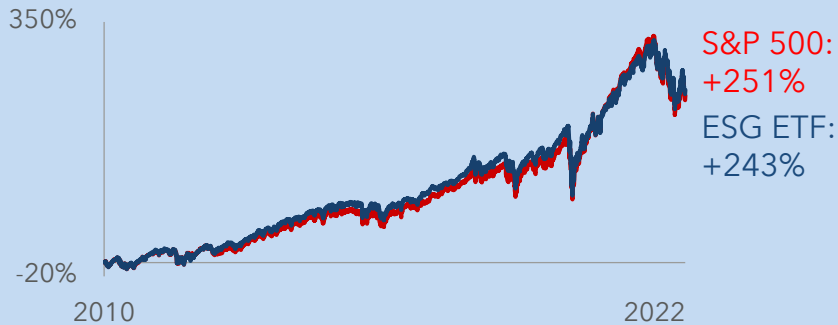
Only 22% of environmental and 11% of social proposals received majority support

Source: (1) Harvard Law Forum on Corporate Governance, Freshfields: "Trends and Updates from 2022 Proxy Season".

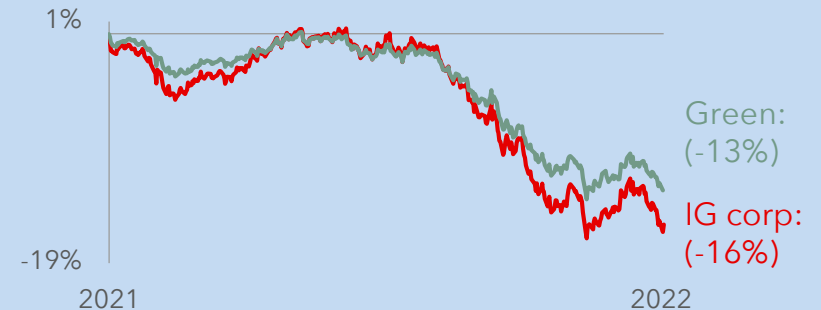
ESG's Market Performance

The global surge in commodity prices has slowed ESG's outperformance but investors are still putting money into "best-in-class" sustainable business models, driving outperformance over the long run

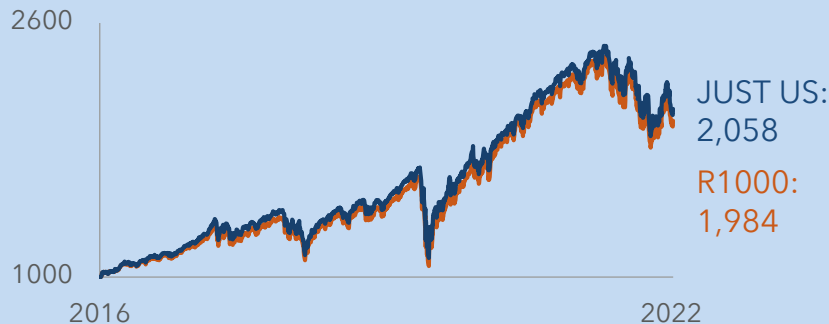
ESG ETF vs. S&P 500



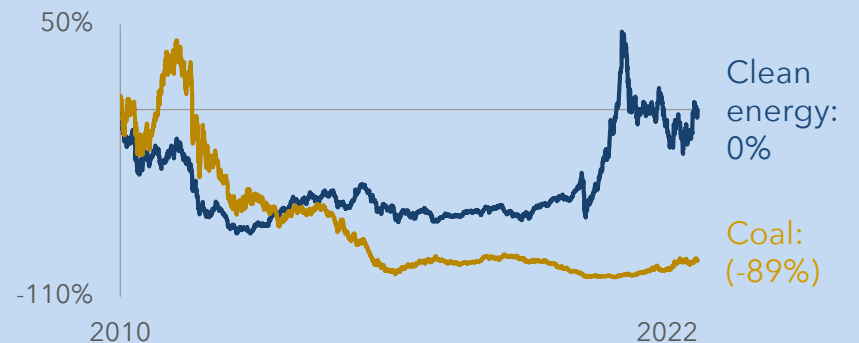
US green corp bond index vs. US IG corp bond index (Total return)



JUST US vs. Russell 1000 (Total return index)



Clean energy vs. coal



Source: (1-4) Bloomberg. Data as of September 7, 2022. ESG ETF is MSCI USA ESG select. Clean energy is S&P 500 global clean energy index. Coal is Dow Jones coal index. JUST US Large Cap Diversified Index tracks the top 50% of Russell 1,000 companies as ranked by Just Capital. "Sustainable Equity Funds Outperform Traditional Peers in 2020".



5 Corporate Strategy: Multi Stakeholder Integration

Summary Conclusions

- 1** **Corporate commitment:** Corporate commitment to ESG remains robust with over 3,400 entities committed to the TCFD disclosure framework and over 2,800 organizations committed to the Science Based Targets Initiative to reduce emissions. While the recent regulatory and market focus has been skewed to the “E” component of ESG, employees and shareholders remain focused on the “S” component.

- 2** **Significant challenges to reaching net zero:** A growing number of companies are making public commitments to Net Zero, but the majority of them are not “on track” to meet their goals. Many corporate plans require significant technological advancements that are not yet commercially viable or rely on renewable energy credits and offsets.

- 3** **Shareholder capitalism to stakeholder capitalism:** After decades of “shareholder” capitalism, corporates have transitioned to a period of “stakeholder” capitalism where they must balance the demands of shareholders, employees, regulators and customers.

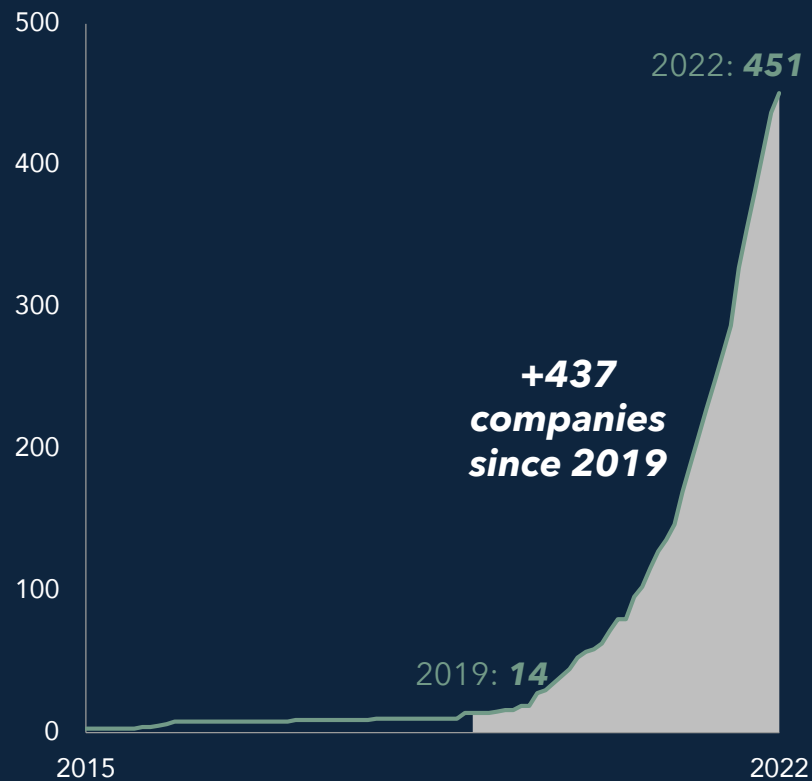
- 4** **Bank commitment to ESG remains high:** Banks are increasingly committing to Net Zero in their “financed” emissions, requiring increased disclosures from corporates they lend to. Additional bank regulation is expected in 2022 and 2023 which could require enhanced disclosure for “financed emissions”.

- 5** **ESG paper supply slowing, but on par with market:** 2022 ESG related issuance is down roughly 20% year on year. However, compared to global bond issuance down 30% and oil and gas issuance down 16%, ESG issuance trends appear in-line with the broader market slowdown. Further, if the record 2021 issuance year is excluded, ESG issuance is on track to grow from pre-COVID annual levels.

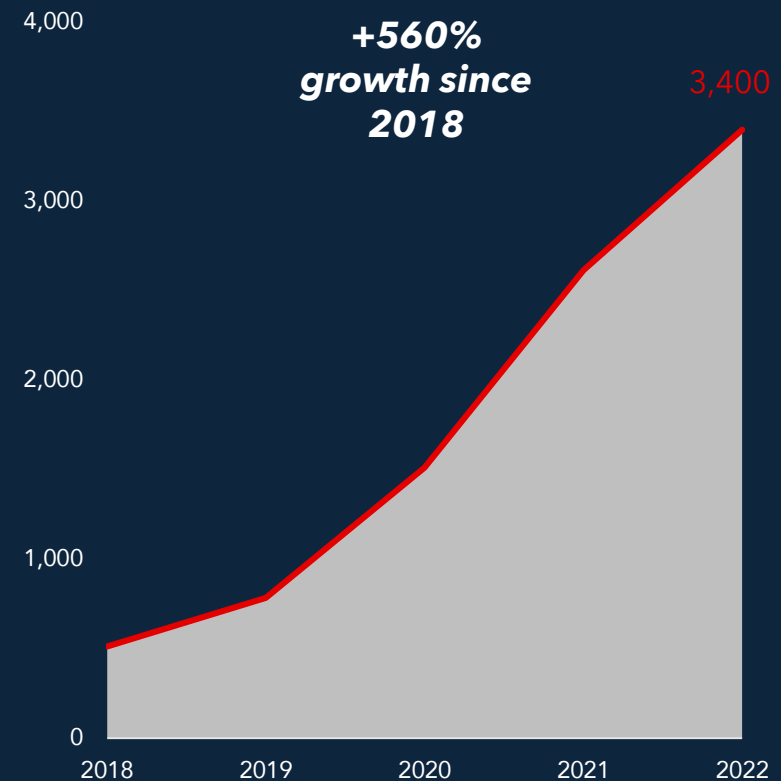
Companies Keeping Pace with ESG

Companies globally are becoming more outspoken and transparent about their Net Zero goals. Ahead of expected regulatory action, companies are rapidly adopting voluntary disclosure models (such as TCFD, SASB, or GRI) and publicly setting Net Zero goals for their businesses. As of Q2 2022, 451 of the world's 650 largest companies in the heaviest-emitting sectors had made Net Zero pledges.

of 650 largest companies in the heaviest-emitting sectors making Net Zero pledges



of entities supporting TCFD disclosure framework



Source: (1) BloombergNEF. "Corporate Net-Zero Assessment Tool" (March 2022). (2) Task Force on Climate-Related Financial Disclosures. 2022.

Corporate Commitments to Net Zero

An assessment from the Climate Action 100+ shows that momentum around climate commitments is growing, but most of the world's heaviest emitting companies are still in the early stages of the shift to a Net Zero economy.

CA 100+ Net Zero Company Benchmark Indicator (Number of Focus Companies)

1) Net Zero GHG emissions by 2050 (or sooner) ambition



2) Long-term (2036-2050) GHG reduction target(s)



3) Medium-term (2026-2035) GHG reduction target(s)



4) Short-term (up to 2025) GHG reduction target(s)



5) Decarbonization strategy



6) Capital allocation alignment



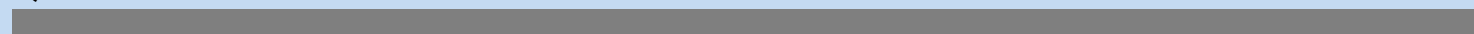
7) Climate policy engagement



8) Climate governance



9) Just Transition



10) TCFD disclosure



● Yes, meet all assessment criteria

● Partially meet assessment criteria (at least 1 sub-indicator was met)

● No, does not meet all assessment criteria

● Not assessed

Source: Climate Action 100+

Renewable Energy Credits Necessary for Targets

A new study by Nature Climate Change finds that many companies only appear to be on target to meet Paris aligned climate goals because of the use of renewable energy credits. The credits allow companies to buy certificates from clean power providers to offset their true carbon emissions. Without the accounting offsets, the percentage of companies studied with climate goals aligned with the 1.5°C Paris Agreement limit drops from 68% to 36%.

Companies with climate goals that are...	RECs included	RECs subtracted
Aligned with the 1.5°C Paris Agreement limit	68%	36%
Aligned with the 2°C limit	8%	12%
Not Paris – Aligned	24%	52%

Source: (1) Bloomberg, "Companies' Climate Goals in Jeopardy From Flawed Energy Credits" (June 9, 2022). "Renewable energy certificates threaten the integrity of corporate science-based targets," Nature Climate Change.

Banks as Key Stakeholder

As the global regulatory dynamic evolves, banks have committed to aligning their lending and investment portfolios with Net Zero emissions by 2050. As a result, banks are encouraging corporates to develop credible, science based plans for the energy transition.

The UN led Net Zero Banking Alliance

116	Bank signatories to the Net Zero Banking Alliance
41	Countries represented by bank participations
\$70 Tn	Total assets of banks committed to the Alliance
39%	Percentage of global banking assets represented by participants

Commitments for Alliance aligned banks:

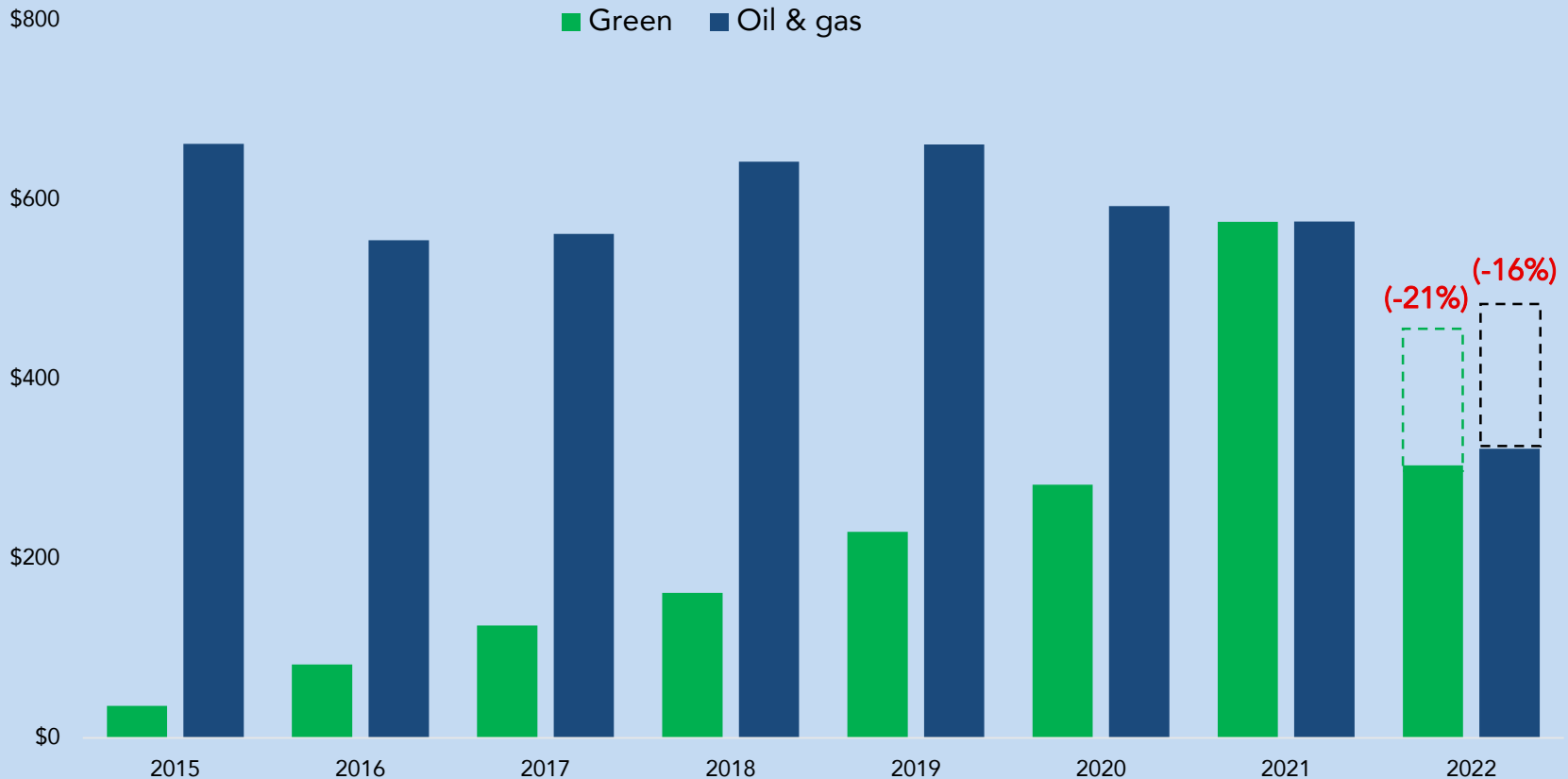
- **Set and publicly disclose long-term and intermediate targets** to support meeting temperature goals of the Paris Agreement
- Establish **emissions baseline and annually measure and report** the emissions profile of their **lending portfolios and investment activities**
- Use widely accepted **science based decarbonization scenarios** to set long-term and intermediate targets
- **Regularly review** targets to ensure consistency with current climate science

Source: (1) UN Net-Zero Banking Alliance

Green Issuance Slows in 2022

In the US, the amount of bonds and loans issued for green projects has been steadily rising relative to the amount raised for traditional fossil fuel projects. In 2021, a nearly identical amount was raised for green & fossil fuel projects. While green, social, sustainability and sustainability-linked bond issuance is down roughly 20% y/y, total global bond issuance has declined 30%.

Annual amount of bonds and loans issued, USD bn

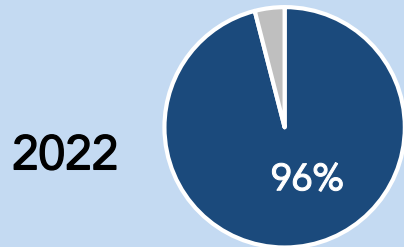
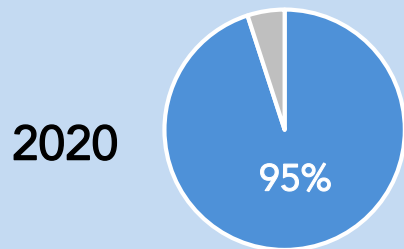
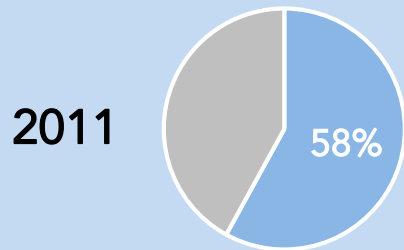


Source: (1) WSJ, "Wall Street, Like the Climate Bill, Bets on Both Green Energy and Fossil Fuels" (August 14, 2022). Dealogic. 2022 data through early August.

Corporate Focus on the "S" & "G" of ESG

While much of the policy focus to date has been focused on the "E" portion of ESG, the "S" and "G" components remain important for corporate stakeholders. In response to shareholder demands, corporates have been increasing diversity at the board and management level.

% of S&P 500 companies with 2+ women directors



92%

S&P 500 boards with at least one racially / ethnically diverse director in 2021

36%

Russell 3000 boards with diverse directors in 2021

27%

Overall female directors in the Russell 3000 in 2021

30%

Overall female directors in S&P 500, compared to 16% in 2011

21%

Overall racially / ethnically diverse directors in the S&P 500 in 2021

15%

Russell 3000 boards with racially / ethnically diverse directors in 2021

Source: Freshfields "Trends and Updates from the 2022 Proxy Season". ISS. Harvard Law Review

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Role

Tom Joyce is a Managing Director and Capital Markets Strategist within MUFG's global capital markets and investment banking business. Based in New York, Tom heads a team that creates customized analytical content for multi-national S&P 500 companies. His team provides in depth analysis on the impact of economic, political, public policy and regulatory dynamics on the US credit, foreign exchange, rates and commodities markets.

Experience

Tom has over 25 years of Investment Banking experience in New York, London, Hong Kong, and San Francisco. Over the last 15 years, Tom created and built the Capital Markets Strategy role, advising corporate C-Suite executives (Boards, CEOs, CFOs, and Treasurers) on the pervasive macro forces driving markets. Tom also presents at dozens of corporate events each year including Board meetings, CEO ExCo sessions, CFO and Treasury off-sites, corporate leadership events and conferences.

Education

Tom's educational background includes a year of study at Oxford University from 1991 - 1992, a Bachelor of Arts in Political Science from Holy Cross College in 1993, and a MBA from Kellogg Business School, Northwestern University in 2000.

Personal

Tom resides in New Canaan, CT with his wife and four sons, where he coaches youth basketball and serves on the Board of Trustees of the New Canaan Library, the Board of the New Canaan Football (Soccer) Club and the Holy Cross College President's Council.

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Experience

Hailey has a decade of Wall Street experience, including three years as a Consumer Sector Specialist in Equity Sales and seven years as a Capital Markets Strategist. Hailey is also a member of MUFG's Inclusion & Diversity Council and has devoted years to participating in and developing Wall Street recruiting programs.

Education

Hailey graduated with honors from the University of Michigan's Ross School of Business with a BBA and a minor in International Studies.

Personal

In March 2020, Crain's New York Business Magazine named Hailey one of the "Rising Stars in Banking and Finance".



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Experience

Stephanie has spent over five years as a Capital Markets Strategist. She is an active member of the University of Michigan recruiting team and is also focused on the diversity recruiting effort at MUFG. At her prior firm, Stephanie was a part of the Americas Women's Network Junior Council.

Education

Stephanie graduated with honors from the University of Michigan's Ross School of Business with a BBA .

MUFG's Capital Markets Strategy Team

The MUFG Capital Markets Strategy team provides monthly publications and weekly policy notes, presenting to Boards and C-Suite executives, on a broad range of transformative themes driving the FX, rates and credit markets including: the COVID-19 recovery, ESG's acceleration, tax code policy changes, US-China decoupling, corporate strategy, geopolitical risk and central bank monetary policy.



MUFG's Capital Markets Strategy Team



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