

EI NEW ENERGY™

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NEW TECHNOLOGIES

Watershed Moment for US Hydrogen

Hydrogen incentives within the new US Inflation Reduction Act (IRA) mark a possible watershed moment for the nascent clean hydrogen industry. While a bipartisan infrastructure law enacted earlier in President Joe Biden's presidency afforded the US Department of Energy (DOE) \$8 billion to establish a hydrogen "hubs" program, seen as helpful in getting investments considered, it wasn't viewed as a substantial enough driver for getting projects off the ground. The IRA, which sets up a first-time production tax credit (PTC) and slightly less generous investment credit for hydrogen, could give the lowest-carbon projects a much-needed jump start. The IRA, signed into law by Biden on Tuesday, unlocks some \$369 billion in climate spending over the next decade in areas like hydrogen, carbon capture, electric vehicles and renewable power.

Major Leap

When it comes to clean hydrogen, the US today is at "ground zero plus a foot," says Frank Wolak, CEO of the Washington-based Fuel Cell and Hydrogen Energy Association. Only a small amount of the roughly 11 million metric tons of hydrogen consumed in the US is utilized for decarbonization. The bulk remains "gray" hydrogen extracted using steam methane reforming, which emits carbon dioxide. A big obstacle has been cost disparities: Conventional gray hydrogen typically costs \$1-\$2 per kilogram to produce compared with \$2.40/kg to \$6/kg or more for "blue" or "green" hydrogen. Green hydrogen is produced using renewable electricity and blue hydrogen involves SMR, but with carbon capture.

For clean hydrogen — presumably green hydrogen but possibly other forms like blue — the tax credits could be a "game changer." That's because developers and investors need some form of incentive to get into the market, says Ben Reiter, an attorney with the Washington firm Nixon Peabody, who advises developers on decarbonization technologies. The newly minted credits will "allow far more potential clean hydrogen projects to pencil out and drive down the cost of clean hydrogen over the longer term," Reiter says. The DOE has established a target for how far they want clean hydrogen's price tag to fall — down to \$2/kg by 2025 and \$1/kg by 2030, on average, via net-zero-carbon pathways.

Access to the tax credits could provide assurance to a handful of planned projects that anticipated having some kind of PTC in place. These include Air Products' planned \$4.5 billion hydrogen complex in Ascension Parish, Louisiana, to produce more than 750 million standard cubic feet per day of blue hydrogen, and the Intermountain Power Project (IPP) in Utah which would transition away from coal-fired power toward a system involving natural gas generation and renewables with hydrogen production and storage. Also, several electrolyzer proposals in the works will benefit from the PTC, Wolak says.

The credit puts the US on track to share equal footing with others like the EU who have made direct investments in hydrogen. "My sense is that the amount of money available through the PTC will begin to really build the architecture for hydrogen to take a leap commensurate with the US economy," Wolak says.

>> *continued on page 2*

REGIONAL POWER GENERATION COSTS

(\$/MWh)	US	Europe	Japan	Dvlpg. Asia	Mideast
Large Solar PV	37	70	117	37	32
Wind Onshore	41	54	83	47	61
Large Hydro	58	76	78	47	93
Gas CCGT	61	235	221	207	203
Coal	73	213	96	66	149
Geothermal	85	85	127	38	163
Wind Offshore	95	93	192	110	102
Nuclear	104	104	118	58	87
Gas OCGT	107	369	341	328	321
Solar CSP	116	176	NA	188	115
Biomass	132	132	132	108	125
Coal w/ CCS	142	246	195	137	260
Wave-Tidal	274	274	268	260	260

Levelized cost of energy, or cost of generating electricity over lifetime, including capital, operating, fuel and carbon costs. Dvlpg. Asia = developing Asia, mostly China and India. Source: Energy Intelligence

Green Clearly Gains

The IRA provides a \$3/kg PTC for hydrogen produced with an electrolyzer powered by clean energy, essentially eliminating the cost delta with gray hydrogen, says Plug Power CEO Andrew Marsh. “All applications that use gray hydrogen today, such as fertilizers and manufacturing, will now be able to buy green hydrogen at a competitive price with gray,” Marsh told analysts on a quarterly conference call last week.

“Applications that are looking to move to hydrogen, like steel and concrete manufacturing and natural gas heating, will have a path to dramatically reduce their carbon footprint cost competitively.” Marsh said the first big markets for green hydrogen will likely be “industrial applications where it’s simpler to substitute green hydrogen for other feedstocks.”

Blurry on Blue

Blue hydrogen may be more of a wild card, though Washington sources see a number of blue hydrogen projects qualifying for the lower levels of the tax credit. The full credit value is only available to projects producing hydrogen with a full life-cycle emissions rate of less than 0.45 kilograms of carbon dioxide equivalent per kg of hydrogen. Blue hydrogen likely falls in the lowest tier, or 20% of the full credit, though determining whether the tax credit would be applicable in those cases would be more complex.

Emily Kent, zero-carbon fuels policy manager for the Clean Air Task Force, says multiple factors will play a role in how “clean” the hydrogen is — where the gas is sourced, methane leakage rates, the level of CO₂ capture achievable on the system and where renewable energy is sourced for the operations. Another potential obstacle: the legislation clarifies that the clean hydrogen tax credit may not be claimed for hydrogen produced at a facility that has received the tax credit for carbon capture.

Next Step: Finding Markets

How fast acceleration occurs may depend on a multitude of other factors, including the market case for sectors that could be decarbonized with the help of hydrogen, hydrogen interests say. Kent points to bipartisan legislation in the US Senate — proposed but not enacted — that would provide helpful grants and low-interest loans to promote development of hydrogen infrastructure tied to ports, chemicals, cement and steel manufacturing and other emissions-intensive sectors. More support for end-use sectors is seen as the next logical policy breakthrough, which could help build up a value chain and bolster the market case for how hydrogen is utilized in hard-to-decarbonize sectors.

Bridget DiCosmo, Washington

VIEWPOINT

US Climate Policy: Slow, Scattershot, But Strategic

The US is taking a very different approach to climate policy than other governments around the globe — and differences can be a strength. The country has not enacted a national carbon price, as many have long hoped. Nor has it mandated any deadlines for decarbonizing the economy. Compared with countries often labeled climate leaders, such as Europe and more recently China, the US approach is uncoordinated, late to the game and at best moderate in strength. Yet it has settled on a strategy that suits its culture and its unique strengths — a tailored strategy centered around stimulating private sector investments through incentives rather than forcing the economy’s hand. The signing of the Inflation Reduction Act (IRA) this week is the latest evidence of this. The bill includes generous incentives for carbon capture, hydrogen, electric vehicles, renewable power and more. These are significant in their own right.

Playing to Strengths

Broadly speaking, the US is an ideal spot for a private sector-driven approach given the heft of its economy and its longstanding culture of technological innovation. Looking closer, the incentives in the IRA are shaped strategically to suit individual clean energy sectors — especially with CCS, a sector where the US is uniquely well positioned. Generous CCS incentives included in the new law reflect the fact that the US has some of the best geology for CCS, along with unmatched knowledge of the subsurface given the numerous oil wells drilled over multiple generations. The presence of existing infrastructure and industrial clusters also bode well for CCS. In fact, competition has been heating up lately to secure access to the best areas for injecting and sequestering carbon.

Doing What’s Doable

Another big advantage of the free-market approach taken by the US: it’s what’s realistic. For many years, Democratic presidential administrations have failed to enact firmer climate policies. Take carbon pricing, for example. During the early years of US President Barack Obama’s administration, when his Democratic party also held majorities in both houses of Congress, cap-and-trade ran close to the finish line only to die in the Senate. President Joe Biden hasn’t bothered much with anything this strong, knowing the Democratic majority is too narrow in the Senate and that consensus doesn’t exist for a national carbon price.

Many have insisted that a carbon price is market-based in nature, but not everyone buys that in the US context. On one

hand, a carbon price is indeed technology-agnostic, letting the market decide which technologies are used to decarbonize the economy. Yet a carbon price is still a government-engineered economic signal and it is easily labeled as a tax that drives up costs for consumers and businesses.

Exceptions exist of course — and the IRA notably includes a new fee on methane. This was palatable because curbing methane will ultimately lead to more gas that can be monetized. It's hard to argue with saving energy and making money at the same time. Again, this was a tailored approach that works strategically for this subset of US greenhouse gases.

Drawbacks

The incentive-driven approach doesn't offer a lot of urgency to the climate challenge, to be sure. A strategy of periodically enacting climate investments like those seen in the IRA doesn't offer much assurance that policymakers are acting in a coordinated, comprehensive fashion. Yet more forceful climate policies run the risk of simply being overturned by a future administration, a future Congress or the courts. Many criticize US policymaking as slow and scattershot. That's largely by design: the country's political system was crafted from its earliest roots so that major overhauls are usually only possible when widespread consensus exists. That means policymaking often grinds slowly in Washington. But it also means policies have more staying power than they might otherwise possess.

Even from a free-market perspective, the US approach has its disadvantages. Chief among them is that the investment-based approach can backfire if Democratic administrations like Biden's resort to more executive action in the absence of strong legislation — but this is now more difficult given recent Supreme Court rulings. It's possible that Biden or a future presidential administration could declare climate change a national emergency under the National Emergencies Act. This would unlock a more robust suite of executive authorities yet this, too, is legally murky.

Withstanding Headwinds

Any climate policy has its pros and cons, even in places that have acted early and remained somewhat steady in their vision. On multiple occasions in recent years, China has revamped many of its climate policies in light of changing economic and geopolitical headwinds. Europe, long trumpeted as the world's climate leader, has seen many growing pains and ups and downs with its carbon market. And some European countries are rethinking rapid transitions away from fossil fuels as they seek to replace Russian gas.

Headwinds will never go away. When one quiets, another is gathering speed on the horizon. The US needs a climate policy that stands up through the changing winds of different presidencies and world events. Focusing on strong and forceful cli-

mate policies in the US would waste time, at least for the foreseeable future. They don't fit the culture of US society or the US business world, nor do they suit the polarized political climate.

Rather, stakeholders and policymakers alike should work within the realities and strengths of the US going forward. As author Henry David Thoreau once wrote, "If a man does not keep pace with his companions, perhaps it is because he hears a different drummer. Let him step to the music which he hears however measured or far away." The world can benefit from a variety of policy models. There's no reason climate action needs to follow just one drummer.

Lauren Craft, Washington

TRANSPORTATION

China EVs Making Waves Globally

China-made electric vehicles (EVs) are not just moving in the fast lane on their home turf. They are also creating waves in the global export market as value-for-money alternatives that deliver decent performance. The trend — which looks set to persist — calls to mind the success story of Chinese-made solar panels, which took the world by storm and helped accelerate the global shift away from fossil fuels. A potential flood of Chinese EVs into the global auto market could similarly speed up erosion of gasoline and diesel consumption, posing a formidable threat to oil demand.

China doubled its EV export volumes year on year during January-July, selling just over 250,000 units of pure-electric, plug-in hybrid or fuel-cell vehicles to overseas markets, according to data from the China Association of Automobile Manufacturers (Caam). Judging from publicly available data, Chinese-made EVs have grabbed a roughly 10% share in passenger EV models (no larger than nine-seaters) sold globally outside of China during the first half of 2022. While not yet a serious threat, Chinese EV exports have the potential to rise exponentially as many automakers, including Tesla, are cranking up output in China to cater to both domestic and export demand.

Tesla's Prowess

Tesla's wholly owned Shanghai Gigafactory is blazing the way as the top exporter of made-in-China EVs. The Shanghai factory sold over 116,000 units of Tesla models 3 and Y during the first seven months of 2022 to overseas markets — including Europe, Japan, Australia and Singapore — singlehandedly contributing to 46% of China's total EV exports. And Tesla's China export prowess is set to grow further. The company said in its June quarterly report that its Shanghai factory has completed

CHINA DOMESTIC AUTOMOBILE SALES

(units)	Jul '22	Y-o-Y %Chg.	Jan-Jul '22	Y-o-Y %Chg.
All Automobiles	2,420,000	30%	14,477,000	-2%
ICEs	1,827,000	15	11,283,000	-15
EVs	593,000	120%	3,194,000	120%

Source: China Association of Auto Manufacturers

an upgrade that will “enable us to continue to increase our production rate further.” The Shanghai plant is now capable of churning out over 750,000 units of models 3 and Y annually, up by 67% from just 450,000 units previously. With its expanded capacity, the Shanghai factory is now the largest of all of Tesla’s production plants worldwide, outsizing factories in California, Texas and Berlin.

Telsa’s Shanghai factory has cumulatively produced over 1 million units since starting operations in late 2019, contributing to one-third of all Tesla models produced so far, tweeted CEO Elon Musk recently. This is despite the plant suffering significant disruptions during the second quarter due to Covid-19-related lockdowns in Shanghai and supply-chain issues. It was also affected for much of July due to the upgrading works.

Chinese Firms Gain Inroads

Tesla’s local rivals — such as Shanghai Automotive (SAIC), BYD and Nio — are also working hard to make inroads into European, Latin American and Southeast Asian auto markets, where air pollution and high oil prices are stoking demand for affordable and high-quality EVs. Some Chinese automakers are also starting local EV manufacturing chains in targeted markets, especially in countries like Thailand and Indonesia where local costs are low or where raw materials for EV batteries are in abundance. State-owned SAIC is the second-largest EV exporter from China after the Tesla Shanghai factory, although it trails way behind with only about 47,000 units exported during January-July for a 19% share of total Chinese EV exports. But SAIC’s monthly EV export volume has been rising rapidly, from just under 5,000 units in January to over 13,000 units in July, according to latest figures from the China Passenger Car Association.

SAIC’s Europe Ambitions

SAIC’s EV export strategy, especially in European markets, is centered on its MG lineup — an iconic British brand acquired in 2007 by the Chinese company which now manufactures “designed in Britain” MG models in China. Its MG-branded EVs have won several accolades, including that of “pure-electric sales champion” in Sweden, and 2022 Affordable Car of the Year in the UK. Riding on the momentum, SAIC launched its latest MG4-Electric model in June and shipped the first batch to European markets last month to target the start of sales this fall “in countries such as Germany, France, the UK, Italy, Spain, Norway, Sweden, Denmark, the Netherlands,

CHINA AUTOMOBILE EXPORTS

(units)	Jul '22	Jan-Jul '22	Jan-Jul Y-o-Y %Chg.
All Automobiles	290,000	1,509,000	51%
ICEs	236,000	1,252,000	43
EVs	54,000	256,000	101%

Source: China Association of Auto Manufacturers

Belgium and Luxembourg.” SAIC predicts “monthly sales of MG vehicles in Europe are expected to exceed 10,000” and that the company would cross the 100,000 units sales milestone in Europe before the end of this year with the help of its new MG4-Electric. To back its ambitions, SAIC intends to set up 800 marketing service outlets in Europe. In 2023, the company plans to introduce the MG4-Electric into other markets such as “Australia, New Zealand, the Middle East, Mexico and South America” so that the model will “cover major regional markets on six continents.”

Asian Markets

SAIC also sells its MG ZS EV model in India and Thailand. Indian demand reportedly exceeds supply, with MG Motor getting about 700 orders monthly for the model, but is only able to supply around 300, reports the *Hindustan Times* newspaper. In Thailand, MG’s electric models are similarly a success story by topping the country’s EV sales chart in a 2021-22 local marketing survey. SAIC is also active in Indonesia through a partnership with US automaker GM under the SAIC-GM-Wuling (SGMW) joint venture (JV), which manufactures both EVs and conventional oil-powered vehicles at its base in China’s Guangxi province. The JV’s Indonesian plant rolled out its locally made “Air ev” model just last week, which was named the official car partner for the 2022 G20 Summit to be held in Bali this November. “Moving forward, the Air ev will enter India, Egypt and more regions around the world, asserting China’s status as a leader in smart automotive manufacturing,” says GM.

Kim Feng Wong, Singapore

INTERVIEW

Oil Industry Seeks Meaningful Role at COP27

The UN climate talks — now less than three months away — could give a more prominent voice to oil- and gas-producing countries and industry players. That voice is critical for turning climate objectives into results, says Brian Sullivan, executive director of global oil and gas association Ipieca, in emailed responses to Energy Intelligence. Ipieca was founded at the request of the UN Environment Programme in 1974 and

says it remains the industry's principal channel of engagement with the UN. Due to be hosted this year by Egypt at its Red Sea resort town of Sharm El-Sheikh, this year's COP27 conference will aim to advance implementation of the Paris Agreement and deliver on a broad range of items agreed at COP26 in Glasgow last year. "If the world is going to stay on track to hit the Paris Agreement goals, then all parties and solutions have a part to play," Sullivan says.

Ipieca has been pleased with the COP27 Egyptian presidency's call for all parties to work together to limit global warming to 1.5°C, and is "committed to regular, inclusive and meaningful dialogue" with a wide spectrum of stakeholders. "In the pre-COP27 workshops, we've heard positive comments on the role of industry in supporting the Global Goal on Adaptation to strengthen resilience to climate change, with the understanding that industry can support with good practice, planning and monitoring tools, and technology transfer to help address this issue at national, regional and global levels," Sullivan says.

Industry Know-How

The oil and gas industry can support COP27 and realization of the Paris Agreement objectives — plus commitments made in Glasgow and beyond — in many sectors, Sullivan explains. Areas that are "being actively supported in their delivery by the industry" include the Global Methane Pledge to collectively reduce methane emissions by 30% below 2020 levels by 2030; the International Aviation Climate Ambition Coalition, which aims to reduce CO2 emissions from aviation to net zero by 2050, and the Clydebank Declaration for green shipping corridors to establish six zero-emission maritime routes by 2025.

Ipieca believes the oil, gas and alternative energy industries have "a key role to play in the energy transition by working to provide affordable and reliable energy — which is needed to fuel growth and improved living conditions — with decreasing emissions to support a net-zero world." Further, the industry is "an essential partner when it comes to research, development and operation of new lower-carbon energy and mobility solutions that can meet global needs." Businesses can, Sullivan says, "bring technical and commercial know-how to the discussions, and they can explain what support they need from governments and others to develop lower-carbon businesses and supply chains."

Just Transition

One theme Egypt is looking to advance at COP27 is a just transition. "That means respecting the rights of communities and workforces, whether they are affected by the transition out of existing operations or by the development of new lower-carbon energy, making lower-carbon energy affordable and reliable for all, protecting the interests of vulnerable groups and making progress on the UN Sustainable Development Goals," Sullivan explains. This featured in a

number of dialogues at COP26. At that summit, a Just Transition Declaration was signed by more than 30 countries "with broad agreement" from many stakeholders that "the energy transition needs to be fair, and not leave anyone behind," he notes.

Conversations about a just transition could be "very productive if they are held at COP27 because the organizations whose collaboration will be essential to make a fair transition happen will be present," Sullivan suggests. These include governments, international agencies, unions, companies and representatives of civil society groups such as indigenous communities. "So, it is very important to make room for these discussions in the COP27 agenda, where influential decisions are made," Sullivan says.

COP27 Challenges

The talks in Egypt will also need to deliver progress in other areas, Sullivan notes. Aside from acting on the commitments already agreed upon at Glasgow, countries are charged with updating their 2030 emission reduction targets by the end of 2022. While early analysis shows the updated pledges at Glasgow could result in a temperature increase of between 1.8°C and 2°C, greater ambition is needed at COP27 to limit temperature increases to 1.5°C, he says. Nationally determined contributions, as the pledges are known, "need to be aligned with strategies to achieve them — this is where a partnership approach between and across governments, industry, and civil society will be key."

Finance, in particular for adaptation, is another top priority and obstacle for Sharm el-Sheikh, Sullivan adds. "Developed countries are already struggling to meet their 2020 commitment of \$100 billion per annum of climate finance, and there is a request for this level to double from 2025." Adaptation and loss and damage will also rank high on the agenda: "Coming out with an agreed-upon loss and damage financial mechanism would be a great success for COP27," he says.

Ronan Kavanagh, London

STRATEGY

Oil Firms Undeterred on Low-Carbon Advances

High energy prices and geopolitical anxiety haven't slowed down plans to advance low-carbon projects by oil and gas companies, including by US majors. If anything, the opposite is happening. That's a big takeaway from Energy Intelligence's latest Low Carbon Investment Tracker, part of the Energy Transition Service. Announced low-carbon spending in the

first half of 2022 hit almost \$60 billion among the 33 oil and gas companies studied, nearly equaling the entire level seen in 2021, according to the report.

“In regions like Europe, heightened energy security and supply concerns have created a more supportive environment for firms to continue to advance projects in a range of areas including wind power and hydrogen — areas that overlap with existing European climate goals,” says Alex Martinos, Director of Energy Transition Research at Energy Intelligence.

“Much of this effort has been supported by governments,” he adds, pointing to Germany’s “numerous bilateral technology transfer agreements” and recent funding it has offered to foster hydrogen hubs. On a global scale, renewable power deals saw the most activity, especially in offshore wind, but mounting interest was also seen in the hydrogen and carbon capture spaces. In terms of the corporate breakdown, European majors led the low-carbon announcements, but noteworthy plans were announced by US companies like Exxon Mobil and national oil companies like Petrobras and Petronas.

Hydrogen: Ambition Expands

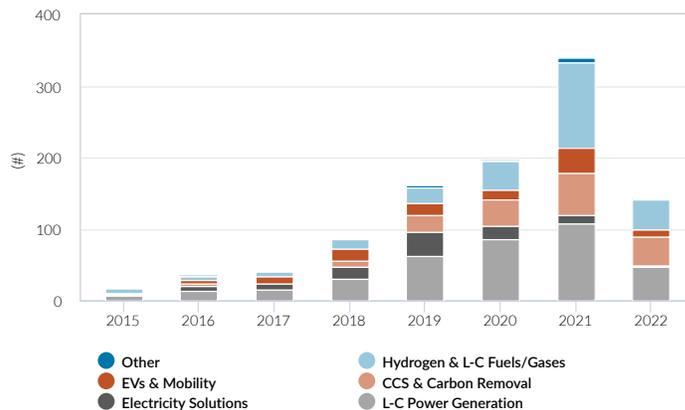
Announced investments in hydrogen have advanced to a new stage of ambition. In recent years, the hydrogen space had seen a flurry of mostly modest cooperation agreements, memorandums of understanding and pilot projects. Now, these initiatives are “evolving and emerging into more sizable and substantive projects,” Martinos says.

In fact, the largest low-carbon investment tracked so far in 2022 was in hydrogen — Exxon’s Baytown blue hydrogen project. The trend has continued past the first half of 2022: Shell announced in July it is starting construction on Europe’s largest (200 MW) green hydrogen electrolyzer plant. Sinopec has advanced numerous hydrogen projects in China, and in Australia, a range of initiatives are under consideration by Woodside, BP and others.

CCS Gaining Ground, Too

The stage of CCS investments is “perhaps just a half a step behind what we’re seeing in hydrogen,” notes Sam Burman, a senior analyst and co-author of the report. “One thing to flag is the diversity of what we’re seeing under the CCS umbrella, ranging from plans to capture emissions from power plants and LNG facilities to blue hydrogen production and also wider hub concepts,” he adds. Numerous partnerships have been forged in the last year in the CCS space, including with NOCs like Adnoc, Pertamina and Petronas.

INVESTMENT COUNT BY CATEGORY



INVESTMENT VALUE BY CATEGORY



NOTE: H1 for 2022. L-C = Low-Carbon. Source: Energy Intelligence

What’s Next?

Energy Intelligence expects large-scale investment in CCS to continue gathering speed in the years ahead. This is likely to be spurred on by public, political and investor pressure — plus government initiatives like US tax credits for CCS within the newly signed Inflation Reduction Act. In the hydrogen space, an area to watch is turquoise hydrogen made from methane pyrolysis. Shell and Chevron recently announced a venture capital investment in this space. Green and blue hydrogen are also likely to see continued growth in interest with larger, more mature projects. On another front, sustainable aviation fuel (SAF) remains a focus area for many firms seeking to extend the shelf-life of existing refinery infrastructure by producing low-carbon fuels. More generally, biofuels remain on the radar for many firms, with European majors like Total and Eni converting existing oil refineries to produce the greener fuels. Chevron demonstrated its expanding interest with its recent multi-billion dollar acquisition of Renewable Energy Group.

Lauren Craft, Washington

IN BRIEF

China EV Sales Still Soaring

Electric vehicles (EVs) in China are persisting in a triple-digit growth trend, with July sales surging by 120% year on year to 593,000 units, according to latest data from the China Association of Automobile Manufacturers. The July figure is just shy of the all-time monthly record of 596,000 units achieved in June, pointing to a continuation of the strong momentum. “An improvement in the supply chain coupled with high oil prices have brought about a red hot EV market,” commented the China Passenger Car Association, which has ratcheted up its full-year 2022 sales prediction for “passenger-type” EVs (no larger than nine-seaters) to 6 million units, from its previous forecast of 5.5 million units made at the end of 2021. There is further room for another upward adjustment in the fourth quarter, the association noted.

Shell, Equinor Eye US Hub

European majors Shell and Equinor are partnering to pursue a “collaborative clean energy hub” concept in the US Northeast with manufacturer US Steel. The hub would focus on carbon capture and hydrogen technology in Ohio, West Virginia and Pennsylvania, the companies said this week. The area is home to the prolific Marcellus Shale gas play, where Equinor operates. Shell, meanwhile, is constructing a petrochemical complex in the US state of Pennsylvania that will use shale gas as feedstock. The nonexclusive cooperation agreement calls on Equinor and Shell to jointly apply for federal funding designated for the creation of regional clean energy hubs. US Steel is evaluating the role it may play, including as a potential funding participant, customer, supplier or partner. The news follows a similar but separate agreement announced in February to develop a carbon capture and storage (CCS) and hydrogen hub in the region. Shell, Equinor and US Steel were partners in that agreement, along with EQT Corp., Marathon Petroleum, GE Gas Power and Mitsubishi Power. Equinor also announced a collaboration with technology firm Battelle earlier this year to explore CCS development near its Marcellus operations.

India’s Modest Pledge

India has formalized climate targets made by Prime Minister Narendra Modi at last year’s COP26 summit in Glasgow, but there appears to be ample room for fossil fuels to keep growing. India has pledged to have non-fossil fuels account for about half of its installed power generation capacity and reduce the emissions caused by activities for the nation’s economic growth by 45% by 2030. These are upgrades over India’s vow under the Paris climate agreement in 2015, when it promised to make non-fossil fuels account for 40% of the installed power base and reduce emission intensity of GDP by 33%-35% by 2030 compared with 2005 levels. Still, some bold, actionable targets have been dropped from the latest NDC. These include establishing 500 GW of non-fossil fuel based power generation capacity, sourcing half of India’s power from renewables, and reducing carbon emissions by one billion tons by 2030. This may expose India’s intention to keep burning coal, which now accounts for 57% of its primary energy mix. The updated Nationally Determined Contribution is a step towards India’s goal of achieving net-zero emissions by 2070. It could help India avoid international criticism that it is a climate laggard. However, New Delhi’s reluctance to formalize all the goals Modi pledged at Glasgow also underlines how the recent energy crisis has prompted some countries to prioritize energy security and affordability over climate goals.

US Passes SAF Incentive

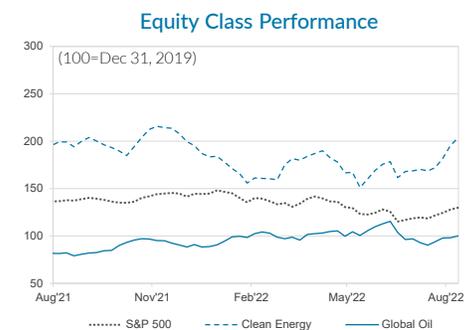
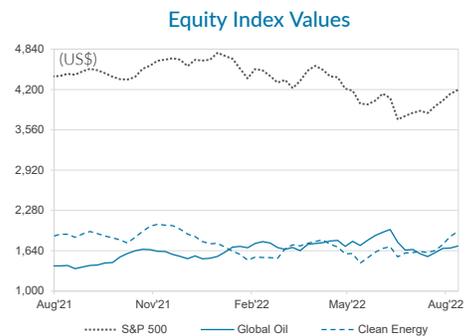
Sustainable aviation fuel (SAF) producers are applauding clean energy incentives in the Inflation Reduction Act of 2022 that include a tax credit for SAF. Stakeholders have lobbied for that provision to incentivize production and put SAF on an equal footing with renewable diesel. The credit for the sale of SAF is linked to environmental performance. It starts at \$1.25/gallon for a 50% cut in emissions versus fossil jet and scales up to \$1.75 for higher reductions. The bill also includes extensions for a 50¢/gallon credit for alternative fuels, a \$1/gallon credit for renewable diesel and

biodiesel, and extends through 2024 a \$1/gallon income tax credit for second-generation biofuel production. The SAF supplies must be produced in the US and used by aircraft refueling in the country.

Gevo Advances SAF Plant

US sustainable aviation fuel (SAF) producer Gevo expects to break ground on its first commercial Net-Zero 1 (NZ-1) plant next month, having finally closed on its purchase of the site in the state of South Dakota. First production is expected in 2025 from the plant, which will produce 55 million gallons of SAF per year plus a further 7 million gallons of other low-carbon products. Gevo uses the alcohol-to-jet pathway to produce SAF from fermented industrial corn. An onsite wind farm will be used to power the NZ-1 plant and provide the electricity needed to make green hydrogen to ensure net-zero greenhouse gas emissions. The firm is also looking at ways of upgrading existing US renewable ethanol production in a bid to ramp up SAF production more quickly.

CLEAN ENERGY EQUITY MARKETS



Source: S&P Global

EI NEW ENERGY DATA

ENERGY FUTURES: REFERENCE PRICES

	Aug 12	Aug 5	Chg.
Carbon (€/ton)			
ECX EUA	86.05	82.74	+3.31
CME GEO (\$/offset)	4.02	3.27	+0.75
Crude oil (\$/bbl)			
Nymex light, sweet	91.92	91.30	+0.62
ICE Brent	97.62	97.28	+0.34
Natural gas (\$/MMBtu)			
Nymex Henry Hub	8.25	8.09	+0.17
ICE UK NBP	46.09	44.27	+1.82
Coal (\$/ton)			
McCloskey CSX	192.40	191.20	+1.20
ICE Rotterdam	337.05	345.94	-8.89

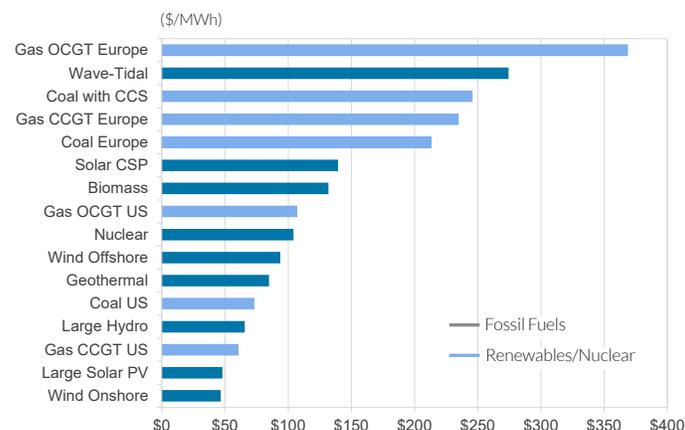
All prices are weekly averages and front-month. EUA = EU Allowances; GEO = Global Emissions Offset. Replaces ECX CER starting 3/30/21. ICE UK gas converted from p/therm. *Short tons. Source: Exchanges

GLOBAL ELECTRICITY PRICES

	Aug 12	Aug 5	Chg.
Europe (\$/MWh)			
Germany (EEX)	383.81	350.98	+32.83
France (Powernext)	388.46	395.64	-7.17
Scandinavia (Nordpool)	190.17	88.76	+101.40
UK (APX)	349.16	307.91	+41.25
Italy (GME)	466.33	516.20	-49.86
Spain (Omel)	152.95	143.92	+9.04
North America			
New England	117.28	139.45	-22.18
Texas (Ercot)	102.22	74.84	+27.38
US Mid-Atlantic (PJM West)	113.55	126.95	-13.40
US Southwest (Palo Verde)	130.05	106.48	+23.57
Canada (Ontario)	51.04	67.94	-16.90
Other			
Australia (NSW)	121.53	91.04	+30.49
Brazil (SE-CW)	17.81	21.23	-3.42
India (IEX)	46.48	73.69	-27.21
Japan (JPX)	200.36	218.33	-17.97
Singapore (USEP)	3145.40	160.26	+2985.13

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)

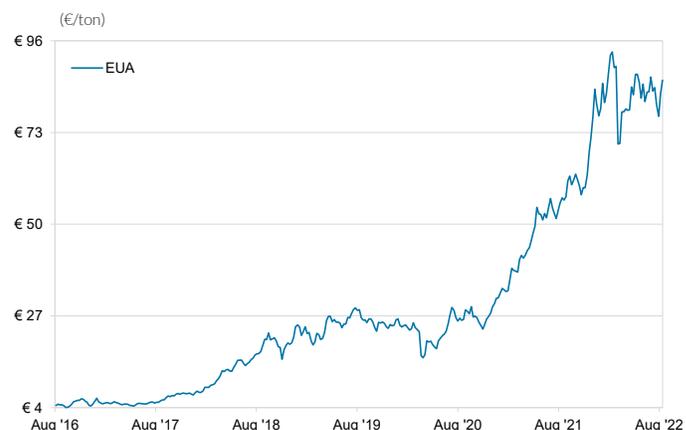
Sales Penetration		EVs = all New Energy Vehicles. EVs = plug-in hybrids and all-electrics. LDVs = light-duty vehicles. EFTA includes Norway, Switzerland, Iceland, Liechtenstein. Sources: China Association of Automobile Manufacturers, China Passenger Car Association, US Alliance for Automotive Innovation, 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

	Aug 16	Aug 9	Chg.
Europe (€/ton)			
EUA Dec '22	92.08	85.93	+6.15
US (\$/ton)			
CCA (Calif.) Dec '22	31.11	32.25	-1.14
RGGI (Northeast) Dec '22*	13.65	13.30	+0.35
New Zealand (NZ\$/ton)			
NZU (spot)	83.45	80.00	+3.45
Asia (\$/ton)	Aug 15	Aug 8	Chg.
China-Guangdong	8.57	8.74	-0.17
South Korea	20.76	21.55	-0.80

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

EU CARBON FUTURES PRICES



ECX front-month futures. Source: ICE