

EI NEW ENERGY

COPYRIGHT © 2020 ENERGY INTELLIGENCE GROUP. ALL RIGHTS RESERVED. UNAUTHORIZED ACCESS OR ELECTRONIC FORWARDING, EVEN FOR INTERNAL USE, IS PROHIBITED.

CONTENTS

- 2** EXPLORING AND TRANSITIONING?
- 3** WHAT BIDEN COULD DO
- 4** GAS AT HEART FOR ASIAN NOCS
- 5** GAS OFTEN GREENER ON OTHER SIDE
- 6** EU HYDROGEN PLANS JEOPARDIZE GAS
- 7** NEWS ROUNDUP
- 8** EI NEW ENERGY DATA

OGCI: Carbon Target Designed to Spur More Action

Hoping to jump-start ambition among the oil industry without pushing some players away, the Oil and Gas Climate Initiative (OGCI) last week unveiled a modest new target to reduce the collective average carbon intensity of the upstream oil and gas operations of its 12 members. It has drawn some criticism from campaigners for not going far enough, since the target is weaker than goals set by some individual OGCI members, namely European oil majors. This is true, but does that miss the point? OGCI Executive Committee Chair Jerome Schmitt tells Energy Intelligence that the target is significant because it brings national oil companies (NOCs) into the equation and will hopefully spur similar actions from other players. Furthermore, the OGCI's thinking is to start with feasible goals that carry wide-spread support and then ramp up from there.

The OGCI goal is to cut its members' aggregate carbon dioxide emissions intensity to between 20 and 21 kilograms of carbon dioxide per barrel of oil equivalent by 2025, from a collective baseline of 23 kg CO₂/boe in 2017. The OGCI's members, which span a diverse mix in terms of geography, strategy and ownership models, are BP, Chevron, China National Petroleum Corp., Eni, Equinor, Exxon Mobil, Occidental, Petrobras, Repsol, Saudi Aramco, Royal Dutch Shell and Total.

OGCI's Schmitt explains that while "the visible leadership" on climate and on climate targets in particular is dominated by a few international oil companies (IOCs), NOCs account for close to 50% of global oil production and OGCI-associated production emissions. "What we are trying to do is to launch initiatives that can [be] led by and be taken on board by all types of industry players including national oil companies ... and which can be thereafter, sold to and supported by smaller players including other NOCs and governments as well," Schmitt says.

This desire to find a consensus was also why OGCI has focused on a target based on carbon intensity rather than an absolute cut in emissions — a move criticized by some. This would allow increases in emissions overall, with a group average also potentially letting poor performers "off the hook," says Andrew Grant, Head of Oil, Gas and Mining at Carbon Tracker. Schmitt recognizes "that many are calling for absolute targets," but says the OGCI's "aim is to have an impact," and to have an impact it needs to engage all the OGCI companies. This means that OGCI needs "to push and pull and convince other companies, big or small, IOCs or NOCs everywhere in the world," to adopt a comparable reduction. There would be "no practical way" to achieve that with an absolute target, Schmitt believes. OGCI will not publish individual company data for similar reasons. Whereas listed majors are well used to disclosing such data, unlisted NOCs are not. "It's already an incredible victory to have them contributing to the target and being willing to be audited every year on that," whereas requiring companies to publish individual data would put off many. "Our aim is to find something which is workable."

Finding a workable consensus among the 12 OGCI members has not been easy and the result is perhaps inevitably imperfect, however advocates of industry engagement say this should not detract from its importance, not least in encouraging industry laggards to take some action. "Individual companies can show leadership on climate change, but no compa-

REGIONAL POWER GENERATION COSTS

(\$/MWh)	Dvlpg.				
	US	Europe	Japan	Asia	Mideast
Gas CCGT	36	53	51	40	38
Large Solar PV	46	83	125	46	56
Wind Onshore	46	66	139	55	72
Large Hydro	57	66	68	37	77
Geothermal	71	71	82	66	61
Coal	72	97	95	55	63
Gas OCGT	72	98	90	77	77
Biomass	94	94	93	70	84
Wind Offshore	104	103	121	112	114
Nuclear	111	111	94	56	77
Solar CSP	127	157	NA	121	107
Coal with CCS	141	147	167	114	126
Wave-Tidal	281	281	276	266	266

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

EUROPEAN OIL COMPANIES' GHG INTENSITY AND SCOPE 3 TARGETS

Company	Absolute Target	What It Covers	Intensity Reduction (%)
BP	Net-zero	Own production	50%
Eni	80% reduction	Total sales	55
Equinor	--	--	50
Repsol	Net-zero	Own production	--
Royal Dutch Shell	Net-zero	Total sales, with customer involvement	65
Total	Net-zero	Total sales, Europe	60%

Scope 3 absolute and intensity targets by European oil companies as of early May 2020. Source: companies

ny or even country can tackle this challenge, alone," says Shell CEO Ben van Beurden. "It's a process," says a source at another European major. "Nobody would have imagined such an initiative 10 years ago. Nobody would have imagined the OGCI to be able to on board Exxon, Chevron and Oxy five years ago. Nobody would have imagined a target to lower collective carbon intensity two years ago. Targets are made to be improved and progress has no other way than going forward. There is no going back or stepping aside from this ambition."

The OGCI also emphasizes that this is not the end of the road for it but closer to the beginning. "We are on a continuous improvement journey," Schmitt says. Having previously set a methane target, "now we have an upstream carbon intensity. Then we are going to work on something else and then on something else again" and progressively "add more tools, and go step by step further down the road."

Ronan Kavanagh, London, with Philippe Roos, Strasbourg

STRATEGY

Oil Firms Chase Discoveries Despite Transition Goals

Global oil majors pursuing ambitious energy transition goals are still finding a perhaps counterintuitive niche for certain low-cost exploration, despite stranded-asset warnings and added pressure from the economic slump. Investment trends in Latin America serve as a useful illustration of this. Global majors, independents and national oil companies have largely maintained their exploratory plans in key areas such as the Brazilian pre-salt, the Guyana-Suriname Basin and deepwater Mexico, even as overall capital spending has been slashed by a third. Competitiveness is a key concern, with sources telling Energy Intelligence that the factors that prompted acreage grabs in Latin America bid rounds in the last several years, for example, have kept up their advantages. These include low break-even costs, favorable fiscal regimes and medium-term development time frames -- plus they serve as a cushion against short-cycle oil market volatility seen by the shale sector. "What they're probably looking for is being able to have a very fixed [operating expenditure] and know this asset will be able to be profitable, no matter what the volatility in the oil market does," said Schreiner Parker, consultancy Rystad Energy's business development manager for Latin America.

Searching for more oil might seem at best unnecessary or at worst irresponsible in a world already seen as awash in supply. The demand picture is more uncertain than perhaps ever before and companies with ambitious emissions goals are starting to zero in on reducing hydrocarbons projects. But while there may be enough barrels on the books to seemingly meet the foreseeable demand, not all of those barrels may be the most competitive — particularly as companies are looking more closely at the carbon footprints of oil projects. "Carbon emissions mitigation could be a wild card favoring exploration," Wood Mackenzie wrote in a recent report, calling the cost of full-cycle new exploration "surprisingly similar" to existing greenfield and brownfield alternatives. "Companies struggling to decarbonize disadvantaged older assets might even find it cheaper to start afresh with new discoveries."

Explorers including Royal Dutch Shell and Total that are chasing ambitious carbon-reduction goals have flagged a potential disadvantage for areas that require more energy-intensive extraction or processing — potentially benefiting deepwater over areas like oil sands and shale. Factors like the number of wells and the emissions of development facilities may all play a role (OD Jul.14'20). Mathieu Soulas, Total senior vice president for climate and strategy, told Energy Intelligence earlier this month that producers will need to leave a lot of oil in the ground, but that the search for new resources would go on. "That's why Total is focusing on oil that is cheap to produce, and is not going to develop new projects in expensive fields," he said. "So we still need exploration, but focused on finding cheap barrels" (NE Jul.16'20)

Total has multiple holdings in significant producing and exploratory fields off Brazil, as well as 17 blocks in more frontier areas. And it's not alone: Exxon Mobil led the charge into Latin America exploration with discoveries off Guyana that now sum to over 8 billion barrels of oil equivalent. But even some of the planet's most climate-motivated majors have major Latin America exploratory holdings amassed in the past several years, including Shell, Equinor, Repsol, Eni and BP.

But such moves remain a gamble. Companies could face stranded-asset risk amid demand uncertainty, with weaker pricing leading to asset write-downs after billions were spent on recent bid rounds. And investors demanding a greener business plan may be unimpressed with companies taking on new hydrocarbon activities. Political winds, which helped the stars align for explorers in recent years, also remain unpredictable. Exxon is being forced to navigate the tumult of disputed elections in Guyana, which is expected to slow down its Payara oil project, while Mexican President Andres Manuel Lopez Obrador has called off future acreage rounds. But many still seem willing to roll the dice, given the attractive payout. Repsol CEO Josu Jon Imaz was recently asked if the company would divest two finds off Mexico in light of its energy transition plans — to which the answer was a resounding no. The company would meet its carbon targets, but not exit the oil business, he said. "We are focusing the exploration in the areas we defined before ... So our target and our aim is to go on in Mexico to develop these projects."

Kathrine Schmidt, Houston

POLICY

How Far Could Biden Speed Up the US Transition?

US Democratic presidential front-runner Joe Biden is set on pursuing a bold climate agenda. In the four years since the former vice president left the White House after two terms in the Obama administration, the political landscape has shifted sharply. And so has Biden's thinking.

Big swaths of the US electorate now view climate change as a top priority, emboldening the presumptive candidate to present major initiatives to constrain new oil and gas development and advance comprehensive carbon targets (NE May7'20). Achieving such goals in real-world conditions would be extremely challenging anywhere, but especially so for the world's largest oil-consuming nation and the second-largest greenhouse gas emitter. Before Covid-19 struck, domestic calls for US climate action were mounting, in reaction to extreme weather events and devastating natural disasters. Recent surveys show this heightened awareness remains strong in political discourse and sentiment across the US, despite the electorate's immediate focus on the crises in public health and the economy.

Biden duly rolled out a \$2 trillion clean energy and infrastructure plan this month, building on previous pledges he's made for net-zero emissions and a carbon-free power sector (see table; NE Jul.16'20). How this plays when campaigning ratchets up later in the summer is an open question. Right now, Biden is consistently leading US President Donald Trump in national opinion polls ahead of the Nov. 3 presidential contest. But a Biden victory remains a big if. Polls can be misleading and incumbency has historically favored US presidents seeking a second term.

If elected, Biden could use executive powers to impose new rules in selected areas, from auto fuel economy standards to tighter regulations on power plant emissions. But if Democrats secure majorities in both houses of the US Congress he could go much further, so long as members approve policies to promote the bolder ambitions.

The presidential race has inevitably stirred great interest in how a possible Biden administration could shape the energy transition.

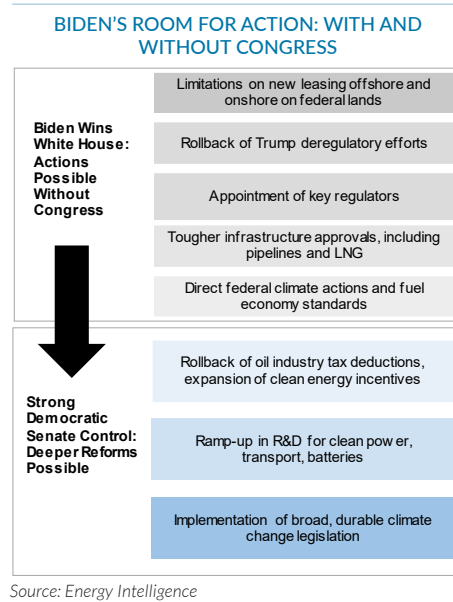
Below are four key areas for policy action, to be explored in upcoming articles in the coming months.

Climate policy: Biden's domestic climate agenda centers around a goal for net-zero carbon emissions by 2050. With cooperative Democratic congressional majorities, Biden could give more teeth to the goal by enshrining it in federal law, although there's a high bar for pushing anything over the congressional finish line, even when the same party is working together. Biden has also promised to "immediately" bring the US back into the Paris climate accord, which needs no green light from Congress. If the US re-enters, it could give a surge of momentum to the climate negotiating process, including a landmark conference in Glasgow, Scotland, in 2021, at which signatory states will be called on to tighten their targets. A Biden administration would seek to reclaim the US' role as a leading negotiator.

Clean transport: The power sector once accounted for the largest chunk of US greenhouse gas emissions and was the top target of the Obama administration's mitigation efforts, but transport has been the biggest source of US emissions for the past three years. Biden has duly placed a stronger emphasis on this sector. His proposals include ambitious fuel economy standards, investments in electric vehicle charging, and rebates for swapping out older, inefficient vehicles. More radical policy moves could include internal combustion engine phaseout goals or zero-emission vehicle standards akin to those in China, Europe, or progressive states like California, which would require cooperation from Congress (NE Oct.27'16).

Renewable power: Much room still exists for big emissions cuts in the US electricity generating mix, which was still led by natural gas (38%) and coal (23%) as of end-2019, according to the US Energy Information Administration. Notably, Biden's platform calls for a carbon-free power sector by 2035. Such a move would largely rule out gas, marking a major shift from the generally pro-gas policies of past presidents, Obama included. A potential national renewable energy or clean energy standard for the power sector is another option that would require congressional action (NE Jun.6'19).

Phasing out fossil fuels: Besides disadvantaging gas in pursuing carbon-free power, Biden could use executive powers to adopt a tougher approval process for pipelines and other oil



Source: Energy Intelligence

BIDEN'S CLIMATE GOALS: KEY AREAS

- Overall Climate Policy**
- Set goal for a 100% clean energy economy and net-zero emissions by 2050
 - Rejoin Paris climate agreement
 - Create a new Advanced Research Projects Agency on Climate to pursue technological breakthroughs
 - Has expressed support for a carbon tax, but not actively promoting it
- Transportation**
- Establish "ambitious" fuel economy standards
 - Make public investments in 500,000 electric vehicle charging stations
 - Offer federal rebates encouraging consumers to swap out older, less-efficient vehicles
 - Set goal for all US-built buses to be zero-emissions by 2030
- Power**
- Set target for a carbon-free power sector by 2035
 - Make major investments in energy efficiency, clean buildings, and power transmission infrastructure
- Approach to Fossil Fuels**
- No new access to federal lands or waters for oil and gas development; existing activity could continue
 - Said in 2016 that oil industry tax deductions should be ended
 - Set tougher bar for pipelines and other oil and gas infrastructure approvals

Source: Biden public speeches and statements.

and gas infrastructure. He has vowed to restrict new access to federal lands and waters for exploration and production and is likely to set stricter greenhouse gas regulations on everything from upstream methane emissions to downstream refining emissions via the Environmental Protection Agency. Furthermore, he would likely attempt to remove long-standing oil and gas industry tax deductions for expenses such as intangible drilling costs and geophysical work, although Congress holds the powers here. Obama unsuccessfully sought to end those incentives in each of his annual budget requests.

Lauren Craft, Washington

STRATEGY

Asian NOCs Keep Gas at Heart of Transition Thinking

Recent moves by Malaysia's Petronas and China National Offshore Operating Co. (CNOOC) signal a growing willingness of some Asian state oil companies to expand their exposure to renewable energy and buy into the low-carbon transition — even if the overall pace of regional change remains uneven and tends toward the conservative (NE Jul.9'20).

In a second significant renewable investment, Petronas this month took a stake in solar energy start-up SOLS Energy, which follows last year's acquisition of Singapore-based Amplus Energy. That deal secured the national oil company (NOC) a solar portfolio of roughly 500 megawatts and indicated its new intent. Indeed, Petronas plans to devote 7% of its 2020 capital spending to renewables and is reportedly in talks with Indian solar power developer Acme Solar to acquire another 100 MW.

For its part, CNOOC in January said it would channel 3%–5% of annual capex to offshore wind, which has obvious synergies with its offshore oil and gas operations. It has set up a wholly owned subsidiary in Shanghai for renewable energy, Rongfeng, which has a 300 MW offshore wind project under construction in Jiangsu that's scheduled for completion this year.

However, the efforts of Petronas and CNOOC still pale by comparison with the radical low-carbon transition strategies of their European counterparts, such as Norway's Equinor and France's Total (NE Jul.16'20). And, while questions over the suitability of natural gas as a cleaner fuel gather pace, Asian NOCs are avidly promoting the fossil fuel as the main thrust of their energy transition strategies (NE Jun.6'19). Petronas, for example, has bundled its gas business with alternative energy into a new division, "Gas + New Energy," to underline the fact. Other "new energy" options favored by Asian NOCs are geothermal and transport biofuels — the former entails the drilling of wells just like for oil and gas, while the latter overlaps with their existing downstream fuel business.

China National Petroleum Corp. (CNPC) and Sinopec are also firm advocates of gas allied to carbon capture and storage (CCS) technology to eliminate emissions from fossil fuels. For China, natural gas is the "realistic option" for carbon reduction, CNPC said in its latest annual report. CNPC's gas-based low-carbon strategy is also diverse, targeting higher gas output by boosting shale gas, coal seam gas and other unconventional developments. For good measure, the state giant is leading a CCS "development center" in the oil- and gas-rich Xinjiang autonomous region — one of five such projects under the UK-based Oil and Gas Climate Initiative (OGCI), of which CNPC is a member (p1).

CNPC also views geothermal as the "most realistic" alternative energy form that it wants to "strongly promote." It invested 700 million yuan (\$100 million) in geothermal projects in 2017–19, although this is a fraction of its annual 200 billion–300 billion yuan capital spend. Otherwise its renewable efforts are limited to a 15 MW solar facility to power its Jilin oil field, a handful of electric vehicle (EV) charging stations and a partnership signed recently with Beijing Automotive to build hydrogen refueling stations in Beijing.

Domestic rival Sinopec also emphasizes gas and geothermal, but appears slightly ahead in the foray into hydrogen. Last year it completed China's first hybrid fuel station in Guangdong province, offering a choice of gasoline, diesel, hydrogen and EV charging (NE Oct.3'19). It also partnered France's Air Liquide last year to install two hybrid stations in Shanghai for dual oil/hydrogen fueling, and is planning at least a couple more such projects.

However, Sinopec's spend is still relatively modest. It invested over 1 billion yuan in alternative energy, environmental conservation, smart operations and other innovative products in 2019 but this was less than 1% of total capex of 147 billion yuan. Longer term, both CNPC and Sinopec are well placed to ramp up hydrogen fueling and EV charging when the time is right, exploiting their large retail networks.

In Southeast Asia, liquid biofuels for transport use is a popular option that allows NOCs to operate on familiar ground. Indonesia, with its highly controversial but abundant palm oil supply — due in part to illegal forest burning to make way for palm plantations — is particularly well positioned. Showing the way, state-owned Pertamina this month started trial production of 100% palm oil-based biodiesel (B100), which it says can replace conventional diesel without the need for blending. But the B100 technology has yet to attain scale, with test runs of only 1,000 barrels per day. And, a planned commercial launch of B100 in 2023 has slipped to 2026, likely due to its key partners, Italy's Eni and Saudi Aramco, pulling out of the venture. Pertamina is also active in geothermal energy, with over 1.8 gigawatts of installed capacity, overtaking the Philippines in 2018 to become the world's second-largest geothermal producer after the US.

Kimfeng Wong and Marc Roussot, Singapore

ANALYSIS

Some Gases Far, Far Greener Than Others

Natural gas resources have life-cycle greenhouse gas emissions that are just as wide-ranging as oil. In fact, depending on the asset and how it is managed, some of those resources are much worse for the climate than oil. That's a key finding from the OCI+, a new version of the Oil-Climate Index (OCI), a tool for policy-makers and investors developed by researchers from Brown University, Stanford University and the University of Calgary. The OCI+ includes 14 oils and 13 gases from different formations around the world with an average climate impact of 528 kilograms of carbon dioxide equivalent per barrel of oil equivalent. Typically, 70%-75% of this impact is generated as the oil industry's so-called Scope 3 emissions when its products are burned by customers, but some resources have disproportionately high Scope 1 and 2 emissions during the production phase (NE Apr.30'20). Gas venting, flaring and fugitive methane emissions can, for example, amount to over 300 kg CO2e/boe while producing and upgrading heavy oils requires nearly 200 kg CO2e/boe. By contrast, light oil and properly managed gas production generate only about 20-40 kg CO2e/boe.

While the climate impact assessment of fuels usually focuses on their sole carbon content — or how much CO2 is released when they are burned in engines or power plants — a thorough analysis must take into account the full value chain from extraction to refining to end use, the OCI+ authors emphasize (NE Jan.24'19). The most critical upstream parameter is how much gas is leaked or flared during production, with high leakage at Russia's Astrakhanskoye gas field, for example, causing some 170 kg CO2e/boe of upstream emissions (NE Apr.2'20). Fugitive emissions can also be substantial during production and processing of US shale gas, the model warns. Similarly, high flaring rates at Kuwait's Ratawi and Mexico's Chuc oil fields are cause for 50-100 kg CO2e/boe of emissions, whereas associated gas at Australia's Cossack is generally not flared given the field's ample pipeline infrastruc-
ture (NE Oct.10'19). This

leads to a very low 33 kg CO2e/boe of upstream emissions at Cossack, only slightly above the OCI+'s lowest upstream emitter, Norway's Ekofisk, where only 18 kg CO2e/boe are emitted during production, due to the "responsible management" of associated gas and the use of renewable hydropower on offshore rigs.

The OCI+ model also shows how effective some tools can be to reduce upstream emissions. While pessimistic fugitive methane and venting assumptions would bring them to 370 kg CO2e/boe for Astrakhanskoye, up from the base case's 285 kg CO2e/boe, better leakage management would reduce that number to 245 kg CO2e/boe, according to the model's sensitivities. Piping gas, as opposed to liquefying it and shipping it as LNG, which are carbon-intensive processes, can save another 30 kg CO2e/boe where feasible, the model also shows (NE Feb.27'20). Likewise, heavy oil could be made substantially less harmful for the climate with a combination of solar steam for enhanced recovery, renewable hydrogen in refining, and no petcoke burned (NE Feb.22'18). This way, Indonesia's Duri and the US' Midway Sunset and South Belridge oil fields could cut upstream and midstream emissions by over 50% at an average 130 kg CO2e/boe down from 275 kg CO2e/boe, and downstream emissions by almost 15% at 415 kg CO2e/boe down from 475 kg CO2e/boe.

Besides steam injection, which is used at Duri, Midway Sunset and South Belridge, CO2 injection is one of many enhanced oil recovery (EOR) techniques. The OCI+ model suggests that, while using natural sources such as high CO2 gas fields would not reduce emissions because of the EOR process' high energy intensity, using manmade CO2 from waste flue gas or directly removed from the

atmosphere would be helpful for the climate as it would result in negative upstream emissions of 200 kg CO2e/boe, and the lowest life-cycle emissions in the model, at just under 290 kg CO2e/boe (NE May28'20).

Refining emissions are usually small, ranging from 25-30 kg CO2e/boe for simple hydroskimming refineries processing light, sweet crudes to 35-40 kg CO2e/boe for medium conversion plants, and up to almost 100 kg CO2e/boe for deep conversion of heavy crudes (NE Jun.25'20). And while some products like asphalt or light petrochemical feedstock do not generate emissions because they are usually not burned, most hydrocarbons are combusted to power vehicles, generate

CLIMATE IMPACT WIDELY DIFFERS ACROSS OIL AND GAS TYPES

(kg CO2e/boe)	Country	O/G	Type	Upstream	Midstream	Downstream	Total
Duri	Indonesia	Oil	Heavy	246	74	468	788
Midway Sunset	US	Oil	Depleted	219	70	475	764
Brent	UK	Gas	Depleted	467	2	275	744
Athabasca DC	Canada	Oil	Extra Heavy	140	15	552	707
South Belridge	US	Oil	Depleted	133	84	481	698
Astrakhanskoye	Russia	Gas	Sour	287	14	345	646
Kapuni	NZ	Gas	Sour	343	7	271	621
Ratawi	Kuwait	Oil	Medium	123	25	464	612
Ghawar	Saudi A.	Oil	Light	21	26	529	576
Eagle Ford Volatile	US	Oil	Ultra-Light	46	12	509	567
Eagle Ford Black Oil	US	Oil	Ultra-Light	46	16	486	548
Spraberry field	US	Oil	Light	65	17	446	528
Azeri Light	Azerbaijan	Oil	Light	34	12	468	514
Chuc	Mexico	Oil	Light	72	24	418	514
Vaca Muerta	Argentina	Gas	Shale	35	18	441	494
Shah	UEA	Gas	Sour	142	10	330	482
Idd El Shargi	Qatar	Gas	Wet	65	3	404	472
Ekofisk	Norway	Oil	Light	18	14	434	466
Eagle Ford Condensate	US	Gas	Condensate	33	9	423	465
Cossack	Australia	Oil	Ultra-Light	33	19	399	451
Sulige	China	Gas	Coal-Bed	136	0	283	419
Obagi	Nigeria	Oil	High Gas	79	6	333	418
South Pars	Iran	Gas	Wet	55	4	354	413
Gorgon	Australia	Gas	Dry	73	2	326	401
Urengoykoye	Russia	Gas	Wet	43	0	286	329
Marcellus	US	Gas	Shale	45	0	282	327
Eagle Ford Gas	US	Gas	Shale	58	7	233	298

Greenhouse gas emissions caused by the production and usage of 27 oil and gas types, in kg of CO2 equivalent per barrel of oil equivalent. Source: OCI+ Preview (web tool under development)

electricity or produce heat. While emissions hardly differ between oils, at 400–500 kg CO₂e/boe, the range is more open for gas fields, at 250–400 kg CO₂e/boe, depending on the variable ratio of oil to gas in the output.

Philippe Roos, Strasbourg

NEW TECHNOLOGIES

EU Hydrogen Plans Spell Trouble for Gas

European oil and gas majors are betting on gas to be their growth fossil fuel over the coming decades as they realign portfolios to deweight oil in anticipation of peak or plateau oil demand. But the recent release of two new energy strategies from the European Commission, one on hydrogen and one on energy system integration, could lengthen those odds (NE Jul.9'20).

The EU is targeting carbon neutrality by 2050 and knows deep electrification alone won't be enough to reach this goal. There are too many hard-to-decarbonize sectors. Nonetheless, Brussels expects electricity to account for 50% of final EU energy consumption in 2050, up from 23% now. To lower the carbon footprint of non-electrified activities, Brussels has released a hydrogen strategy which envisions a limited, short- to medium-term role for natural gas with carbon capture and storage (CCS), so-called blue hydrogen, with gas playing a bridging role to help build up hydrogen capacity and hasten its cost competitiveness. An energy system integration strategy aims eventually to squeeze gas out of the mix, through energy efficiency, the circular economy, electrification powered by renewables, and the use of renewable or low-carbon gases.

The commission said renewable or green hydrogen using renewable-fueled electrolyzers is the main priority, with growing renewable capacity supporting green hydrogen production (NE Jul.2'20). But it concedes that other forms of low-carbon hydrogen are needed "in the short and medium term ... to rapidly reduce emissions from existing hydrogen production and support the parallel and future uptake of renewable hydrogen."

This leaves the door open for hydrogen produced from natural gas with CCS, but the subject divides industry professionals. In a green versus blue hydrogen webinar last week, James Watson, secretary-general of lobby group Eurogas, said it will be "necessary to have both green and blue hydrogen in 2030" to build up scale, with "potentially a bit more blue than green."

However, Italian utility Enel has already called time on CCS, closing all its CCS projects. "We are not very positive on CCS costs or scale," said Valentino Rossi, Enel's head of regulatory

affairs. "Green hydrogen is the only long-term solution; a transition with natural gas plus CCS is too expensive." Rossi said that by the time the hydrogen is needed, "green hydrogen will be in the money or close to cost competitiveness with gray hydrogen." EU plans for a carbon border tax, which Russian oil and gas exporters fear may happen, could also push the cost of natural gas as blue hydrogen feedstock higher, further weakening the economics.

A May study from lobby group Hydrogen Europe suggests some €430 billion (\$474 billion) of investment — including €145 billion in grants and subsidies — will be needed before 2030 to create an industry capable of producing 16.9 million tons of hydrogen annually. Some 7.4 million tons will be green hydrogen, with some 4.4 million tons produced in the EU, needing some 80 gigawatts of wind and solar capacity to provide it. Besides this, roughly 8.2 million tons of blue hydrogen could be produced using gas with CCS, plus 1.3 million tons derived from coal gasification with CCS, mainly sited in coal-rich countries such as Poland, Bulgaria, Romania and Hungary. A 2050 scenario released in June by Eurogas argued that hydrogen production through methane reforming coupled with CCS (blue hydrogen) would supply the bulk of medium-term demand for hydrogen in 2050. Oil and gas companies are watching the sector with interest — a survey by consultancy DNV GL shows 52% of senior oil and gas professionals expect hydrogen to be a significant part of the energy mix by 2030 (NE Jul.2'20).

The first phase of the European Commission hydrogen strategy covering the years 2020–24 envisions 6 GW of electrolyzer capacity built to produce up to 1 million tons of renewable hydrogen. These volumes will predominantly replace existing gray hydrogen used in the chemicals sector, but also in "other industrial processes and possibly in heavy-duty transport." There will be an emphasis on localized electrolyzers and localized renewable power and hydrogen fueling stations to support buses and later trucks. Existing natural gas-hydrogen plants should be CCS retrofitted. The second phase, covering 2025 to 2030, calls for 40 GW of operational electrolyzer capacity, producing some 10 million tons of renewable hydrogen within the EU.

These targets come with a price tag of €24 billion–€42 billion for electrolyzers, plus €220 billion–€340 billion to build and connect 80 GW–120 GW of wind and solar capacity to the electrolyzers, some €11 billion to retrofit natural gas-hydrogen plants with CCS and €65 billion for hydrogen transport, distribution, storage and refueling stations. Currently, the EU has the capacity to build some 1 GW of electrolyzer capacity annually.

In its strategic vision for a climate-neutral EU published in November 2018, Brussels said the share of hydrogen in Europe's energy mix is projected to grow from less than 2% to 13%–14% by 2050.

Jay Eden, London

NEWS ROUNDUP

Chinese Power Rebound

Chinese power demand, seen as a bellwether of the economy, posted a 6.5% year-on-year increase in June to 630 TWh, latest data from the National Energy Administration showed. The June growth rate was stronger than the 4.6% registered in May and 0.7% in April, signaling a rapid rebound in GDP in the wake of the Covid-19 shutdown. China's economy grew by 3.2% in the April-June quarter, after slumping 6.8% in the first quarter (NE Apr. 30'20). Over half of the incremental electricity consumed in June was supplied by coal- or gas-fired power plants, which increased output by 5.4% to 432 TWh. Hydro power was the second-largest contributor, increasing output by 6.9% to 122 TWh. Wind posted the highest growth rate of 19.2% to 36 TWh while nuclear output rose 13.6% to 32 TWh.

EU Hydrogen Backbone

Building a Europe-wide pipeline network for hydrogen and biomethane by 2040 could cost from €27 billion to €64 billion (\$31 billion-\$73 billion), according to a group of 11 European gas infrastructure companies. The so-called "European hydrogen backbone" would combine converted gas pipelines (75%) and new lines (25%) to connect hydrogen supplies and demand centers. A report by the group, which includes Spain's Enagas, Denmark's Energinet, Belgium's Fluxys, Gasunie of the Netherlands, GRTgaz and Terega from France, Italy's Snam, Sweden's Swedegas, Net4gas from the Czech Republic and Germany's OGE and Ontras, said a 6,800 km network should be built by 2030, ending up with a 23,000 km hydrogen network spanning Europe by 2040.

Gas Flaring Unabated

The World Bank's annual global gas flaring report shows associated gas burned as a byproduct of oil production in 2019 rose to levels last seen a decade ago. Around 150 billion cubic meters was flared, 3.5% up on 2018 and equivalent to total annual gas consumption in sub-Saharan Africa. The increase was driven by the US, up 23% on the back of higher shale oil output, plus Venezuela, which rose 16% despite a pro-

duction crash, and Russia, where flaring rose 9% despite flat oil output. Just four countries — Russia, Iraq, the US and Iran — have accounted for 45% of total global gas flaring for three years running, suggesting "there may be systematic and structural barriers to reducing gas flaring practices in these countries," the report said.

China Ups Turbine Game

China has erected its largest offshore wind turbine to date. The 10 MW unit sited offshore Fujian province's Xinghua Bat is the largest in Asia-Pacific and second-largest in the world, according to co-developers China Three Gorges Corp. and Dongfang Electric. The turbine was grid connected earlier this month for trial runs. The partners took nearly three years to research and develop the turbine, which is manufactured by Dongfang and designed to resist typhoon strength wind conditions. The project elevates China to the club of double-digit capacity wind turbine makers, previously the domain of Western manufacturers: Siemens Gamesa recently launched a 14 MW model (NE Mar. 26'20). The Chinese partnership has its sights on building larger wind turbines capable of generating 12 MW-15 MW.

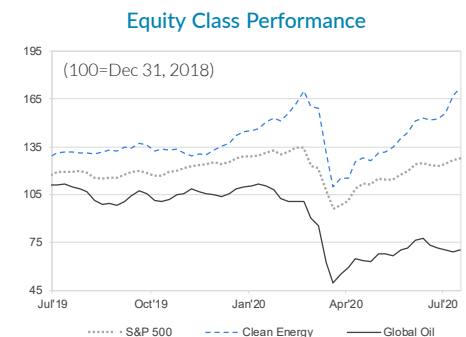
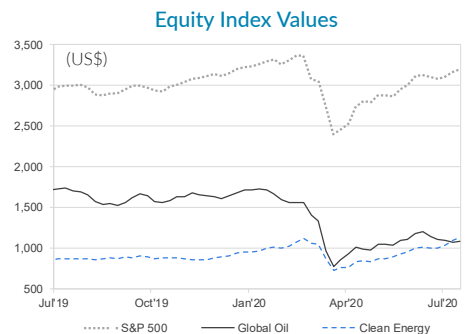
US Methane Rules Contested

A court in California has once again struck down the Trump administration's efforts to rescind methane capture requirements. In 2018, the administration tried to suspend most of the methane capture rules for oil and gas production on public lands set two years earlier by the Bureau of Land Management (BLM). That was rejected in a federal district court, and another effort flopped when the US Senate failed to approve the repeal. On Jul. 15 a judge for the US District Court for the Northern District of California ruled that the BLM's 2018 rulemaking was "wholly inadequate" and overstepped its authority under federal mineral law by defining "waste" gas too narrowly. The 2018 revisions rescinded requirements for gas-capture targets; controlling emissions from drilling, well completion and pneumatic controllers; and leak detection and repair.

Will ReFuelEU Plan Fly?

A Brussels-based lobby group has made a slew of recommendations to help the EU make a success of its ReFuelEU initiative, due later this year. The earlier EU Emissions Trading System and Renewable Energy Directive II both failed to sufficiently boost the development and uptake of sustainable aviation fuels and the Transport and Environment (T&E) group wants to ensure the ReFuelEU legislation does more to boost efuels for aviation, prioritizing their development over that of advanced biofuels. T&E reckons advanced biofuels derived from waste and residue feedstocks could only meet 11.4% of EU aviation demand by 2050 due to competing users and the EU's huge parallel efforts to minimize waste. Among other measures, it wants EU legislation to only support those advanced biofuels that bring about sufficient emissions reductions after competing uses and broader environmental impacts are taken into account. T&E calculates an efuel mandate would increase airline fuel costs by 4.5%-9%, but suggests narrowing the gap through higher carbon prices or a jet fuel tax.

CLEAN ENERGY EQUITY MARKETS



Source: Standard & Poor's

EI NEW ENERGY DATA

ENERGY FUTURES: REFERENCE PRICES

Carbon (€/ton)	Jul 21	Jul 14	Chg.
ECX EUA	26.54	29.56	-3.02
ECX CER	0.29	0.29	0.00
Crude oil (\$/bbl)			
Nymex light, sweet	41.92	40.44	+1.48
ICE Brent	44.32	42.90	+1.42
Natural gas (\$/MMBtu)			
Nymex Henry Hub	1.68	1.74	-0.06
ICE UK NBP	1.53	1.62	-0.09
Coal (\$/ton)			
McCloskey CSX	40.50	40.00	+0.50
ICE Rotterdam	49.60	48.00	+1.60

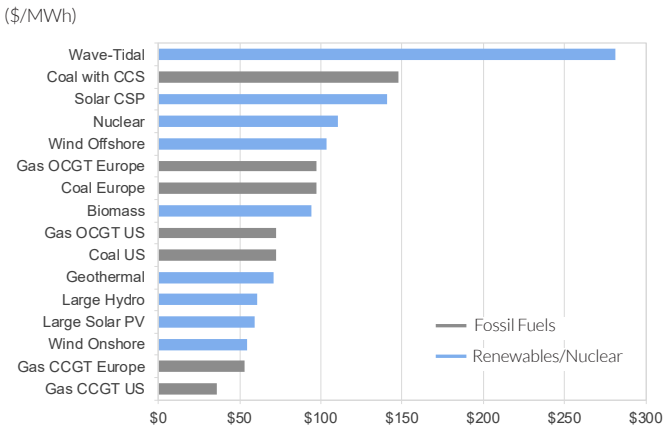
All prices are front month. EUA = EU Allowances; CER = Certified Emission Reductions under UN CDM. ICE UK gas converted from p/therm. *Short tons. Source: Exchanges

GLOBAL ELECTRICITY PRICES

Europe (\$/MWh)	Jul 21	Jul 14	Chg.
Germany (EEX)	39.59	47.52	-7.92
France (Powernext)	41.53	45.94	-4.42
Scandinavia (Nordpool)	2.25	4.42	-2.17
UK (APX)	40.41	40.47	-0.06
Italy (GME)	46.06	46.55	-0.48
Spain (Omel)	47.07	35.38	+11.69
North America			
New England	28.00	24.00	+4.00
Texas (Ercot)	18.67	18.73	-0.07
US Mid-Atlantic (PJM West)	31.28	27.75	+3.53
US Southwest (Palo Verde)	29.00	47.00	-18.00
Canada (Ontario)	10.87	11.25	-0.38
Other			
Australia (NSW)	50.05	34.12	+15.94
Brazil (SE-CW)	17.64	16.08	+1.57
India (IEX)	30.60	34.45	-3.85
Japan (JPEX)	37.36	40.67	-3.31
Russia (ATS)	20.01	18.97	+1.04
Singapore (USEP)	45.44	40.14	+5.31

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 penetration	EV sales penetration
Updated through May 2020	Updated through Jun 2020
NEV sales (May 2020) 82,000	EV sales (monthly Jun'20) 25,703
% LDV sales NEVs 3.74%	% LDV sales NEVs 2.33%
	EV sales (through end '19) 326,644
NEV fleet penetration	% LDV sales NEVs 1.89%
Updated through end-2019	
NEV fleet 3,810,000	EV fleet penetration
% fleet NEVs 1.47%	Updated through end-2019
	EV fleet 1,444,097
Europe	% LDV fleet NEVs 0.49%
EV registration penetration	
Updated through Q1 2020	
EV registrations 167,132	
% LDV sales NEVs 8.20%	
EV fleet penetration	
Updated through Q4 2019	
EV fleet 1,417,355	
% fleet NEVs 0.50%	

NEVs = New Energy Vehicles. EVs = plug-in hybrids and full battery-electrics. LDVs = light-duty vehicles including cars, SUVs, vans and light pick-ups. Sources for sales and fleet figures: China Association of Automobile Manufacturers, China Passenger Car Association, US Alliance for Automotive Innovation, US Energy Information Administration, European Automobile Manufacturers Association

GLOBAL CARBON PRICES

Europe (€/ton)	Jul 21	Jul 14	Chg.
EUA Dec '20	26.54	29.64	-3.10
US (\$/ton)			
CCA (Calif.) Dec '20	17.10	17.03	+0.07
RGGI (Northeast) Dec '20*	6.21	6.19	+0.02
New Zealand (NZ\$/ton)			
NZU (spot)	33.15	32.00	+1.15
Asia (\$/ton)	Jul 17	Jul 10	Chg.
China-Guangdong	3.99	3.93	+0.05
South Korea	19.28	18.87	+0.41

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

EU CARBON FUTURES PRICES



ECX front-month futures. Source: ICE