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POLICY

Will China Bite Russia's Gas Bait?

Now that cheaper gas imports are presumably available to China as Europe moves to wean itself off Russian supplies, will Beijing be tempted to officially assign a much bigger role for gas in its energy transition? Or will China also be more wary of its gas-rich neighbor who does not hesitate to use energy as a weapon in times of conflicts?

Beijing has so far kept the world guessing about its intent and is likely to continue doing so to maximize its bargaining power. It will also need time to weigh the pros and cons: The potential benefits of cheaper gas from its close neighbor and ally could well be offset or even negated by the risks of a deepening strife with the US and its allies, not to mention the perils of conducting business with Russia and the technical difficulties of accessing the promised Russian gas reserves.

In its latest five-year (2021-25) energy plan, Beijing did not state the ratio it expects gas to occupy in the country's future energy mix. The omission is indicative of its preference for self-sufficiency: Beijing likely wants its investments for boosting domestic gas reserves to first bear fruit before committing to a specific ratio for the cleaner-burning but pricier fossil fuel. In general, gas has been growing in China's energy mix: Natural gas managed to grow its share from 5.9% to 8.4% in the country's primary energy during 2016-20, thanks mainly to imports of pipeline gas and LNG.

Pros and Cons

Some believe Beijing would tread carefully due to the high political stakes involved: "We think China will be cautious … The geopolitical blowback of deepening energy ties with Russia at this stage is likely too risky for China," said Bernstein analysts in a recent report. Even if China appears agreeable — as signaled by the agreement signed earlier this year to import an additional 10 billion cubic meters per year from Gazprom — the absence of details is widely seen as suggestive of the deal having greater political significance than commercial viability.

The additional gas is likely to come from the 21 Bcm/yr Yuzhno-Kirinskoye field off Sakhalin Island, part of Gazprom's Sakhalin-3 upstream project. But the development of Yuzhno-Kirinskoye has been hampered by technical challenges since US sanctions imposed exclusively on the field in 2015. It is therefore unclear whether the project can indeed be launched in 2023-25 and reach design capacity in 2029-33, as envisaged by Gazprom

Alternatives: Nuclear, Renewables

In addition, Russian gas will have to compete against nuclear and renewable energy, which, unlike gas, are deemed "non-fossil fuels" with near-zero emissions that could help China decarbonize more effectively. Under the current five-year plan,

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RENEWABLE ENERGY PRICE PARITY

Europe	Gas ($/MMBtu)	CO2 ($/ton)
Market Price	23.23	85.17
Wind Onshore	0.04	0.00
Solar PV	-3.89	0.00
US		
Market Price	7.26	0.00
Wind Onshore	2.62	0.00
Solar PV	0.10	0.00
Japan		
Market Price	36.50	0.00
Wind Onshore	8.52	0.00
Solar PV	5.31	0.00

Market prices Jan 28. Table indicates either gas or CO2 price needed for new renewable energy to match profitability of new gas-fired power, without subsidies. High US carbon prices reflect low gas prices. Japan at parity so no carbon price needed. Source: Energy Intelligence

Beijing has set a goal of boosting the share of "non-fossil fuels" from 15.9% in 2020 to 20% of China's energy consumption in 2025, further increasing to 25% in 2030. Just a couple of months ago, Beijing gave the go-ahead for building six new nuclear reactors — the highest number of nuclear units approved in a single stroke since 2008. The aim is to increase nuclear capacity by 21 gigawatts to 70 GW by 2025.

China is also erecting gigantic wind and solar farms across vast expanses of deserts and wilderness to achieve multiple targets: emissions reductions, wealth creation in poorer provinces as well as sandstorm management. Construction work has already commenced on 85 GW of the total 450 GW in wind/solar capacity being planned in such arid regions — under a goal of doubling the national total renewable generation capacity to at least 1,200 GW by 2030.

Prefers Self-Sufficiency

Nuclear and renewable energy have another advantage over Russian gas: They can both be produced or harnessed domestically, thus satisfying Beijing's emphasis on "stronger energy self-sufficiency under its 2021-25 energy plan. The domestic energy production goal it has set implies the country is aiming to lower overall import dependence to just 16% in 2025, from as high as 22% during 2016-20. China is over 40% dependent on imports for its gas requirements and that dependence has been rising over the years. So the case for increasing Russian gas imports is not too compelling from the self-sufficiency perspective.

Cost Is Wild Card

The argument that China is not yet "addicted" to gas, and therefore its demand would be highly price elastic, has been verified by latest official data. Chinese LNG imports plunged by a whopping 21% year on year during the first six months of 2022 amid sky-high prices, according to figures from the National Bureau of Statistics. While China did import 11% more pipeline gas — presumably due to increases in Russian supplies — the amount is not large enough to offset the fall in LNG. The net result is a 10% reduction in overall gas imports.

China could, of course, be tempted to further hike imports from Russia if Moscow offers its gas at a steep enough discount. "Beijing now holds all the cards in the negotiations … China will drive a hard bargain," observed Nikos Tsafos, chair for Energy and Geopolitics at the Center for Strategic and International Studies, in a recent commentary. But even if Moscow concedes to Chinese pricing terms, Beijing still has to weigh the not-inconsequential political price of aligning too closely with Russia.

Kim Feng Wong, Singapore

TRANSPORTATION

Electric Vehicles Taking Fast Lane, But Potholes May Loom

Rapid electric vehicle (EV) uptake appears to be the "most probable pathway globally" — not just a possible outcome as presumed before. Yet several risks and what-ifs could trip up that growth, according to the latest EV market analysis from Energy Intelligence's Energy Transition Service. A slowdown could happen if battery material costs continue rising, if manufacturing and supply chain challenges linger, if charging infrastructure remains inadequate, and if problems arise with electricity prices and grid connectivity. The report lays out three scenarios for EV adoption while explaining the various risks and drivers, drawing from data from top auto markets — the US, China and Europe, and now, South Korea and Japan, which are included in the report for the first time.

Drivers and Scenarios

If all of those challenges put the brakes on EV growth, Energy Intelligence's low scenario would play out (see graphs). A core case would occur, on the other hand, if EV sales growth continues and accelerates from the mid-2020s with the help of falling costs, automaker investments and government policies such as internal combustion engine (ICE) vehicle bans. A high case would unfold if costs decline rapidly and if government action is strong, with ICE sales marginalized in top auto markets.

Many of these drivers boil down to a major question: how soon EV battery costs come down to the point that they are competitive with ICE vehicles. Supply chain challenges would delay the moment of "price parity" by around two years but not stop the overall trend, the report finds.

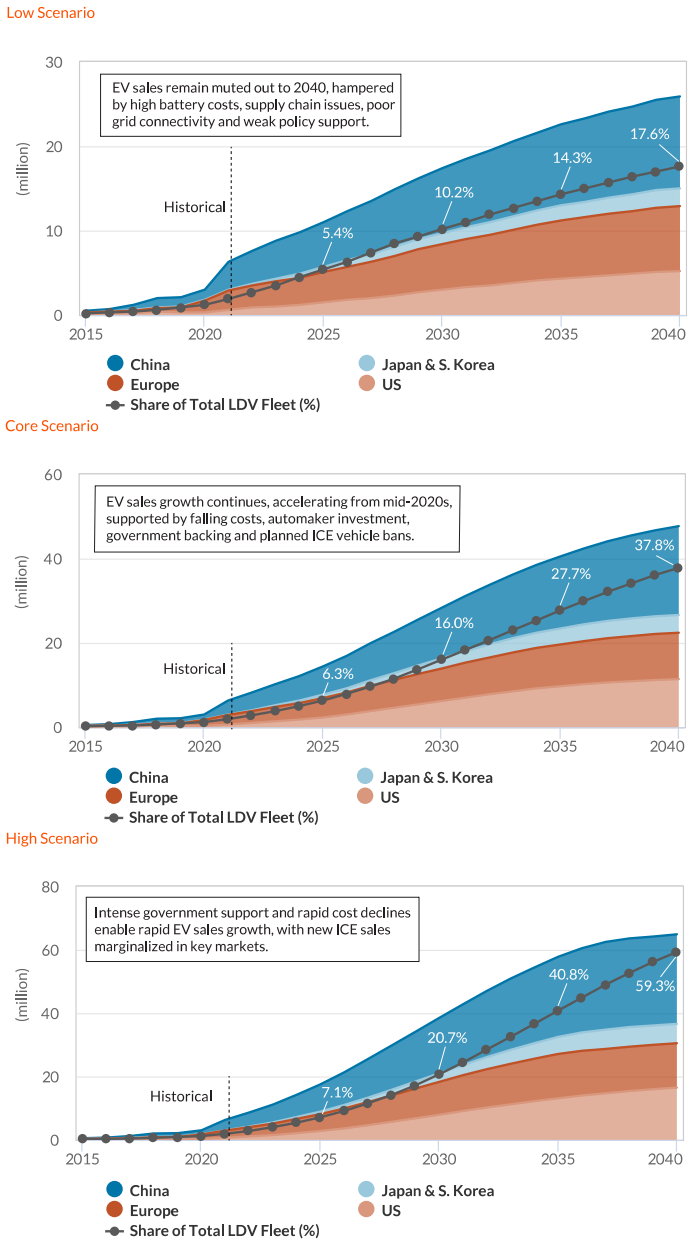
More Headwinds to Watch

Several other surprises and risks could affect how quickly EVs will displace ICE vehicles and ultimately erode oil demand in transport. "Several short-term factors could impact EV uptake in the near term, including the possibility of a global recession, fluctuations in oil prices, further geopolitical tensions and US midterm election results," says Alex Martinos, head of Energy Transition Research at Energy Intelligence and a co-author of the report.

Over the medium term — out to the middle of this decade — the big questions surround whether production capacity can keep pace with rising demand. "China may play a significant role — for example if President Xi Jinping extends 'zero Covid' policies or perhaps restricts the sale of lithium-ion batteries. Either policy would push up raw material prices and prolong supply chain disruption, increasing costs for producers and consumers," says Martinos. Another factor to watch is the roll-

out of major government-backed investments in charging infrastructure, including in the US, which would remove "one of the last remaining obstacles to mass adoption" if such initiatives prove successful.

PLUG-IN EV SALES SCENARIOS BY COUNTRY/REGION



Source: Energy Intelligence

Supply Chain Kinks

Disruptions in the global supply chain for the auto sector, including EVs, are particularly unpredictable. The disruptions are pushing up prices for producers and, in turn, consumers. "Given China's dominance of the supply chain and the impact of its 'zero Covid' policy, this could remain an issue for a while," says Sam Burman, an analyst with Energy Intelligence and one of the co-authors of the report. Yet the issues are expected to be resolved — and thus prices would be eased back — over the next few years as battery and semiconductor capacity increases outside China and as metals supplies recover from a Covid-19-induced slump. Future supply disruptions could also be mitigated by greater metals efficiency, the use of alternative, cheaper materials and new battery chemistries, Burman adds.

Regional Divide

As is widely known, the US has long lagged behind China and Europe in terms of EV sales due to major differences in the level of support and the forcefulness of government action. Similarly in Japan and South Korea — two markets now included in the analysis for the first time — automakers have historically backed hybrids, which partly explains why pure EV adoption in these two countries is relatively low.

Going forward, all regions "will likely experience rapid sales growth." This would happen as purchase costs fall for consumers, as governments continue promoting EVs, and as automakers align toward emissions targets and face continual pressure from shareholders and consumers to decarbonize. "The disparity will continue in sales, but could narrow in terms of fleet composition," says Burman. "Europe will likely continue to see higher sales, but has historically seen longer vehicle cycle time. By contrast, sales in the US are likely to lag due to disparate public backing and a lack of fast, public charging, but the US typically sees more rapid vehicle fleet turnover."

Lauren Craft, Washington

NEW TECHNOLOGIES

Carbon Capture and Usage: Vital But Limited Role

Carbon capture, utilization and storage's (CCUS) role in a net-zero world is to remain "limited," the Energy Transition Commission (ETC), an international think tank, argues in a new report. But limited does not, by any means, signify tiny. Indeed, the ETC found that CCUS should reach 7 billion-10 billion tons of carbon dioxide per year by 2050 for global warming to keep a good chance of staying near 1.5°C. This is more or less the current physical size of the oil and gas industry, which in 2021 has been handling 4.2 billion tons of oil and 3.4 billion tons of gas. The report considers direct air capture (DAC) and bioenergy with carbon capture and storage (BECCS) as subcategories of CCUS.

Most decarbonization of the energy sector will come from renewables — plus some nuclear — but CCUS will be "vital"

to decarbonize processes such as cement production which by nature generate CO2. It is also critical to provide low-cost decarbonization in some sectors and geographies where CCUS is cheaper than other options. Further, DAC and BECCS will be necessary to remove some of the CO2 which is already in the atmosphere if global climate objectives are to be achieved.

'Big Mountain to Climb'

Kash Burchett, the report's lead author, agrees that building a multibillion-ton industry in less than three decades is challenging. "But the technology does exist, it works, and prospects for cost declines are substantial." And while the physical size of a future CCUS sector matches that of the current oil and gas industry, the annual investment involved is only one-third of today's oil and gas amount, at around $150 billion versus $500 billion per year, Burchett notes. "It's a big mountain to climb, but it's not impossible," he insists, citing the French government's decision to build a fleet of nuclear power plants after the 1973 oil crisis as an example to follow and a guide of how fast an industry can be deployed.

CCUS is often criticized because it would legitimize business-as-usual. "Historically, CCUS has been seen by a lot of people, particularly green NGOs, as a Trojan horse and a means to continue burning gas and coal in power generation," says Burchett. "That argument was not entirely unfair, but CCUS is no longer a power story." This is because the cost of solar and wind has come down at a far faster rate than anyone had anticipated. Fossil fuels with CCUS would only amount to 10%-15% of the global energy mix by 2050, according to ETC modeling. Oil demand would fall by 90% to under 10 million barrels per day. Gas would be better off at 2,700 billion cubic meters or minus 30% from current levels, and would be mostly used as chemical feedstock and to make blue hydrogen.

Fossil fuels would account for 2.5 billion-4 billion tons of CO2/year of CCUS, including 0.6 billion-0.9 billion tons just for blue hydrogen. Another 0.5 billion-0.8 billion tons would be needed for cement production and other carbon-intensive industrial processes. But the bulk of future CCUS activity, or 4 billion-5 billion tons/year, would be to generate negative emissions and neutralize the impact of the likely carbon budget overshoot ahead of mid-century, as well as continuing residual emissions after 2050 of both CO2 and nitrous oxide (N2O), notably from agriculture.

Carbon removals can in part be achieved through nature-based solutions (NBS) such as reforestation. The ETC believes NBS will play a big role in the 2020s because they are quick and easy to implement. But their potential scale is limited as they are land-intensive and, perhaps more importantly, less permanent than engineered solutions involving underground storage. Among those engineered solutions, BECCS will similarly be constrained by the availability of sustainable biomass, says Burchett.

Big Role for DAC

In contrast, the ETC believes DAC will play a big role and could capture as much as 3 billion-4.5 billion tons/year by 2050. The main constraint on DAC relates to energy needs. With today's energy efficiency, capturing 3 billion tons of CO2 would imply an additional 9,000 terawatt hours in electricity demand, compared to total electricity production of 27,000 TWh today. This is "not viable," says Burchett. "But we don't think that DAC technology is going to stand still between now and 2050, with innovative solutions which are already being developed by the industry at commercial scale." That could bring down the energy to capture 3 billion tons from 9,000 TWh to 3,000 TWh, which is "still significant but more manageable."

In terms of land intensity, generating 3,000 TWh of solar photovoltaic power would require some 45,000 square kilometers or the size of Estonia. By comparison, the ETC estimates that achieving the equivalent sequestration via NBS would require land use or land management changes applied to around 6 million square kilometers or twice the size of India.

For DAC to reach such a large scale, it is essential to start projects now in order to expedite learning, Burchett warns. "The more and the quicker you build this stuff, the faster you'll reduce your costs." To this effect, Occidental Petroleum's ambition to build 70 DAC plants of 1 million tons/year each by 2035 is "remarkable."

Philippe Roos, Strasbourg

NEW TECHNOLOGIES

Small-Scale GTL Shaping Up for Energy Transition Role

Technology that converts methane from natural gas into synthetic liquid fuels, known as gas-to-liquids (GTL), has developed a bad reputation, especially in the last decade. GTL pioneers like Shell and Sasol have had some success with their technologies in a few countries. But efforts to roll out large-scale GTL schemes more broadly have largely failed, including some high-profile project cancellations in the US. Today, amid higher commodity prices and an increased preference for lower-emissions products, GTL technology is getting another look.

Focus has largely shifted to small-scale modular GTL solutions and away from the multi-billion-dollar type of megaprojects that are currently on line (only six commercial GTL plants in five countries are operating today). Small-scale modular GTL has been in development for years and many believe these types of applications are the key to making the technology economically viable due to the lower capital and

construction risks and overall project flexibility. But GTL is also emerging as a potential energy transition technology — from mitigating gas-flaring to producing sustainable aviation fuel (SAF) and other products from bio-waste and renewable natural gas.

From Waste to Clean Fuel

GTL technology was first developed almost a century ago by German scientists who pioneered what is known as the Fischer-Tropsch (FT) process of building hydrocarbon chains. Most GTL technology today uses some variation of the FT process, although alternative approaches have been developed more recently that convert synthesis gas — or "syngas," comprising carbon monoxide and hydrogen — into methanol and then into gasoline and other products.

Privately held Bluescape Clean Fuels and London-listed Velocys are each focused on adopting their technologies to produce low-carbon fuels. Bluescape, which acquired its technology from the company formerly known as Primus Green Energy, uses a proprietary process known as STG+ (syngas to gasoline plus other products) to produce drop-in gasoline, although it is currently working on a design for diesel and jet fuel. Its feedstock can be derived from either fossil gas or gasified biomass, but it is currently targeting production from renewable feedstocks to meet growing demand for decarbonized fuels. A demonstration plant near Bluescape's headquarters in New Jersey has booked more than 11,000 hours of run time, according to its website.

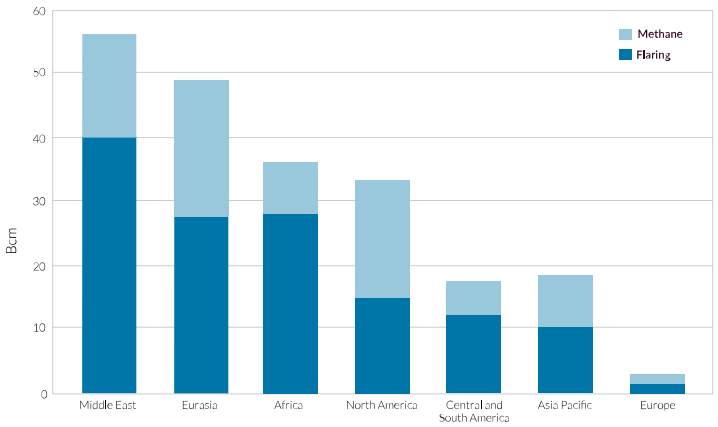
Velocys's technology is based on a more conventional FT process but the company appears to be further along in commercializing it. The company uses landfill waste or woody biomass to produce SAF and has run successful commercial demonstration plants in the US and Japan. It is planning to build a new "reference project" in Natchez, Mississippi, and another in the UK. The Mississippi facility, known as Bayou Fuels, is in the preliminary front-end engineering and design phase and would have capacity of about 35 million gallons of SAF per year.

Velocys last year struck 15- and 10-year SAF offtake deals at Bayou Fuels with Southwest Airlines and IAG, respectively. The agreements account for the plant's full SAF output and "underpin the financing of the construction capital" for the biorefinery, according to Velocys. In 2019, Velocys tapped Oxy Low Carbon Ventures to capture and store CO2 emissions from the Bayou Fuels plant, reducing the carbon intensity of the produced fuel even further.

Flare Mitigation

While several small-scale GTL providers have longer-term ambitions to tap the sustainable fuels market, a more immediate application for many of them is to reduce flaring in the oil patch. Oil and gas operators flared more than 140 billion cubic meters of gas in 2021 globally, with another 125 Bcm vented or leaked into the atmosphere, according to the International Energy Agency.

NATURAL GAS VOLUMES FROM FLARING AND METHANE RELEASES



Note: Methane abatement estimates take into account that flaring reductions would reduce methane that is emitted due to incomplete combustion in flares (8% of natural gas and natural gas liquids entering flares is not combusted). *Source: International Energy Agency*

Nasdaq-listed EN Global (ENG), a Houston-based energy developer, is already moving into the flare-mitigation market. Earlier this year, the company acquired a European GTL provider called Calvert, which has developed a patented FT-based technology that features a "gliding plasma" solution to produce synthetic naphtha, diesel or crude oil.

The plants are sold in two sizes — 50 barrels per day and 100 b/d — with the smaller model priced at around $4 million for delivery. ENG sells plants to local oil-field services companies who then lease or sell the units to E&P customers. It has an agreement in place with Dubai-based Oilserv to sell plants that will be deployed at flare sites in Iraq, Algeria, Libya and the United Arab Emirates, ENG CEO Mark Hess tells Energy Intelligence. Agreements with additional customers are also in place for deployments in Oman and India, although specific unit designs are still being finalized. The plants can be powered by natural gas or, more often, the existing power grid, Hess says, adding that Calvert's technology is considerably less energy-intensive than conventional GTL.

Oil Prices Rule

Industry watchers are dubious that GTL is on the cusp of a comeback. The "black eye" the technology sustained after so many failed promises will be hard to overcome, says Terry Mazanec, COO of Lee Enterprises Consulting, who spent decades developing GTL technologies with BP, and later with Velocys.

While incentives like California's low-carbon fuel standard and growing demand for clean fuels can help improve the economics for GTL, oil prices will continue to be the biggest driver in project viability, he says. "I'd be very surprised if

there are going to be a great number of these plants built in the next five or 10 years," he says.

Luke Johnson, Houston

INTERVIEW

Private Equity Giant Calls for Patience in Transition: Q&A

Private equity giant Warburg Pincus has long been an investor in oil and gas. But in 2020, it shifted its strategy, deciding to exclude oil and gas investments from its next core global fund. Since then, it has dipped into energy transition investments, including "green" cement developer Eco Material Technologies, environmental credit trader ClimeCo, and renewable natural gas player Viridi Energy. Energy Intelligence recently spoke with Warburg Pincus Managing Director Roy Ben-Dor about the firm's energy transition strategy and the role of private equity as the world evolves to a lower-carbon economy.

Q: Majors and NOCs have increasingly been stepping into the energy transition space. How does private equity (PE) compete in that sector? Is it getting a little crowded?

A: We tend to view the strategics [majors and NOCs] more as collaborators than competitors. In general, we've always played well with others, whether those are financial or strategic in nature. I think that's even more so the case in energy transition…We're all in the business of providing capital, all dollars are green. It's more about kind of the resources and the partnership that you can bring. And in that respect, sure, there are competitors, in that they also bring capital, but we view it where can we partner to try to make a better outcome here for the business, and ultimately, for our investment.

Q: How has PE adjusted to investing in the energy transition space? Has there been a learning curve?

A: We know with certainty that the energy transition and broader decarbonization are happening. We know that a lot of it will require an immense scale of capital to effectuate that transition. What we don't know is how long it will take and how windy the path will be. There's obviously always a lot of uncertainty in any investment that you make. But I would say, particularly for energy transition, it maybe has a little bit more in that space.

This uncertainty, particularly in energy transition, highlights that patience is a key attribute of investing in energy transition. Patience in when to deploy capital, patience in supporting businesses over what might be a less than linear growth path…I do think you have to be prepared for the fact that the world is figuring it out. And therefore it means it won't be linear and it could take longer. That is probably like the biggest adjustment I think all firms are going to have to make.

Q: How is Warburg prepared for that adjustment?

A: We have a demonstrated track record of being patient with investments, holding some investments for north of a decade. So we've had the experience, not born out of the energy transition necessarily…Because of the fact that we're cross-sector oriented, we're just better positioned to attack some of these opportunities in a way where we can bring a multidisciplinary approach both to benefit our underwriting, but also to benefit those businesses. So if you looked across our energy transition or low-carbon investment portfolio, a very substantive portion of it would be two groups working on it together versus a singular categorization.

Q: If there is a longer holding time for investments, is there any different way you have to think about exiting the asset when the time comes?

A: I think for any investment, whether it's in energy transition or not, we go into an investment with a view on what all of the options are. Could this be a public company? Who are the logical buyers of the business? Would it be attractive to another financial player in the future based on its profitability and free cash flow characteristics? So, I think we do the same thing, when we look at an energy transition investment, depending on the stage of that investment. If it's an earlier stage business, versus a more mature business, there's just a wider set of uncertainties around when and how.

Q: Where do you see energy transition investments in the next decade or so?

A: We're very positive that the direction is known of where the world is headed, that the degree of change that will be required is significant. And that change will spawn an opportunity for many different businesses to have considerable impact and prove to be beneficial investments. The scale of capital that is required is massive, which means that all sources have a role to play: credit, private equity, public equity, venture capital. I think there's room for everyone to hopefully help effectuate it, and I would personally be surprised if a decade from now, it's not considered sort of a core investment pillar of most large institutional capital.

Caroline Evans, Houston

IN BRIEF

Biden Moves on Climate

US President Joe Biden is vowing new executive climate action in the coming weeks, calling it a "clear and present danger," but stopping short of a formal "emergency declaration" that would unlock more muscular authorities to tackle climate change. On the heels of Democrats' climate legislation once again stalling out in Congress, Biden, speaking Wednesday at a former coal plant in Massachusetts now part of an offshore wind project, outlined new steps in the administration's push to expand offshore wind leasing in the US Gulf of Mexico. Biden also announced $2.3 billion in federal emergency funding for helping communities with extreme weather preparedness and federal guidance on low-income home energy programs.

The offshore wind announcement proposes two wind leasing areas in the US Gulf, off the coast of Galveston, Texas, and Lake Charles, Louisiana, making up roughly 700,000 acres, though acreage has been slightly scaled back from an earlier proposal last year. The US Interior Department plans to hold up to five additional offshore lease sales and complete reviews of at least 16 offshore wind projects and is developing plans to advance wind development in the mid- and southern Atlantic and off the coast of Florida.

UK Eyes Power Overhaul

The UK government said this week it is looking at ways to change wholesale electricity market rules so that natural gas no longer plays a dominant role in setting the nation's power prices. The government said "proposals out for initial consultation include exploring changes to the wholesale electricity market that would stop volatile gas prices setting the price of electricity produced by much cheaper renewables." It said it is looking for ways to introduce incentives for consumers to use cheaper electricity when there is plenty of wind and sunshine, and reform markets so that technologies such as energy storage are better supported. The UK electricity generation mix comprises roughly 50% renewables and other low-carbon sources, and 48% gas. Over the last year, gas accounted for only 40.8% of the electricity generated in the UK, but it is gas that typically sets wholesale prices.

Adnoc, Total Strategic Pact

Abu Dhabi National Oil Corp. (Adnoc) signed a strategic partnership with TotalEnergies to explore new opportunities for growth across the energy value chain, Adnoc said in a statement. The pact is part of a series of agreements signed during an official visit of UAE President Mohammed Bin Zayed to France to meet President Emmanuel Macron. The visit comes in the context of the EU's challenge in replacing now boycotted Russian fuel. The agreement will see Adnoc and TotalEnergies explore collaboration opportunities in areas including gas growth, carbon capture utilization and storage and product supply, the statement says.

Acwa Green Hydrogen Deal

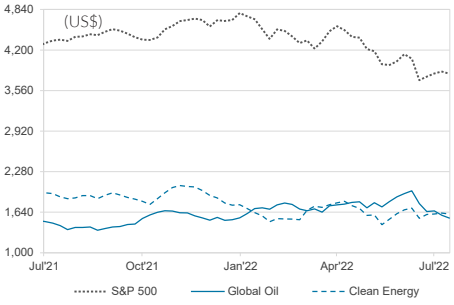
The Saudi leading utility developer Acwa Power has signed an agreement with South Korea steel maker Posco to explore the production of green hydrogen and green ammonia, Acwa said in a statement this week. The memorandum of understanding will involve the joint development of green hydrogen and its derivatives such as green ammonia, allowing Posco to decarbonize its power generation and steel manufacturing processes while serving its Korean clients. The production of green hydrogen and ammonia through new green field investments would support Posco's efforts to reach its target to produce 500,000 tons of hydrogen globally by 2030. Acwa Power is currently developing the region's first and largest integrated green hydrogen plant in Saudi Arabia along with Neom and Air Products, which will produce 1.2 million tons of green ammonia per year upon completion by 2026. Earlier this year, Acwa Power also signed a joint development agreement with Oman's OQ to develop a green-hydrogen based ammonia facility powered by renewable energy in the sultanate.

Permian Firms Eye Methane

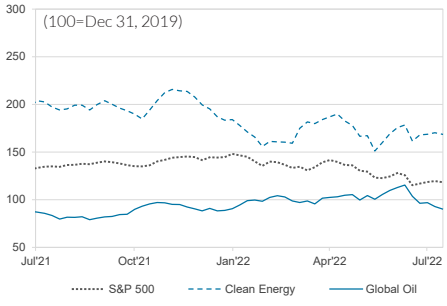
Three of the US' biggest independent hydrocarbon producers are joining a global initiative committed to measuring, reporting and mitigating emissions of methane, a potent greenhouse gas. US giants ConocoPhillips, Pioneer Natural Resources and Devon Energy said last week that they have joined the Oil and Gas Methane Partnership (OGMP) 2.0 Initiative, with a mission to "improve the industry's transparency in methane-emissions reporting and encourage progress in reducing those emissions." Members of OGMP pledge to transparently report their methane emissions and set reduction targets that are "reflective of broader goals" to cut emissions from 2015 levels by 60%-75% by 2030. While individual company data is kept confidential, "participating companies will be provided with the means to credibly demonstrate that they are contributing to climate mitigation and delivering against their methane improvement objectives and targets," according to a release.

CLEAN ENERGY EQUITY MARKETS

Equity Index Values



Equity Class Performance



Source: S&P Global

EI NEW ENERGY DATA

ENERGY FUTURES: REFERENCE PRICES

Carbon (€/ton)	Jul 15	Jul 8	Chg.
ECX EUA	84.25	83.36	+0.90
CME GEO ($/offset)	3.77	4.00	-0.23
Crude oil ($/bbl)			
Nymex WTI	97.92	101.39	-3.47
ICE Brent	101.28	105.73	-4.44
Natural gas ($/MMBtu)			
Nymex Henry Hub	6.58	5.84	+0.74
ICE UK NBP	27.81	33.74	-5.94
Coal ($/ton)			
McCloskey CSX	175.00	175.00	0.00
ICE Rotterdam	392.03	382.93	+9.10

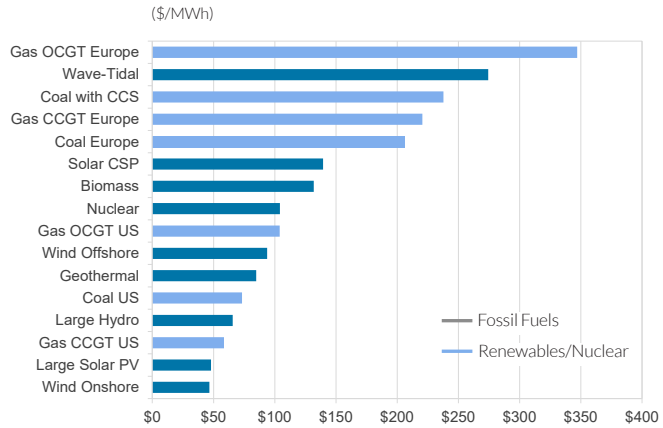
All prices are weekly averages and front-month. EUA = EU Allowances; GEO = Global Emissions Offset. Replaces ECX CER starting 3/30/21. ICE UK gas converted from p/therm. *Short tons. *Source: Exchanges*

GLOBAL ELECTRICITY PRICES

Europe ($/MWh)	Jul 15	Jul 8	Chg.
Germany (EEX)	318.63	258.53	+60.10
France (Powernext)	392.78	360.84	+31.94
Scandinavia (Nordpool)	70.80	66.53	+4.27
UK (APX)	297.87	258.41	+39.46
Italy (GME)	426.38	408.31	+18.07
Spain (Omel)	140.62	146.34	-5.72
North America			
New England	68.15	56.00	+12.15
Texas (Ercot)	291.97	142.09	+149.88
US Mid-Atlantic (PJM West)	94.20	98.56	-4.36
US Southwest (Palo Verde)	87.50	58.21	+29.29
Canada (Ontario)	46.51	34.86	+11.65
Other			
Australia (NSW)	352.87	245.99	+106.88
Brazil (SE-CW)	10.91	10.69	+0.22
India (IEX)	62.34	69.81	-7.47
Japan (JPEX)	177.23	200.86	-23.63
Singapore (USEP)	245.10	289.39	-44.29

Weekly average of wholesale prices. Source: Exchanges

NEWBUILD POWER GENERATION COSTS



Source: Energy Intelligence

DATA: The complete set of EI New Energy data is available to web subscribers, including historical and forecasted levelized cost of energy (LCOE) calculations, EV sales, our Green Utilities rankings, fuel switching thresholds, electricity production by sector, ethanol and biodiesel fundamentals, carbon and energy prices, along with methodologies and reader's guides. The New Energy Data Service can be accessed here.

LATEST INDICATORS: SALES AND FLEET PENETRATION OF EVS

China	
NEV sales (Mar 2022)	484,000
% LDV sales NEVs Mar 2022	**21.7%**
NEV sales (Feb 2022)	334,000
% LDV sales NEVs Feb 2022	**19.2%**
Total NEV fleet as of Mar 2022	8,915,000
% fleet NEVs	**2.90%**

US	
EV sales Mar '22	72,899
% LDV sales NEVs Mar '22	**5.85%**
EV sales Feb '22	59,554
% LDV sales NEVs Feb '22	**5.66%**
Annual EV sales 2021	605,958
% LDV sales NEVs 2021	**4.14%**

Europe (EU, UK, and EFTA)	
Sales Penetration	
EV registrations Q1'22	562,276
% LDV sales EVs Q1 '22	**20.47%**
EV registrations Q4 '21	684,655
% LDV sales EVs Q4 '21	**26.2%**
EV registrations Q1 '21	454,694
% LDV sales EVs Q1 '21	**14.83%**

NEVs = all New Energy Vehicles. EVs = plug-in hybrids and all-electrics. LDVs = light-duty vehicles. EFTA includes Norway, Switzerland, Iceland, Liechtenstein. Sources: China Association of Automobile Manufacturers, China Passenger Car Association, US Alliance for Automotive Innovation, US Argonne National Laboratory/Wards Auto, European Automobile Manufacturers Association

GLOBAL CARBON PRICES

Europe (€/ton)	Jul 19	Jul 12	Chg.
EUA Dec '22	83.65	85.65	-2.00
US ($/ton)			
CCA (Calif.) Dec '22	28.50	29.27	-0.77
RGGI (Northeast) Dec '22*	13.58	13.77	-0.19
New Zealand (NZ$/ton)			
NZU (spot)	73.15	73.15	0.00
Asia ($/ton)	**Jul 15**	**Jul 8**	**Chg.**
China (National)	8.62	8.52	+0.10
South Korea	14.12	16.07	-1.95

Benchmark months. *Short tons; all others metric tons. *Source: ICE, OMF*

EU CARBON FUTURES PRICES

ECX front-month futures. *Source: ICE*

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