

EI NEW ENERGY™

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POLICY

Major Victories for Carbon Capture in US Bill

Companies involved in carbon removal are some of the biggest winners in sweeping new US legislation that would provide hundreds of billions of dollars in incentives and other provisions to accelerate clean energy projects and reduce emissions. The Democrat-led Inflation Reduction Act (IRA), which narrowly passed the Senate last weekend and is expected to clear the House of Representatives this week, has won high praise from industry groups and quiet optimism from public companies with substantial exposure to direct air capture (DAC) and carbon capture and storage (CCS) technologies.

More broadly, the legislation is a signal that the US government sees carbon removal as a key tool in fighting climate change across industrial sectors. Although CCS and DAC both have many hurdles to overcome, on everything from transportation to scale, those most optimistic about the legislation say it could spark a fresh wave of projects and investors globally and help knock down some of the roadblocks.

“We cannot overemphasize the transformative effect that the [IRA] will have on the deployment of carbon capture technologies,” Matt Bright, policy manager for carbon capture at the Clean Air Task Force says in a statement. He expects the bill to have “a profound ripple effect on the rest of the globe,” as incentive schemes make it easier to slash emissions from even some of the hardest-to-abate sectors. “Demonstrating that a carbon capture and removal industry is viable here in the US will likely mean that other countries can seize the opportunity to decarbonize their cement and steel industries, which collectively account for 12% of global emissions,” he says.

Wish List

The legislation reads almost like a wish list from the carbon removal industry: significantly higher tax credits for CCS and DAC under a section of past legislation known as 45Q, including for enhanced oil recovery (EOR); a “direct pay” and credit monetization option for companies with smaller tax burdens; lower capture thresholds to qualify for the 45Q credits; and an extended deadline to break ground on qualifying projects. Researchers at Princeton University expect policies in the bill to increase the use of carbon capture 13-fold by 2030 to around 200 million tons per year of CO2 captured for storage. They say that could rise as high as 450 million tons/yr by 2035, assuming sufficient investment in transport networks and storage basins.

Beefing Up 45Q

The enhancements to 45Q will have the biggest impact. The bill’s 70% increase to \$85/ton makes point-source CCS economic for more industries, from gas-fired power to cement and steel, analysts say. That gives companies looking to transport CO2 captured from industrial emitters — known as “CCS as a service” — an expansive base of new potential customers. “I think that you will see a lot of new industry

>> *continued on page 2*

RENEWABLE ENERGY PRICE PARITY

| | Gas (\$/MMBtu) | CO2 (\$/ton) |
|---------------|----------------|--------------|
| Europe | | |
| Market Price | 42.90 | 87.38 |
| Wind Onshore | -0.08 | 0.00 |
| Solar PV | -4.01 | 0.00 |
| US | | |
| Market Price | 7.83 | 0.00 |
| Wind Onshore | 2.62 | 0.00 |
| Solar PV | 0.10 | 0.00 |
| Japan | | |
| Market Price | 45.50 | 0.00 |
| Wind Onshore | 8.52 | 0.00 |
| Solar PV | 5.31 | 0.00 |

Market prices Aug 9. 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

coming in and just the total market getting much bigger,” Denbury CEO Chris Kendall told investors on a quarterly earnings call. Up to 1 billion tons/yr of CO₂ could be economically captured with the proposed changes to 45Q, according to Chris Davis, senior vice president of newly formed Milestone Carbon, speaking on a panel at the Enercom conference this week.

Direct air capture gets an even bigger boost, with credits more than tripling to \$180/ton for storage and \$130/ton for uses like enhanced oil recovery (EOR). Occidental Petroleum, which is developing the world’s largest DAC plant for an EOR project in Texas, said the enhancements to 45Q will allow the company to accelerate its carbon-removal plans and improve its technology more quickly.

“It gives certainty in some of the revenue, to allow us to build this development,” Richard Jackson, Oxy’s head of US onshore and carbon management operations, said on a quarterly conference call. He said Oxy, like the industry at large, must lower costs and improve the technology. “So, having certainty to be able to accelerate that development plan, we believe, allows us to reduce those costs quicker, and it creates a sustainable business sooner.”

Expanding the Market

Current 45Q policy requires projects to start construction by the end of 2025, a tight timeline for even the most advanced operators. If the new bill gains final passage and is signed into law, developers will have until Jan. 1, 2033 to break ground, allowing companies to secure financing and offtake contracts, and finalize the currently lengthy permitting process. A wider swath of facilities will also be eligible for 45Q. Most projects must now capture at least 100,000 tons/yr to get the tax credits. Under the IRA policies, a point-source operation would need to capture just 12,500 tons/yr to qualify; a DAC facility would only have to extract 1,000 tons/yr.

That will give opportunities to a wider range of players, Steve Pattee, vice president of consultancy Lonquist Sequestration, tells Energy Intelligence. “45Q will bring more people to the table, the timeline makes [projects] more probable, and then the threshold further increases the expanse of who can qualify,” he says.

The IRA clearly represents a policy win for carbon-removal proponents. And while there is little for them to dislike in the bill, future lobbying efforts will likely target ongoing requests for state primacy in approving “Class VI” permits for CO₂ sequestration wells, a process that can take years to complete at the federal level. Still, Denbury’s Kendall says CCS “now has the necessary public policy support to incentivize rapid development of capture projects.”

Luke Johnson, Houston

POWER

Europe’s Solar Industry Eager to Accelerate

With Europe facing an unprecedented energy crisis, Brussels is being forced to take drastic action to reduce gas use, and is also looking to turbocharge renewables. Solar could make a major contribution here, although it is not the only technology that needs to be scaled up and accelerated, Dries Acke, policy director at SolarPower Europe tells Energy Intelligence.

Solar deployment is already accelerating in Europe, having “broken, every record, every projection and expectation of deployment in 2022,” Acke said in an interview last week. The solar PV industry association’s mid-year analysis suggests that 39 gigawatts of solar capacity will be added in 2022, equivalent to around 4.6 billion cubic meters of gas. And annual capacity additions will continue to rise in the next few years, according to the SolarPower Europe projections — getting closer to 60 GW or even towards 70–80 GW in higher scenarios. “If you add that up every year, it gets to quite an impressive contribution from the solar industry,” Acke noted.

Exceeding EU Targets

Indeed Acke suggests that the solar industry can go much further than the target set out by the European Commission in its solar power strategy released in May. That sets a goal of 650 GW in AC terms (or 750 GW DC equivalent) by 2030, whereas SolarPower Europe believes the industry can actually do even more, having set an ambition to reach a terawatt DC (1,000 GW DC) by then. “This is an industry commitment,” Acke states.

Otherwise, the solar trade organization was “very welcoming of the solar strategy released in May,” Acke says. The landmark strategy is “very comprehensive,” he noted, including several initiatives, ranging from ambition on deployment and initiatives on rooftop solar, “to specific measures around some of the key bottlenecks,” such as permitting, skills and diversification of global supply chains. The strategy will still however need to be finalized and put into effect. At the moment “it is only letters on paper, so a lot of that needs to be translated into legislation, and then be implemented and become reality on the ground,” Acke adds.

Obstacles to Overcome

Some logistical hurdles linger. Preparing power grids to accept distributed solar generation is one challenge. Distribution system operators (DSOs) still face tariffs and incentive schemes “that are capex based, which basically means that they get revenues from investing in more copper and bigger pipes in the ground or wires in the ground.”

What's needed instead "is an operation and opex based incentives system where the regulator actually remunerates DSOs, for the system flexibility they provide on a local level and, and the digitalization and a smart system that they ultimately need to provide," Acke suggested.

Variable and intermittent renewables will also need to be backed up — including the use of demand response based on technology that allows for load shifting, or load shedding storage elements — with more energy storage also needed. This includes grid-level storage, such as large pumped hydro facilities, as well as "more local small scale storage solutions, for example rooftop solar together within residential battery elements," Acke says. SolarPower Europe's preliminary figures suggest that around 200 GW of storage, "big and small," will be needed by 2030.

Hydrogen Essential But Problematic

Hydrogen could help here. But while Acke accepts that hydrogen is an "essential part of the puzzle" for a net-zero economy, he also says some caution needs to be exercised, and "a glass of cold water poured over the hype and enthusiasm." Hydrogen is "very inefficient," as it takes a lot of electricity to make an equivalent amount of energy value in hydrogen. This should be used "extremely carefully" and only where it adds value, Acke explained.

Applications like high-temperature, industrial energy-intensive sectors like steel and cement should be the priority, as well as non-road transport like maritime and aviation. "And then there's some clear applications where we should just say no, for example, in residential heating, for example, or in road transport. Otherwise, we are going to waste an extremely scarce resource," Acke warns.

Ronan Kavanagh, London

POLICY

US Nears Giant Leap on Methane Action

Lawmakers this week look set to finalize legislation that could help deliver on the US pledge to reduce methane emissions through a fee on the potent greenhouse gas. The US and EU last year sponsored a global effort to get countries to focus on limiting releases of methane by 30% collectively by 2030. More than 100 countries signed on throughout the last year. But getting substantial reductions will rely on countries implementing national-level policies — something the Inflation Reduction Act currently set for a vote in the US House of Representatives seeks to do.

The Basics

The proposed law ties a methane fee to compliance with the US Environmental Protection Agency's (EPA) forthcoming methane standards for the sector. The fee starts at \$900 per metric ton of methane over a 25,000 metric ton threshold in 2024 before topping out at \$1,500 per metric ton in 2026.

The EPA's pending methane regulations, as proposed, would be fully in effect in 2026. The threshold is in line with the EPA's current reporting requirements for methane releases. The Congressional Budget Office estimates the fee will raise \$850 million in 2026, peaking at \$1.4 billion in 2028 before declining.

The methane fee also doesn't kick in until companies' releases exceed 0.2 percent of gas sales, or 10 metric tons of methane per million barrels of oil sales. "I would think some of this is giving companies a little wiggle room so that they're not totally buried under a tax," says Mark Agerton of the University of California at Davis, noting this is helpful if a drive to completely zero out methane emissions would be too costly or impractical. At the same time, the bill appears aimed at reducing incentives for venting and flaring at fields on federal onshore and offshore lands. Companies will have to pay royalties on all methane produced regardless of whether they sell it. That even includes gas lost by venting, flaring and "negligent releases" — a shift from the status quo.

Safeguard Against Rollbacks

The bill also structures the methane fee — controversial with industry — as a safeguard against a future administration rolling back methane emissions requirements, notes Brian Prest at Resources for the Future. "If the regulations, for whatever reason, are not in effect in 2024, then you have the methane fee," Prest said. The bill also notes that the rules must be "at least as stringent" as the EPA's rule as it was proposed in 2021. If rules are eased, the methane fee applies. That marks an effort to ensure methane is subject to rules — even if a new administration were to repeal the EPA's proposal, or a court overturn it. Those are possibilities that climate action advocates are keenly aware of following the Trump administration's regulatory rollbacks and the Supreme Court's recent power-sector decision.

Better Measurement

The bill also requires the EPA to improve how it accounts for methane emissions to "accurately reflect total methane emissions and waste emissions." Owners and operators can also "submit empirical emissions data," presumably if they want to prove they are releasing less than the agency might estimate.

Industry will also receive government help for better measurements, with \$1.55 billion, and the EPA meanwhile gets \$20 million specifically for monitoring methane. As the

agency works to finalize its rules, it's been a challenge determining how to report methane emissions when observed releases often exceed estimated volumes.

"Right now the federal government has data sets, but the data sets are not seen to be a full accounting," Prest says. That also reduces incentives for companies to tamp down on methane releases if the EPA's current estimation methods downplay the quantities. "If they do a good job of improving those estimates, I think that could go a long way."

Emily Meredith, Washington

POLICY

European Countries Advance the 'First Fuel' — Saving Energy

As Europe swelters in another swath of heat waves, with near-record gas and power prices, member states are putting measures in place to save energy. Across the EU there is a gas reduction agreement agreed by member states earlier this month to reduce gas demand by at least 15% until next spring — based on a five-year average — so gas can be injected into storage, hopefully safeguarding enough gas to meet needs this winter. The goal is to save roughly 45 billion cubic meters of natural gas. EU gas storage is roughly 72% full, against a target of at least 80% by November.

Spain

At the beginning of August, Spain introduced energy-saving measures that limit temperatures in public buildings, including shopping centers, cinemas, train stations and airports. Madrid says public buildings must have automatic door closing to save energy and temperatures must be kept in a 19°C–27°C range, saving on air-conditioning and heating. Lighting will be switched off at 10 p.m. local time to further save energy.

The measures will be in place until at least November 2023. "The measures are aimed at reducing consumption quickly — changes in behavior can reduce the demand for gas and oil by 5% in the short term — and to promote the electrification of the economy and the reduction of the consumption of natural gas," an official statement notes. Spain has pledged to cut energy consumption by 7% to help meet the EU-wide 15% target.

France

The country has an "energy sobriety plan" and aims to reduce energy use 10% over the next two years, versus 2019

levels. Like the Spanish plans, France is asking companies and public buildings to keep doors closed to avoid unnecessary heating and cooling, alongside a ban on illuminated advertisements at night — possibly between 1 a.m. and 6 a.m. — except in train stations and airports. Full details of the plan are due toward the end of September.

Germany

Europe's largest economy hasn't put any concrete energy-saving measures in place like France and Spain have done, but is aggressively promoting energy efficiency so more gas can be put into storage. In late July, Berlin set new storage targets, aiming for a 75% fill rate by September, 85% by October and 95% by November, versus roughly 73% earlier this week.

Some retired coal and lignite units are being temporarily brought back into service and an ordinance is planned to reduce gas use in electricity generation. Berlin also wants to reduce gas consumption in offices and homes and plans to legislate so that unused spaces are not heated unnecessarily. These measures are planned to last six months but could be extended.

Berlin says consumers should be conservative about adjusting their thermostats and close windows to save energy used in heating and cooling. The government also supports modernizing heat pumps in apartment blocks, plans to get rid of a minimum temperature that tenants must heat apartments, and wants to ban heating swimming pools using natural gas-fired systems.

Many cities have reduced street lighting voluntarily, stopped illuminating historic buildings and monuments and lowered temperatures in public buildings.

Italy

Other countries that are large users of Russian gas — including Italy — have so far refrained from imposing energy savings measures at the government level, although many, including Italy, are considering many of the measures adopted or planned in France, Germany and Spain. In July, Italian ministers said they were working on an emergency plan and are encouraging "sobriety" in energy use over the summer.

Measures under discussion include a 19°C–27°C heating and cooling temperature band and reducing night lighting in cities. In extreme cases, public buildings and shops could be forced to close early. Officials in Rome say they are keen to reduce gas use in the residential sector, which accounts for 30% of overall demand.

Jason Eden, London

POLICY

Risks and Rewards for Egypt's Role as COP Host

Egypt is hoping to leverage its hosting of the upcoming COP27 climate conference to showcase its leadership in the energy transition and act as a voice for both developing and producer nations. The summit will likely give more airtime to producer narratives than past gatherings, but one shouldn't expect a reversal on Glasgow climate commitments. The event is scheduled for Nov. 7–18 in the Egyptian resort town of Sharm el-Sheikh, located between the desert of the Sinai Peninsula and the Red Sea.

Cairo will be acutely aware that its best-laid plans could unravel. At last year's Glasgow climate summit, the UK focused relentlessly on global action against coal use, only for spiraling gas prices to trigger a surge in coal-burning, even among rich OECD nations.

At Sharm el-Sheikh, a key indicator of success will be progress on climate finance to help developing nations adapt to climate change. But slowing global economic growth could well undercut the global community's ability to hit existing financing commitments, let alone meet the targeted \$100 billion per year climate adaptation war chest for developing nations. As a leader of the African group within the COP, failure here will be keenly felt by Cairo.

Risk at the Red Sea

Egypt itself is in need of assistance. It has been battered by rising food prices, especially wheat, triggered by Russia's invasion of Ukraine. Paying for the increase in foreign debt is "expected to consume almost 45% of total revenues in the new FY2022/23 budget," according to Egypt's updated nationally determined contributions (NDC) report, presented to the UN last month. The new economic stresses "limit Egypt's ambition on allocating future climate investments," this latest climate transition plan added. While an improvement on the last NDC, Egypt's new plan does not embrace net zero and sees overall emissions rising, albeit at a far slower rate.

Producers were unhappy at Glasgow and felt ignored. Egypt, itself an LNG exporter, is certainly sensitive to producer concerns, and as conference president, Cairo can set the agenda for important side events that take place alongside the more formal UN negotiations and craft a final COP declaration. Producer arguments are also feeding into the Katowice process looking into the impacts of climate responses, which was set up after COP24 in Poland. Opec has contributed to the process, advocating strongly for wider backing for carbon capture and storage (CCS) and the circular carbon economy. These arguments may become more prominent at Sharm el-Sheikh.

Debate Drivers

The climate debate, ultimately, will be driven by real-world events — both at COP27 and outside it. Certainly, producer arguments blaming the lack of investment in oil and gas capacity for high prices are hard to refute. But countering this will be an enhanced OECD sensitivity to overreliance on external energy supplies. And this Ukraine conflict-driven tilt toward self-sufficiency will have been intensified by perceived Opec-plus inaction over high prices.

All in all, Ukraine has intensified the paradox in which producers are being actively courted for supplies in the short term, while longer term the energy transition could be accelerating. Egypt, for one, is looking to establish itself as a gas and LNG hub and take advantage of the loss of Russian gas supplies to Europe. But it is also acutely aware of its own vulnerabilities to climate change: More than 30% of the Nile Delta, home to around 60% of Egypt's food production, is in low-lying areas vulnerable to the impacts of sea level rises, the NDC notes. The memory of this summer's record temperatures and wildfires in many parts of the globe will also still be raw for many when delegates meet on the Red Sea in November.

Transition Pioneer

Cairo now aims to generate 42% of its electricity from renewables by 2035, and while not mentioned in the NDC, it is hoping to boost this to 60% by 2045. Overall, Cairo is targeting emissions reductions of 33% for electricity, 65% for oil and gas, and 7% for transportation by 2030 compared to a business-as-usual trajectory. In many ways Egypt has been a transition pioneer. In 2020, it became the first country in the region to issue a green bond. A lot of the transition building blocks are in the process of being put in place: Italy's Eni is looking at CCS possibilities in the country, and local behemoth Orascom is investing in green hydrogen in-country, and there is a strategic cooperation deal on hydrogen with Siemens.

Last month, Saudi renewables developer Acwa Power signed a deal in Egypt for the largest onshore wind project in the Middle East. Suez Wind will generate 1.1 gigawatts at a cost of around \$1.5 billion, reducing CO2 emissions by some 2.4 million tons per year. This is Acwa Power's third project in Egypt, after the 120 megawatt Ben Ban solar independent power project and the 200 MW Kom Ombo solar plant. "It is full speed ahead. They are trying to get as many green projects formalized in time for the conference as possible," notes one Cairo-based consultant.

Oil and gas sector emissions reductions get less press, but are also significant. In addition to an active flare-reduction program, Cairo last October signed a deal with local firm SMA to undertake a two-year country-wide inspection of all

facilities for gas leaks, notes another source. Some 25 teams, using infrared Flir cameras, have started on downstream facilities in the Alexandria area, and should begin surveying upstream operations toward the end of the year. This project alone is targeting a 30% cut in oil and gas sector emissions.

Influence Game

For Cairo, however, energy is increasingly a vehicle through which it projects influence — and its hosting of COP27 should also be seen through this lens. Egypt's gas hub and green hydrogen plans could see it emerge as a significant supplier to Europe. Egypt could also be the savior of Lebanon's power sector, via a US-promoted scheme to pump gas via Jordan and Syria. If Sharm el-Sheikh can shift the climate debate even slightly in favor of producer arguments,

Cairo will have won some valuable brownie points with allies in the Mideast Gulf. Keen to see the region's biggest have-not succeed, Gulf governments earlier this year pledged some \$22 billion in investments and deposits, including in the country's downstream, to help Egypt avoid financial crisis.

Egypt, by officially sharply hiking hotel prices in Sharm el-Sheikh, has probably already lost one battle for hearts and minds among the cash-strapped Western environmental press and NGO community. They also fear Egypt will impose restrictions on the protests that generally accompany COP, which would likely weaken the traditional role climate activism plays at COP and potentially erode the event's legitimacy in the view of some.

Rafiq Latta, Nicosia and Ronan Kavanagh, London

IN BRIEF

CRC in Big CCS Deal

US operator California Resources Corp. (CRC) and Canada-based Brookfield Renewable are teaming up one of the most substantial planned investments in carbon capture and storage (CCS) developments in California so far after numerous project announcements on the US Gulf Coast lately. Under the joint venture (JV) deal, Brookfield will initially invest up to \$500 million in projects jointly approved by the partnership, and could invest another \$1 billion or more if it decides to fully participate in all CCS projects proposed under the arrangement.

Brookfield's investment will be made through the \$15 billion Brookfield Global Transition Fund, "the world's largest private fund dedicated to facilitating the global transition to a net-zero carbon economy," which closed in June. The JV, led by CRC's wholly owned subsidiary Carbon TerraVault, will offer CO2 capture and transportation services and operate storage sites as well. The JV is targeting the injection of 5 million tons/yr of CO2, or 200 million tons in total storage development. Reaching this target would require an estimated \$2.5 billion of total capital, CRC said.

Aramco Eyes Novel Hydrogen

Oil giant Saudi Aramco has joined a group of high-powered global investors in supporting a \$25 million funding round for an innovative producer of clean hydrogen. Houston-based Utility Global says its proprietary process can convert various waste streams into zero-emissions hydrogen more cheaply and using far less energy than other clean-hydrogen technologies.

Utility Global's H2Gen products are based on the company's "electroless coupled exchange reduction oxidation process," or what the company calls "eXERO." The process is "an industry first" that uses no electricity and produces "high-purity hydrogen" with about 30% less capital than conventional electrolysis, the company says. Hard-to-decarbonize sectors like steelmaking appear to be an early focus for Utility Global. It says its technology can

decarbonize steelmaking by 25% by converting "off gases" into hydrogen that can be recirculated into the steel production process. The Series B round was led by existing investor Ara Partners, a private equity firm focused on decarbonization, and strategic investors including venture capital arms of Aramco, Samsung of South Korea, and French industrial player Saint-Gobain.

India Biorefinery First

Prime Minister Narendra Modi Wednesday launched India's first bio-refinery that will produce ethanol from agricultural waste to help the world's third largest oil consumer cut its gasoline consumption through blending. "We have been overdependent on other countries to meet our demand for fertilizers, edible oils, crude oil and gas," Modi said while launching Indian Oil Corp's second-generation ethanol plant. "So whenever there is any supply disruption due to geopolitics, the Indian economy becomes vulnerable."

State-owned Indian Oil's ethanol plant will produce 100,000 liters per day (over 600 barrels per day) of ethanol using waste biomass like paddy straw. India is building 11 more such bio-refineries as it has advanced a goal of blending 20% ethanol in gasoline by 2025. The South Asian nation is currently blending 10% ethanol in gasoline.

CCS for Haynesville Plants

Texas-based CapturePoint said it has signed a letter of intent with midstream giant Energy Transfer to participate in a feasibility study to capture and store CO2 emissions from natural gas processing plants in the Haynesville Shale formation in the southeastern US. The agreement would support CapturePoint's plans to develop a regional storage hub. Under the deal, Energy Transfer would build and operate a pipeline from the Haynesville to storage sites at the Cenla hub. CapturePoint would build and operate capture services for third-party Haynesville facilities and is seeking additional industrial sources of CO2 emissions to capture and then store at the hub.

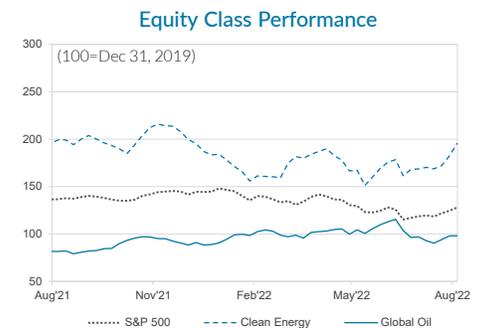
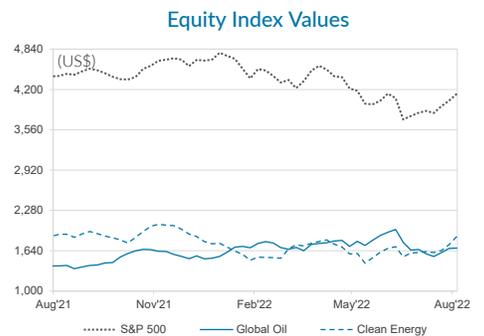
India's Reliance Upbeat

The head of India's Reliance Industries conglomerate has said that its nascent Green Energy business could start to "outshine" its current growth engine businesses within half a dozen years or so. "Over the next 12 months our investments across the green energy value chain will gradually start going live, scaling up over the next couple of years," Reliance Chairman Mukesh Ambani said in a foreword to the company's 2021-22 annual report.

"This new growth engine holds great promise to outshine all our existing growth engines in just 5-7 years," he added. Ambani did not define what he meant by outshine, but Reliance's three current growth engines — Digital, Retail and Oil to Chemicals — all generate substantial revenue and earnings.

Reliance's Green Energy business has started development of four big factories that will make solar cells and panels, hydrogen fuel cells, hydrogen electrolyzers and batteries.

CLEAN ENERGY EQUITY MARKETS



Source: S&P Global

EI NEW ENERGY DATA

ENERGY FUTURES: REFERENCE PRICES

| | Aug 5 | Jul 29 | Chg. |
|-------------------------------|--------|--------|--------|
| Carbon (€/ton) | | | |
| ECX EUA | 82.74 | 77.00 | +5.74 |
| CME GEO (\$/offset) | 3.27 | 2.94 | +0.33 |
| Crude oil (\$/bbl) | | | |
| Nymex WTI | 91.30 | 96.80 | -5.49 |
| ICE Brent | 97.28 | 105.46 | -8.18 |
| Natural gas (\$/MMBtu) | | | |
| Nymex Henry Hub | 8.09 | 8.55 | -0.47 |
| ICE UK NBP | 44.27 | 41.70 | +2.57 |
| Coal (\$/ton) | | | |
| McCloskey CSX | 191.20 | 188.60 | +2.60 |
| ICE Rotterdam | 345.94 | 388.42 | -42.48 |

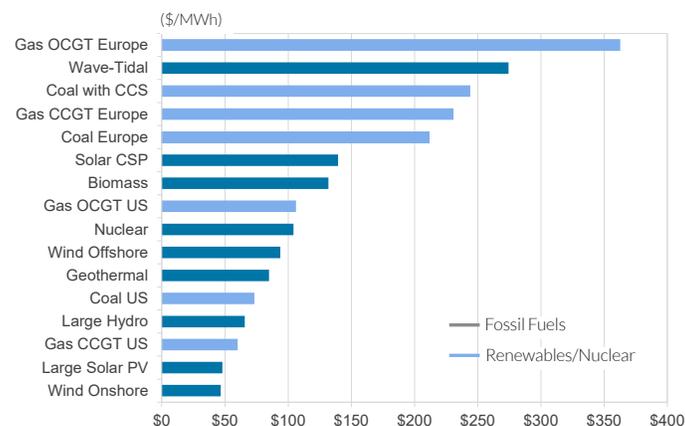
All prices are weekly averages and front-month. EUA = EU Allowances; GEO = Global Emissions Offset. Replaces ECX CER starting 3/30/21. ICE UK gas converted from p/therm. *Short tons. Source: Exchanges

GLOBAL ELECTRICITY PRICES

| | Aug 5 | Jul 29 | Chg. |
|----------------------------|--------|--------|---------|
| Europe (\$/MWh) | | | |
| Germany (EEX) | 350.98 | 404.13 | -53.14 |
| France (Powernext) | 393.59 | 478.54 | -84.95 |
| Scandinavia (Nordpool) | 88.89 | 113.68 | -24.80 |
| UK (APX) | 307.91 | 373.01 | -65.10 |
| Italy (GME) | 521.10 | 496.93 | +24.17 |
| Spain (Omel) | 143.92 | 144.96 | -1.04 |
| North America | | | |
| New England | 139.45 | 101.80 | +37.65 |
| Texas (Ercot) | 77.56 | 75.12 | +2.44 |
| US Mid-Atlantic (PJM West) | 126.95 | 109.43 | +17.53 |
| US Southwest (Palo Verde) | 106.48 | 99.60 | +6.88 |
| Canada (Ontario) | 67.94 | 49.88 | +18.05 |
| Other | | | |
| Australia (NSW) | 91.04 | 194.37 | -103.34 |
| Brazil (SE-CW) | 21.23 | 13.56 | +7.67 |
| India (IEX) | 73.69 | 75.63 | -1.94 |
| Japan (JPX) | 218.33 | 184.88 | +33.45 |
| Singapore (USEP) | 182.06 | 236.76 | -54.70 |

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 2022) | 596,000 | EV sales Jun '22 | 74,211 |
| % LDV sales NEVs Jun 2022 | 23.8% | % LDV sales NEVs Jun '22 | 6.59% |
| NEV sales (Jun 2022) | 2,600,000 | EV sales May '22 | 73,608 |
| % LDV sales NEVs Jan-Jun 2022 | 22% | % LDV sales NEVs May '22 | 6.66% |
| Total NEV fleet as of Jun 2022 | 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 | |
|-------------------------------|---------------|
| 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% |

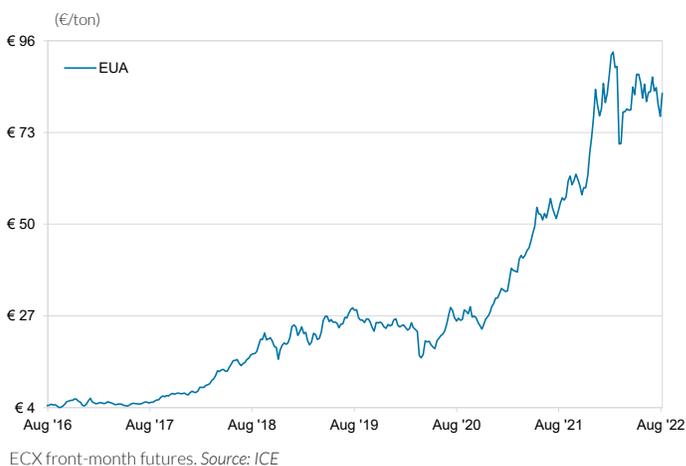
NEVs = all New Energy Vehicles. EVs = plug-in hybrids and all-electrics. LDVs = light-duty vehicles. EFTA includes Norway, Switzerland, Iceland, Liechtenstein. Sources: China Association of Automobile Manufacturers, China Passenger Car Association, US Alliance for Automotive Innovation, US Argonne National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

GLOBAL CARBON PRICES

| | Aug 9 | Aug 2 | Chg. |
|-------------------------------|--------------|---------------|-------------|
| Europe (€/ton) | | | |
| EUA Dec '22 | 85.93 | 81.95 | +3.98 |
| US (\$/ton) | | | |
| CCA (Calif.) Dec '22 | 32.25 | 29.95 | +2.30 |
| RGGI (Northeast) Dec '22* | 13.30 | 13.35 | -0.05 |
| New Zealand (NZ\$/ton) | | | |
| NZU (spot) | 80.00 | 80.00 | 0.00 |
| Asia (\$/ton) | Aug 8 | Jul 29 | Chg. |
| China (National) | 8.74 | 8.60 | +0.14 |
| South Korea | 13.09 | 13.89 | -0.81 |

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

EU CARBON FUTURES PRICES



ECX front-month futures. Source: ICE