

EI NEW ENERGY™

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POWER

Utilities Crushed by Financial Pressure

Extreme volatility and historically high prices in electricity futures and derivatives markets are putting some utilities and other energy companies under serious financial pressure. Covering margin calls — collateral required by trading exchanges or clearing houses to cover paper losses on electricity and gas trades — in the derivatives markets is becoming too expensive for many players and some are seeking financial help from the European Commission and member state governments. Many in the industry fear a Lehman Brothers' style collapse if governments don't step in and provide financial help. The situation will naturally require decision-making focused on short-term solvency, with unclear implications for the strategies of the affected companies — including their ability to finance low-carbon projects.

“One of the biggest challenges that energy traders face is high volatility in the coming months as recession and geopolitical risk factors keep markets in a see-saw,” Osama Rizvi, an energy and economic analyst at Primary Vision Network, tells Energy Intelligence.

Multiple utilities have asked their governments for financial help to meet collateral obligations, including Germany's Uniper and RWE, Swiss Alpiq and Axpo, Finland's Fortum, plus Austria's Wien Energie. In a blog post, a Wien Energie executive notes “the energy suppliers' strategic financing instruments can often no longer serve the rapidly falling and rising energy prices without risk of failure.”

Options under discussion at the national state and EU level include asking exchanges and clearing houses to stop increasing the size of margin calls as positions get further out of the money. Other ideas include widening a list of collateral tools beyond cash positions that exchanges and clearing houses will accept, or direct government intervention via financial assistance packages, notably loan guarantees, for companies on the brink of collapse.

The total size of electricity derivatives margin calls in Europe, excluding the UK, was probably more than €1.5 trillion (\$1.54 trillion), said Helge Haugane, senior vice president for gas and power at Norway's Equinor. This was “squeezing market liquidity and leaving small- and medium-sized firms struggling.”

Government Intervention

In the UK, the treasury and the Bank of England announced a £40 billion scheme last week to “address the extraordinary liquidity requirements faced by energy firms operating in UK wholesale gas and/or electricity markets.” Meanwhile, the Finnish government last week proposed a €10 billion loan and guarantee scheme to help cash-strapped electricity traders. “The proposed central government scheme is a last-resort financing option for companies that would otherwise be at risk of insolvency,” a government statement notes, adding “collateral requirements for electricity producers ... have rapid-

>> *continued on page 2*

RENEWABLE ENERGY BREAK-EVEN PRICES

Developing Asia	Coal	Gas
Market Price	4.62	42.00
Wind Onshore	2.29	2.61
Solar PV	1.06	0.00
Solar CSP	19.25	25.42
Mideast	Oil	Gas
Market Price	92.60	40.20
Wind Onshore	7.91	2.83
Solar PV	0.00	0.00
Solar CSP	61.65	14.56

Market prices Sep 13. Coal and Gas in \$/MMBtu, Oil in \$/bbl. Table indicates fuel price above which renewable energy is more profitable than new coal-, gas- or oil-fired power, without subsidies. Source: Energy Intelligence

ly reached exceptionally high levels. As these levels continue to increase, there is a risk that electricity producers will face a liquidity crisis.” Similarly, Sweden has said it will provide a support package worth billions of euros to ensure that energy companies could cover their collateral requirements. Denmark has promised similar assistance.

Brussels Intervention

Brussels is also working on the problem as part of wider talks on energy emergency measures, European Commission energy chief Kadri Simson said last week. “The uncertainty created by Russia’s behavior is causing additional stress for electricity trading,” Kadri emphasized, adding “we need to stabilize the futures markets” and avoid a situation in which “companies suffer because of liquidity problems.” Potential solutions include “engaging with securities and banking regulators to take swift action” and “looking into our Temporary State Aid Crisis Framework to see if we can streamline procedures to address liquidity gaps via state guarantees.” Not everyone in the EU is happy to directly help struggling energy companies. Christine Lagarde, the head of the European Central Bank, said Friday that the ECB and associated national banks “stand ready to provide liquidity to banks but not to energy utility firms.” She added that “watering down the prudential requirements for clearing houses and derivatives counterparties should be avoided.”

In addition to the financial pressure caused by market volatility, utilities need to finance retail price caps that have been decided by governments in several countries. This is creating a government debt to the utilities as governments commit to refund the losses caused by the difference between capped prices and costs. “We’re not worried the government won’t pay but we don’t know when, and in the meantime have to advance the cash,” one utility tells Energy Intelligence. Another issue for gas utilities is to finance the gas they store for winter — a normal practice but at an abnormally high price.

More Troubled Companies?

Uniper, RWE and Wien Energie are unlikely to be the last companies to seek financial support. Many industry watchers expect these companies to be the tip of the iceberg, with many more utilities seeking assistance over the coming months. With Russia cutting off gas flows through key pipelines such as Nord Stream 1, some “energy companies have had major struggles in hedging their underlying exposure via derivatives,” Shoaib Ali, markets analyst at Bank of New York Mellon, tells Energy Intelligence. This “may have caused a potential cascade in liquidations that would need government intervention in the form of a Lehman-esque collapse in a worst-case scenario,” Ali says.

Jason Eden, London, with Philippe Roos, Strasbourg

INTERVIEW

Energy Crisis Accelerates Interest in Battery Storage

Energy storage is gaining a surge of interest in Europe as the continent grapples with a worsening energy crisis. Traditionally, natural gas has provided security for energy systems by generating electricity and balancing grids, but that role is being increasingly challenged by stationary power storage. With a crisis in Europe on both the economic front and the “capacity side” with impacts from the war in Ukraine, “we’ve just seen this acceleration of interest of uptake,” Paul McCusker, a senior vice president at energy storage specialist Fluence, tells Energy Intelligence. Policymakers have been a key part of this, with “crisis-driven engagements at a country level and at an energy minister level,” he adds. Fluence is an AES-Siemens joint venture and McCusker heads the company’s Europe, Middle East and Africa divisions.

Fluence expects this acceleration will continue, “largely driven by the fact that energy storage is a relatively fast technology to deploy,” McCusker said in an interview. “There’s a growing recognition of that” and also of the “material role” battery storage can play in providing flexibility as a “key component” of the energy transition, he adds. Some forecasts suggest the stationary power storage market in Europe could reach as much as 200 gigawatts by 2030.

Policy Shortfalls

While policymakers are starting “to get” the importance of storage, McCusker argues that they need to do more to help nurture the industry. He’s not alone, with Fluence co-authoring an open letter to EU policymakers in July, alongside a “whole host” of industry participants, calling for better support. While “very supportive” of the RepowerEU plan, the letter calls out “the need” for better policy frameworks and targets for energy storage. Pointing to “great momentum in the market with private investors very keen to deploy capital,” the Fluence executive argues steps need to be taken to take advantage of that momentum and support it even further. Actions need to be taken “on the policy side to provide more certainty for investors and, really move faster at this critical moment,” he says.

Supply Chain Problems

The policy framework is not the only challenge. “As we’ve come out of the Covid period, we’ve seen these capacity shocks and supply chain issues, and also logistical issues impacting lots of industries,” McCusker says. Battery-based energy storage, specifically, has a “major supply chain vulnerability as an overall industry,” with a supply chain

that has been “very much anchored in the East, in Asia,” he recognizes. “First we’ve seen the impact of that longer supply chain in terms of logistics, disruption, ports, congestion — so initially delays and then the economic cost of that tight logistics market,” McCusker says.

The other factor, as the industry scales up, is “having all of your supply chain centered in one geography. There’s a supply chain concentration risk there, which we’re certainly more alert to.” Policymakers in Europe and in the US also seem to be understanding that more clearly now too, recognizing that “we need to establish supply chains closer to our markets,” he argues. This is something that Fluence has been working on for a few years and has in fact accelerated, McCusker notes. Notably, the company plans to start manufacturing in the US in the next 12 months. Europe will follow shortly afterward, where Fluence has been working with Swedish battery developer Northvolt to develop the first European production “of any material scale” for stationary storage. “So in the next few years, we need to look at how you stay focused on that, and really get the new supply chain established, and much more local content into production,” he says.

New Technologies

While Fluence sees lithium-ion batteries having a considerable role to play for the immediate and medium term, it expects that as battery technology evolves, there will be a migration over time to longer-duration systems. This includes new battery chemistries as well as new technologies, like green hydrogen, which is “very much in the headlines here in Europe,” McCusker says. As green hydrogen develops, Fluence also sees growing interest — and a technical and commercial need — for battery-based systems to work with hydrogen systems, which the company is exploring. “Interestingly, I think this crisis period will stimulate more innovation, and creative ways to combine technologies, like the battery-hydrogen example,” he says.

Ronan Kavanagh, London

ANALYSIS

The Role of Human Behavior in Reaching Carbon Goals

Changing consumer behavior is an essential part of reaching mid-century carbon neutrality targets — but old habits die hard. To be sure, some small but nonetheless important emissions cuts can be accomplished by individuals making little lifestyle changes, such as biking more or optimizing the thermostat. The bulk of the behavioral changes needed to

reach net-zero targets, however, could only happen by governments investing financially in the needed alternatives, or by governments taking a more forceful hand than they usually do at present, for example through tougher restrictions on energy-intensive travel.

Little Moves

French think tank Carbone 4, in a recent report, maps out three ways to reach the Paris agreement’s minus 80% emissions target. One category is spontaneous “little gestures” by individuals, which would cut France’s emissions by about 10% between now and 2050. Those “discretionary changes” in individual behavior are hard to target through policies or legislation but measures such as awareness campaigns can help to shape routines and habits, the International Energy Agency (IEA) notes. Such campaigns proved effective during the 1973 energy crisis and could again accelerate changes, especially in Europe where countries need to cut dependency on Russian gas.

Examples of these little gestures include biking, avoiding air travel, favoring used products over new ones, eating local food or using thermostats to optimize home energy usage. Somewhat surprisingly, Carbone 4 found that the most effective individual action would be switching from a meat-based to a vegetarian diet, as it would limit deforestation caused by farming needed for feeding animals while also curbing methane emissions from cattle. By contrast, switching from conventional bulbs to LEDs would have little impact in France because its power generation mix is mostly based on carbon-free nuclear and hydro.

Bigger, Costlier Moves

While those gestures involve no or very little financial cost, the next levels of individual actions would require substantial investment — and therefore government support. The IEA found, for example, that 70% of the emissions saved by behavioral changes in its net-zero emissions (NZE) scenario from the base announced pledges scenario (APS) could be “directly influenced or regulated by governments, for example by introducing low emissions zones in cities, or withdrawing licenses to operate regional air routes where a train alternative exists.”

Likewise, Carbone 4 says a step above spontaneous behavioral changes involves substantial individual investment in tools such as home insulation, low-carbon heating systems and electric vehicles. These are the “natural extension of small everyday gestures” — but the group warns that governments need to have the necessary incentives in place.

With those actions, the total impact of behavioral changes could reach some 20% of needed emissions reduction in a country like France, or one-quarter of the Paris agreement’s minus 80% emissions target. That leaves the remaining

three-quarters to another category — systemic changes made by businesses having to decarbonize industry, agriculture, freight transportation, power and heat generation.

Small But Influential

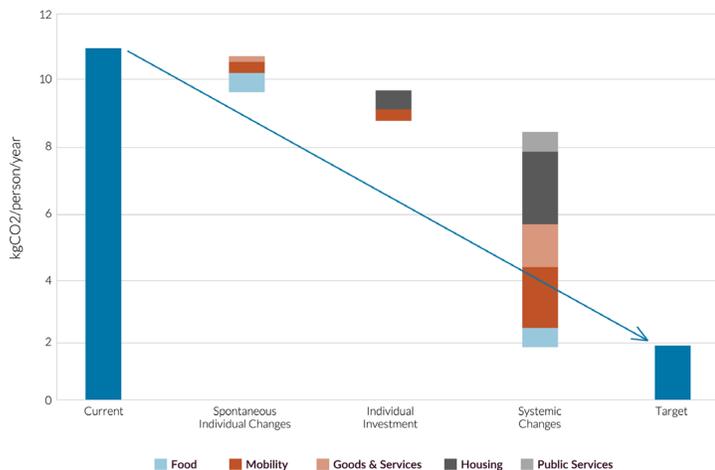
The IEA notes that the opportunities for behavioral change to make a significant impact in curbing energy demand are “greater in advanced economies than emerging market and developing economies.” Overall, from now to 2050, the agency found that behavioral changes would only achieve 4% of the NZE’s required emissions reductions. This is small but nevertheless “very important” in the next decade, IEA chief energy modeler Laura Cozzi tells Energy Intelligence. Where low-carbon alternatives to existing technologies are not immediately available, behavioral changes can avoid building infrastructure and assets that would become stranded.

A good example is long-haul travel by plane, Cozzi says. If people start to limit flying, “that could avoid or delay the construction of airports that could lock in emissions in the future.” Behavioral changes that matter the most in IEA modeling are long-haul flights, shifting some travel from cars to “active” transport such as biking and walking, and efficient home temperature settings.

Ambition Gap

The IEA’s APS, at 36 billion tons of CO2 equivalent in 2030, would leave an “ambition gap” of 14 billion tons as the stronger NZE scenario involves only 22 billion tons that year. The agency believes individual behavioral changes could produce 1 billion tons out of these 14. The rest would be handled by companies or other institutions: 5 billion tons for accelerated decarbonization of the electricity sector, 3 billion tons for energy efficiency and demand reduction measures in end-use

POTENTIAL PATHS TO CUT INDIVIDUAL CARBON FOOTPRINTS: FRANCE AS A CASE STUDY



An illustration of three types of actions to move from the current individual carbon footprint today among French consumers to the targeted footprint of just under 2 kilograms of CO2 per person, per year. This measures the carbon footprint reduction needed between now and 2050 for France to achieve the Paris agreement’s minus 80% target. Source: Carbone 4

sectors, 2 billion tons from reduced methane emissions and another 2 billion tons from electrification, hydrogen and carbon capture and storage.

Beyond 2030–35, the energy system will be “so decarbonized that behavioral changes will matter less,” Cozzi notes.

Philippe Roos, Strasbourg

POWER

China Moving Rapidly on Giant Solar, Wind Farms

China’s initiative to build vast solar and wind farms in wilderness areas could soon be bearing fruit. If plans proceed on schedule, the first kilowatt of renewable electricity under the wilderness effort would be injected into the grid before the end of this year. Construction has already “commenced fully” on the first batch of such projects totaling almost 100 gigawatts (GW), said the National Energy Administration (NEA) in its renewable energy briefing early this month.

The earliest of these batch-1 projects broke ground in late October 2021. Beijing had declared these as solid proof of China’s “determination to walk the talk” on its emissions peaking and carbon neutral pledges.

Fast Timeline

By the end of 2022, nearly half, or some 45 GW, of the first batch of wilderness projects is slated to be grid-connected, with the remaining entering operations before end-2023, according to NEA’s project schedule. They are spread across 19 provinces, but mostly concentrated in the Gobi desert, which spans northern regions like Xinjiang, Inner Mongolia, Qinghai, Gansu, Ningxia and Shaanxi.

And China is losing no time on advancing ahead to round two. The country has “started construction partially” on a second batch of giga-scale wind and solar farms also based in wilderness areas. And planning for a third batch is also under way, the NEA said in its Sep. 2 update.

Even before the wilderness initiative, China had already claimed the world’s top spot in terms of solar and wind capacity, which stood at 680 GW as of July. The country has pledged to grow its wind and solar generation fleet to a combined installed capacity of “above 1,200 GW” as part of efforts to peak carbon emissions before 2030. The ambitious wind and solar farms under construction or being planned in the Gobi desert are considered pivotal toward fulfilling that promise.

Onshore Desert Hubs

Beijing has mapped out “seven onshore new-energy” hubs — mainly concentrated in northern, far-flung arid regions — to house the planned mammoth wind and solar installations, said Li Chuangjun, a top policy planner who heads the renewable energy division at NEA, at a recent carbon forum. Technically available wind and solar resources in such remote regions account for 60% of the national total, according to estimates by lead policy planning agency the National Development and Reform Commission (NDRC).

The concept involves tapping the abundant desert sunshine and wind — and not just to meet local power requirements, but also for export to faster-growing and energy-hungry provinces via long-distance transmission lines. In doing so, China hopes to achieve multiple objectives, including wealth creation in poorer provinces, emissions reductions, and dust and sandstorm management. Erecting ground-mounted panels in the windswept Gobi desert and other similar landscapes would create barriers to sandstorms and cut desertification, in addition to offering shade and improving soil conditions for agriculture.

Offshore Wind Bases

China also has big plans to harness the wild winds at sea by establishing “five offshore wind energy production bases.” They would be located mainly off the eastern coastal provinces of Shandong, Fujian and Guangdong, in the Yangtze River Delta region and the Gulf of Tonkin, according to Li, who spoke late last month at a forum organized by Tsinghua University.

This involves planting mammoth offshore wind farms, with capacities of at least 10 GW each at scale, in those territories. By the end of 2025, China would have completed 20 GW of these planned offshore wind projects, with another 40 GW under construction as well, Li projects.

In the first half of this year, China has added 5.1 GW of offshore wind capacity, according to data released last week by the Germany-based World Forum Offshore Wind. This made China the top contributor to the total 6.8 GW added globally. Cumulatively, China now has nearly 25 GW in total installed offshore wind capacity, comfortably in the lead as the world’s top capacity holder — with its closest rival, the UK, trailing at under 14 GW.

Beating the Target

China is now well past the halfway mark for reaching its 2030 goal of 1,200 GW of combined wind and solar capacity. With more than eight years between now and end-2030, most do not doubt China’s ability to meet and even exceed the 1,200 GW target. The country already has capacity of 680 GW as of

July, so the remaining task would break down into adding an average of roughly 65 GW in combined solar and wind capacity annually until 2030. This, judging from the pace of growth in the past couple of years, appears more than attainable: In 2021, China grew its solar and wind capacity by 53 GW and 46 GW, respectively, for a combined total of 99 GW, according to data from the China Electricity Council. In the first half of 2022, NEA data showed the pace of growth was 31 GW for solar and 13 GW for wind. This, if maintained for the full year, would also set China well on track to attain its target.

Is the Target Enough?

A lingering question is whether the 1,200 GW wind and solar target for 2030 is sufficient for China to become carbon neutral by 2060. A recent study by experts at the China Meteorological Administration warns that the country needs some 6,000 GW of installed wind and solar capacity to achieve carbon neutrality by 2060. So, how could China heed that warning? Assuming the 1,200 GW is reached in 2030, China would still need to do the heavy lifting of adding another 4,800 GW in the following 30 years. This would entail a much quicker growth rate of 160 GW annually, versus just 100 GW posted in 2021. China would need to exceed its 2030 target of 1,200 GW target by a wide margin — or add capacity at a much faster pace in the subsequent years.

Kim Feng Wong, Singapore

INTERVIEW

Cleaning Up Chemicals: Road to Get There

The global chemicals industry could drastically transform itself to produce greener products and still grow in the coming decades, but doing so will require a strong commitment to bring new technologies far past the idea stages. That’s a top message from Chad Holliday, a former chairman of Shell who has also served in the leadership of companies like DuPont and Bank of America. He is championing a new report, Planet Positive Chemicals, published by Systemiq, which describes itself as a systems change company.

The study maps out ways that the chemical industry could grow 2.5 times from its current size and still keep its Scope 1, 2 and 3 greenhouse gas emissions in line with the Paris accord. Yet the report warns the chemical industry is behind other sectors in taking action. Only 17% of chemical companies are aligning with the goals of the Science-Based Targets Initiative (SBTI), compared with an average of 35% across sectors. If the chemicals industry continues to scale up without reducing its emissions significantly, the report warns that this would align

the industry with a 4°C climate scenario by 2050. Or it would be responsible for an estimated 24%–38% of the total 2020–50 global carbon budget under a 1.5°C future.

Steps to Decarbonize

Producing green chemicals is a core focus of the report's recommendations. This could involve, for example, producing ammonia through electrolysis instead of natural gas, or by making ethylene from bioethanol instead of oil. Other practices could cut the lifecycle emissions of chemicals further downstream, including more widespread recycling. Even after certain products cannot be recycled anymore, steps can be taken to use carbon capture on the incinerators, for example with plastics, says Andreas Wagner, the report's lead author.

Driving Down Costs

Of course, a transition to green chemicals is an expensive proposition. Driving down costs will require strong commitments to demonstration projects that implement lessons learned and move toward scalable commercial output without delay, says Holliday. "That's where we have to start. We just need to start faster," he says. "We just can't provide all this technology in labs. You have to lead small production-scale facilities, and then move those facilities across multiple industries." Additionally, government intervention would be needed, and green chemicals producers would need to find customers that are willing to pay a premium at first for the greener products, says Wagner.

The easiest way to decarbonize, as always, is to avoid producing too much from the start. "When we start thinking about the chemical industry, how do we use much fewer chemicals than we did before and make sure we are not using more than we need to?" Holliday asks. He pointed to an agricultural example, in which fertilizer was previously distributed across the whole field. But equipment is now available that only sprays fertilizer on the seeds. Similar technology is now available for weeds, to avoid spraying weed-killing chemicals where they're not needed. Those actions can cut 70% of the chemicals used, Holliday says.

Definitive on DAC

The report champions direct air capture (DAC) as a major solution for decarbonizing the chemicals system, since the CO₂ taken from the air could serve as a principal feedstock for many green chemical products. "We definitely do see a bright future for DAC," says Wagner.

Holliday recalls many "late-night discussions" at chemical companies about the feasibility of DAC, with "strong advocates" on both sides. "What we really need to do is get these demonstration projects and see them work. I don't think we'll fully know the answer until we do that, but it's certainly more encouraging today than it was before."

Big Oil's Role

Oil companies with chemicals businesses are among those advised to take the recommended steps to move toward greener chemicals and lower lifecycle emissions. Holliday has already been asking his colleagues at Shell to explore decarbonization plans for its chemicals business. Further, the oil industry can help decarbonize the wider chemicals sector by investing in the technologies needed, such as carbon removal and hydrogen.

With carbon capture, Holliday "can't think of any suite of companies better suited to go into that than major oil and gas companies," adding that biotechnology processes are another natural fit for the sector. "What I would urge them to think about is demonstration projects," he says.

Kick-Starters

Of course, companies often need kick-starters to motivate them to change. The report recommends a carbon price be applied to the chemicals sector to send a clear signal, but it also recognizes the weaknesses involved in relying on policy. "Where government can lead, great, and where governments are not leading, I think leading-edge companies — a first mover coalition — can have a big role," Holliday says.

Lauren Craft, Washington

IN BRIEF

Huge US DAC Plant

A climate-technology start-up plans to build a massive new direct air capture (DAC) plant in the western US. Los Angeles-based CarbonCapture says it has formed an “exclusive partnership” with carbon storage developer Frontier Carbon Solutions that would aim to permanently remove 5 million tons/yr of CO₂ by 2030 in the US state of Wyoming. “With the passage of the Inflation Reduction Act, the proliferation of companies seeking high-quality carbon-removal credits and a disruptive low-cost technology, we now have the ingredients needed to scale DAC to megaton levels by the end of this decade,” said CarbonCapture CEO Adrian Corless. CarbonCapture has developed what it calls a “deeply modular” platform featuring advanced solid sorbents and stackable “plug and play” components. The partnership, called Project Bison, will deploy CarbonCapture’s DAC modules atop Frontier’s CO₂ transportation and storage infrastructure in Wyoming. It plans to field its first modules by the end of next year and “to continue installing capacity as quickly as modules come off our production line.”

Investor Group Ups Demands

A coalition of more than 500 investment groups has reiterated its annual plea for governments to advance efforts limiting the worst impacts of climate change, with a new focus on methane emissions reduction as well as adaptation and resilience. In an open letter this week, the Investor Agenda coalition urged policymakers to support the reduction of global methane emissions by at least 30% over 2020 levels by 2030. The group also called for governments to “scale up” public and private financing for climate change resilience and adaptation, especially in developing countries. There are 532 signatories representing \$39 trillion in managed assets that have endorsed Investor Agenda’s statement, including UBS Asset Management, BNP Paribas Asset Management, and Fidelity International.

New Height for China EVs

Electric vehicle (EV) sales in China are defying economic headwinds and Covid-19

disruptions, gathering even more momentum in August to reach a new all-time monthly high. Chinese buyers snapped up 66,600 EVs (comprising all-electric, plug-in hybrid and fuel cell models) last month, or double the year-ago sales level, latest data from the China Association of Automobile Manufacturers show. The August sales peak is also some 12% higher than the previous high of 596,000 units attained just two months ago in June. Persistently high oil prices continued to benefit EV sales, helped by a slew of new models catering to a wide range of consumer requirements and budgets, says the China Passenger Car Association. Going forward, the EV sales trend is expected to continue “in full acceleration mode,” especially for smaller and budget-friendly models, it adds.

China on Top in EV Sales

China is capturing a rising percentage of the world electric vehicle (EV) market, outshining rival markets at a quickening pace. China’s new energy passenger vehicle sales from January to July tallied 3.03 million units — compared to 1.24 million units sold in Europe and 590,000 in North America. New energy vehicles include all-electrics, plug-in hybrids, and fuel-cell electrics. China’s share of new energy car sales rose from 52% in 2021 to 60.6% in the first seven months of 2022 — or 68% in July alone. Cui Dongshu, secretary general of the China Passenger Car Association, shared the figures on his personal account on WeChat, a Chinese messaging app.

CNOOC Trades Carbon

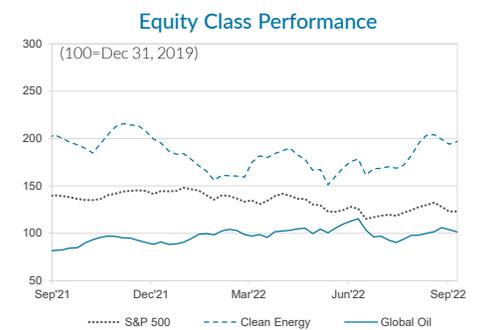
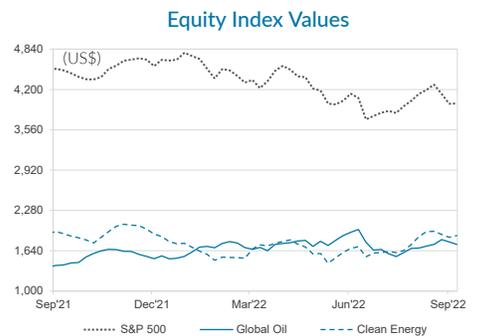
State-owned China National Offshore Oil Corp. (CNOOC) made its first transaction on China’s national emissions trading system with a purchase of 150,000 tons of allowances in late August. CNOOC said the carbon emission allowances (CEA) will be used as carbon assets and re-traded among domestic enterprises. A subsidiary of CNOOC will manage the allowances and oversee the company’s carbon asset management. The move reflects recent indications by CNOOC that it will actively partici-

pate in carbon market transactions, build a carbon asset control platform and develop certified carbon emission reductions. In June, CNOOC announced plans to peak its carbon emissions by 2028 and achieve carbon neutrality by 2050.

US Geothermal Initiative

The US Department of Energy (DOE) has formally launched an initiative aimed at driving down geothermal energy costs by 90% over the next decade or so. Energy Secretary Jennifer Granholm says the goal is to get emerging geothermal technologies to a “totally competitive” price of around \$45 per megawatt hour. That would make next-generation geothermal investment “irresistible,” she said. “It’s dispatchable, it is constant, it’s reliable and it’s renewable, so ultimately, once the system is in place, the fuel is free,” she told an event in Houston. Geothermal advocates in the government and the private sector see massive crossover potential for oil and natural gas workers in the emerging sector.

CLEAN ENERGY EQUITY MARKETS



Source: S&P Global

EI NEW ENERGY DATA

ENERGY FUTURES: REFERENCE PRICES

	Sep 9	Sep 2	Chg.
Carbon (€/ton)			
ECX EUA	69.00	80.79	-11.80
CME GEO (\$/offset)	4.08	4.01	+0.06
Crude oil (\$/bbl)			
Nymex WTI	84.79	90.34	-5.55
ICE Brent	91.71	97.08	-5.37
Natural gas (\$/MMBtu)			
Nymex Henry Hub	7.97	9.11	-1.14
ICE UK NBP	48.30	56.21	-7.91
Coal (\$/ton)			
McCloskey CSX	204.00	200.00	+4.00
ICE Rotterdam	362.71	370.81	-8.10

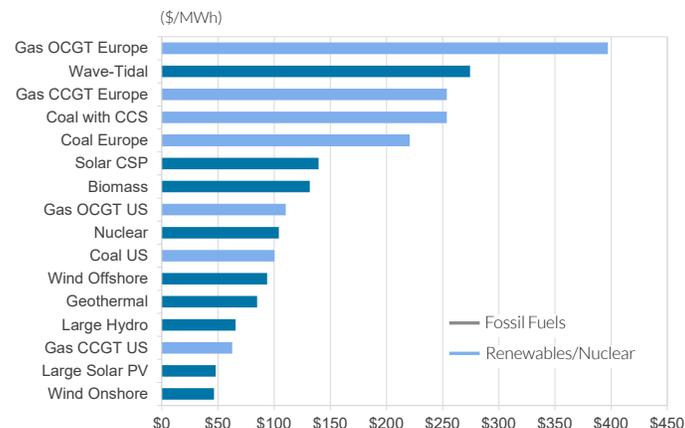
All prices are weekly averages and front-month. EUA = EU Allowances; GEO = Global Emissions Offset. Replaces ECX CER starting 3/30/21. ICE UK gas converted from p/therm. *Short tons. Source: Exchanges

GLOBAL ELECTRICITY PRICES

	Sep 9	Sep 2	Chg.
Europe (\$/MWh)			
Germany (EEX)	409.25	449.07	-39.82
France (Powernext)	427.72	533.81	-106.08
Scandinavia (Nordpool)	314.13	300.38	+13.75
UK (APX)	323.94	435.83	-111.89
Italy (GME)	467.67	548.10	-80.44
Spain (Omel)	157.40	169.74	-12.34
North America			
New England	75.38	95.03	-19.66
Texas (Ercot)	79.49	72.59	+6.91
US Mid-Atlantic (PJM West)	99.75	115.27	-15.52
US Southwest (Palo Verde)	407.70	360.90	+46.80
Canada (Ontario)	63.26	60.94	+2.32
Other			
Australia (NSW)	108.85	105.86	+3.00
Brazil (SE-CW)	10.71	11.64	-0.93
India (IEX)	91.10	94.12	-3.02
Japan (JPX)	187.93	190.63	-2.70
Singapore (USEP)	185.92	142.94	+42.98

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		US	
NEV sales Jun '22	596,000	EV sales June '22	74,211
% LDV sales NEVs Jun '22	23.8%	% LDV sales NEVs June '22	6.59%
NEV sales Jan-Jun '22	2,600,000	EV sales May '22	73,608
% LDV sales NEVs Jan-Jun '22	22%	% LDV sales NEVs May '22	6.66%
Total NEV fleet as of Jun '22	10,010,000	Annual EV sales 2021	605,958
% fleet NEVs	2.5%	% LDV sales NEVs 2021	4.14%

Europe (EU, UK, and EFTA)

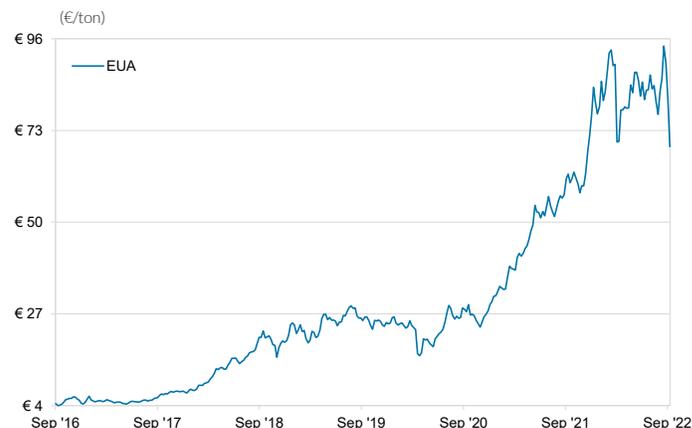
Sales Penetration		NEVs = all New Energy Vehicles. EVs = plug-in hybrids and all-electrics. LDVs = light-duty vehicles. EFTA includes Norway, Switzerland, Iceland, Liechtenstein. Sources: China Association of Automobile Manufacturers, China Passenger Car Association, US Alliance for Automotive Innovation, US Argonne National Laboratory/Wards Auto, European Automobile Manufacturers Association
EV registrations Q2 '22	560,266	
% LDV sales EVs Q2 '22	19.69%	
EV registrations Q1 '22	562,276	
% LDV sales EVs Q1 '22	20.47%	
EV registrations Q2 '21	574,626	
% LDV sales EVs Q2 '21	14.44%	

GLOBAL CARBON PRICES

	Sep 13	Sep 6	Chg.
Europe (€/ton)			
EUA Dec '22	69.75	69.88	-0.13
US (\$/ton)			
CCA (Calif.) Dec '22	27.52	27.70	-0.18
RGGI (Northeast) Dec '22*	13.39	13.49	-0.10
New Zealand (NZ\$/ton)			
NZU (spot)	84.00	85.50	-1.50
Asia (\$/ton)	Sep 9	Sep 2	Chg.
China (National)	8.38	8.41	-0.03
South Korea	19.64	20.20	-0.56

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

EU CARBON FUTURES PRICES



ECX front-month futures. Source: ICE