Inevitable fragments of a carbonneutral society: Natural gas coupled with CCUS, renewables, and hydrogen

As global society keeps pursuing a zero-carbon energy system, hydrogen’s role is becoming more notable. Updates and progress around the topic are now being broadcasted at an increasing pace, extending to areas that promise a significant role for hydrogen. Just a couple of years ago, everyone had agreed that hydrogen would gain a meaningful share by around 2050. However, these days, due to sanctioned projects and the advancement of the related technologies with a set of adopted strategies, it is believed that the hydrogen era will

materialise much earlier.

Hydrogen is not the only piece of the puzzle to achieve carbon neutrality, but it is the one that promises a feasible pathway towards net zero-emission through complementing other routes such as electrification and natural gas coupled with CCUS (carbon capture, utilisation and storage). The supremacy of hydrogen is based on the possibility that it can be employed to decarbonise the so-called hard-to-abate sectors or in sectors in which other decarbonisation pathways, such as electrification, are challenged. These sectors include but are not limited to steel, iron and cement, as well as heavy long-haul vehicles, aviation, and maritime and railways transportation. The GECF Hydrogen Scenario encompasses some of these recent developments in its latest update, which was published in February 2021. The Scenario has taken into consideration the latest updates and strategies adopted by countries and groups and assessed their impacts.

Currently, several countries have officially published their hydrogen strategies or hydrogen roadmaps. In some of the roadmaps and strategies such as the EU Hydrogen Strategy, the main priority has been attached to renewable hydrogen. While in some others, such as for Japan, Russia, and South Korea, blue hydrogen is envisaged to take a meaningful role. In certain strategies, definite and clear targets are set, like for the EU Hydrogen Strategy that considers a minimum of 40 GW installed renewable hydrogen electrolyser or 10mn tonnes (mt) of renewable hydrogen by 2030. Within the EU Hydrogen Strategy, another 40 GW is also defined as a target to install in the neighbouring countries and import to the EU. According to the latest results from the updated GECF Hydrogen Scenario which assumes a practical penetration of hydrogen into the future of the energy system, the demand for hydrogen by 2050 will increase by more than four times. However, the carbon saving through this hydrogen penetration is forecasted to be less than six (6) $GtCO_2$ – far below the amount needed to

achieve the Paris Agreement goals.

This result emphasises that, firstly, the hydrogen production supply chain needs to advance in all parts, and the cost should be reduced to gain more share in the future of the energy system. Secondly, the result highlights that hydrogen could not be the only solution in the carbon neutrality pathway, and other clean and decarbonised options, such as the application of natural gas coupled with CCUS has to be seriously taken into consideration by all stakeholders. Henceforth, let’s take a look at some results and forecasts from the Reference Case Scenario (RCS) of the latest GECF Global Gas Outlook 2050 (GGO 2050), as it will enable a clear view of the potential needs to fully decarbonise the hard-to-abate energy sectors when hydrogen is hypothetically assumed to take a sole role. According to the RCS results, the total EU transport demand in so-called hard-to-abate sectors will be reduced from 217mn tonnes of oil equivalent (mtoe); in 2019 and pre-Covid-19 pandemic situation, to around 150 mtoe by 2050. This reduction is primarily due to the energy efficiency enhancement of the fleets. In order to produce 150 mtoe of energy, around 52mt of hydrogen is needed, requiring more than 500 GW of electrolyser. This should be added to the demand from the iron, steel, and cement industry (other assumed hard-to-abate sectors.) The fossil fuel demand (coal, natural gas and oil products) from these sectors in the EU is forecasted to stand at 24 mtoe by 2050. To meet this level of demand only with green hydrogen, around 70 GW of the electrolyser must be installed. Based on the forecasted demand levels, the EU will need around 570 GW of electrolyser capacity to decarbonise the aforementioned hard-to-abate sectors in case that the green hydrogen is assumed to be the only solution. Based on technical circumstances and the policy, in the EU Hydrogen Strategy, the target was set to 2 x 40 GW renewable hydrogen by 2030. Therefore, the needed electrolyser capacity for 2050 seems to be challenging but feasible in the EU. However, we still need to bear in mind some other salient points. The

first point is that these results are based on assuming a successful effort in enhancing energy efficiency, and the level is subject to uncertainty. The second is that this is the volume needed only to decarbonise the referenced hard-to-abate sectors. Several other consuming sectors are supposed to be decarbonised through other pathways such as electrification.

They also create a massive volume of renewable electricity demand. A big question mark here is to gauge if there is a sufficient potential of renewable energies within the EU to accommodate all renewable electricity demand in the sectors and meet the electricity demand of electrolysers to produce green hydrogen. By looking into this subject from a global perspective, it can be observed that much more hydrogen is needed to decarbonise even these so-called hard-to-abate sectors. According to the latest modelling results published in GGO 2050, the global energy demand from hard-to-abate subsectors within transportation will stand at around 1800 mtoe per annum by 2050. In a hypothetical assumption, to provide this amount of energy only through green hydrogen production, more than 6,000 GW of electrolyser will be needed. This level is around five times more than the total current wind and solar installed capacity.

With similar calculations again on the imaginary only-green hydrogen assumption, 1,500 GW of electrolyser should be installed for the decarbonisation of iron, steel, and cement sectors. While numerous sectors are still not included in these calculations, other measures are assumed for the purpose of decarbonisation as well. In conclusion, the undeniable fact is that that there is no sole solution for carbon neutrality. Indeed, a combination of measures needs to be applied to achieve a net-zero emission. Apart from the energy conservation and energy efficiency enhancement that results in a reduction in final energy demand, clean energy supply should be diversely sourced from all clean available potentials.

Renewables, natural gas, and CCUS will take greater roles in their original form, and all of them should contribute to the hydrogen production. In closing, renewables, natural gas, CCUS, and hydrogen are inevitable parts of a fully decarbonised energy system.

China leads global green-bond sales boom, but faces headwinds

China overtook the US to lead a boom in global green-bond issuance in the first quarter, but analysts said it needs to do more to draw investors to help fund President Xi Jinping’s estimated $21tn carbon neutrality pledge.

Pending tasks include raising investor awareness of the environment, harmonising fragmented rules and tackling

‘greenwashing’, or issuers’ efforts to inflate their green credentials, they said.

At stake is Beijing’s goal of net zero carbon emissions by 2060.

Chinese issuers including banks, property developers, power generators and railway operators sold $15.7bn of bonds during January-March period to fund ‘green’ projects such as clean and renewable energy, according to Refinitiv data.

The volume of such bonds, mostly yuan-denominated, almost quadrupled from a year earlier, the data showed.

That exceeds the roughly $15bn of such bonds sold by US issuers in the first quarter, and helped drive a tripling of green bond issuance globally.

Green bonds blossomed “largely thanks to China’s recovery from the coronavirus,” said Nathan Chow, strategist at DBS. “In addition, the Chinese government is going all out to develop this market this year.”

China, the world’s biggest emitter of carbon dioxide, needs 140tn yuan ($21.33tn) of debt financing over the next 40 years to meet its net-zero emissions target, investment bank China International Capital Corp (CICC) estimates.

With roughly 800bn yuan of green bonds outstanding, China is already the world’s second-biggest green bond market after the US.

However, green bonds account for less than 1% of China’s $18tn bond market.

At this stage, “companies have no cost advantages issuing green bonds…and there’s not enough market support for many green projects which take a long time to complete and are seen as risky,” said CICC economist Zhou Zipeng.

Highlighting such headwinds, China’s first batch of “carbon neutral” bonds, launched in February, met tepid demand.

Several fund managers said green bonds are not yet on their investment radar.

“The only thing Chinese investors currently look at is yield. So obviously if green bonds cannot offer the extra returns, they ask the government, ‘what can you do to help me?’,” said

Ricco Zhang, Asia-Pacific director of the International Capital Market Association (ICMA).
A brokerage source said state-owned companies were motivated to issue green bonds to align with government priorities, but investors lacked incentives to buy them.
Authorities are aware of the problems.
Earlier this month, Chinese central bank governor Yi Gang called for incentives to boost private participation in meeting Beijing's carbon goals.
Moving closer to international standards by excluding coal from the green market would widen the potential foreign investor base, Chow of DBS said.
ICMA's Zhang said regulators also need to harmonise different domestic standards.
Currently, China's central bank, securities regulator and the state planner have separate rules for green bonds issued under their supervision.
"Sometimes it's hard for international investors to have a granular understanding of different (Chinese) green bonds. This brings challenges for green investors to identify the right target for investment," he said.

U.S. Oil Companies Lag Far Behind Greener Europe Rivals

Europe’s largest oil and gas companies are leaving U.S. rivals further and further behind in the race to cut their reliance on fossil-fuel sales.

Total SE, Galp Energia SGPS SA, Equinor ASA, Royal Dutch Shell Plc and Eni SpA are leading the pack, while Exxon Mobil Corp. and Chevron Corp. are among the laggards, according to newly released climate-transition scores from BloombergNEF and Bloomberg Intelligence.

A big reason for this state of affairs is that Europeans are investing far more in renewable energy, battery storage, electric-vehicle charging points, carbon-capture technology and other decarbonization efforts, said Jonas Rooze, head of sustainability research at BNEF. For example, five European companies account for 51% of all renewable energy assets held by the world’s 39 largest oil and gas producers. However, it’s worth noting that this is all relative—these companies still devote most of their capital expenditures on climate-changing fossil fuels, he said.

Between 1988 and 2015, 25 corporate and state-owned entities,

including Exxon Mobil, Shell, BP Plc and Chevron, as well as China's coal producers and Saudi Aramco, were responsible for about half of global industrial greenhouse-gas emissions, according to a 2017 report from CDP Worldwide. The energy transition presents huge challenges for Big Oil, since the clean energy pivot is emerging as many of the companies face pressure to boost shareholder returns. The S&P 500 Energy Index has dropped 15%—including reinvested dividends—since the start of last year.

"Ultimately, our view is only seven of the 39 companies are likely to reduce their Scope 1 and 2 emissions enough to meet the International Energy Agency's Sustainable Development Scenario," said Eric Kane, head of environmental, social and governance research, Americas, at Bloomberg Intelligence. Scope 1 and Scope 2 refer to emissions produced by the companies themselves and by the power they consume. "Further, a third of companies in the peer are yet to set comprehensive greenhouse-gas reduction strategies."

Bloomberg's climate transition scores are forward-looking and designed to help investors answer one key question: How prepared is the company for a net-zero world relative to its peers? The scoring system is zero to 10, with 10 being the best.

The research relies on about 40 data points that are combined into one overall score. To get there, BNEF and BI analyze both current and future carbon performance, as well as business-model risks, using the same scoring system. The most heavily weighted issues are whether a company is developing low-carbon operations with proven revenue models and whether it's expanding in high-carbon activities. And then, how do the companies' 2030 emissions forecasts compare with the IEA's Sustainable Development Scenario, which is aligned with maintaining warming well-below 2 degrees Celsius.

Companies like ConocoPhillips, Occidental Petroleum Corp. and

Santos Ltd. that focus on extracting oil and gas are “more sensitive to transition risks,” like declining demand for oil, than are refiners, Rooze said. Other companies such as PTT Pcl, ENEOS Holdings Inc., SK Innovation Co. and Saudi Aramco are penalized for failing to disclose key information about their operations, such as spending for exploration and production or the amount of crude oil they process, a key metric for gauging the scale of their refining business.

When looking company by company, Exxon Mobil’s focus on fossil fuels and limited clean-energy activity hinders its overall score, even though it’s a leader in carbon capture, utilization and storage technologies to remove carbon dioxide from the atmosphere.

In Europe, BP is ramping up investments in clean energy at the expense of oil and gas. Shell has pivoted to power while still investing heavily in gas, which it sees as a so-called bridge fuel to a more renewable future. The Bloomberg scores place BP and Total ahead of Shell because of their stronger emissions-reduction targets.

Sinopec ranks ahead of PetroChina Co. and Indian Oil Corp. in the Asia-Pacific region, mainly because of its focus on transition strategies, including renewables, EV charging and CCUS and stronger emissions target.

“While quite a few major oil and gas firms have set ambitious new emissions targets recently, meaningful action to develop new low-carbon business models remains limited,” Rooze said. “These are all huge companies, but most are just dabbling.”

- Exxon-Mobil hedge fund activist reveals the multimillion-dollar price-tag of its boardroom battle.
- Sovereign rating cuts are coming to those countries that ignore climate change.
- U.S. weighs creation of a global benchmark for Wall Street’s impact on global warming.

- CEO pay tied to ESG is setting Canadian banks apart from the crowd.
- There’s some big American money joining the rush for carbon permits, as more bet that pollution prices will soar.

World Bank, IMF to consider climate change in debt reduction talks

WASHINGTON (Reuters) – The World Bank is working with the International Monetary Fund (IMF) on ways to factor climate change into the negotiations about reducing the debt burdens of some poor countries, World Bank President David Malpass told Reuters in a Friday interview.

Three countries – Ethiopia, Chad and Zambia – have already initiated negotiations with creditors under a new Common Framework supported by the Group of 20 major economies, a process that may lead to debt reductions in some cases.

Malpass said he expected additional countries to request restructuring of their debts, but declined to give any details.

The coronavirus pandemic has worsened the outlook for many countries that were already heavily indebted before the outbreak, with revenues down, spending up and vaccination rates lagging far behind advanced economies.

China, the United States and other G20 countries initially offered the world's poorest countries temporary payment relief on debt owed to official creditors under the Debt Service Suspension Initiative (DSSI). In November, the G20 also launched a new framework designed to tackle unsustainable debt stocks.

Malpass said the Bank and the IMF were studying how to twin two global problems – the need to reduce or restructure the heavy debt burden of many poorer countries, and the need to reduce fossil fuel emissions that contribute to climate change.

"There's a way to put together … the need for debt reduction with the need for climate action by countries around the world, including the poorer countries," he said, adding that initial efforts could happen under the G20 common framework.

Factoring climate change into the debt restructuring process could help motivate sovereign lenders and even private creditors to write off a certain percentage of the debt of heavily-indebted poorer countries, in exchange for progress toward their sustainable development and climate goals, experts say.

The World Bank and the IMF play an important advisory and consultative role in debt restructuring negotiations since they assess the sustainability of each country's debt burden.

Many developing countries require huge outlays to shore up their food supplies and infrastructure as a result of climate change. Governments must also spend a large amount on alternative energy projects, but lack the resources to pay for those needed investments.

"There needs to be a moral recognition by the world that the activities in the advanced economies have an impact on the people in the poorer economies," Malpass said.

"The poorer countries are not really emitting very much in terms of greenhouse gases, but they're bearing the brunt of the impact from the rest of the world," he added.

IMF Managing Director Kristalina Georgieva earlier this month told reporters about early-stage discussions underway about linking debt relief to climate resilience and investment in low-carbon energy sources.

Doing so, she said, could help private sector creditors achieve their sustainable development targets, she said.

"You give the country breathing space, and in exchange, you as the creditor can demonstrate that it translates into a commitment in the country that leads to a global public good," she said.

Democrats to Push Clean-

Energy Tax Breaks in Infrastructure Plan

A key House lawmaker unveiled plans to pursue tax breaks for renewable energy as a way to ease the shift away from fossil fuels in President Joe Biden's upcoming infrastructure bill.

"Transitioning away from fossil fuels is going to require some tax incentives," House Ways and Means Chairman Richard Neal, a Massachusetts Democrat, said Friday at a virtual tax policy event.

The administration has already started engaging with top lawmakers on Biden's economic rebuilding program — his longer-term follow-up to the Covid-19 relief package. The $1.9 trillion aid bill is currently moving through the House, and Biden is expected to unveil his second initiative later this month; some economists see it weighing in at $2 trillion.

Neal said he's looking at tax incentives for clean energy and renewable technologies, an approach that dovetails with Biden's campaign promises to boost subsidies for green investments, energy efficiency and electric vehicles. Biden

has also directed federal agencies to stop subsidizing fossil fuels and plans to ask Congress to zero-out oil and gas industry incentives.

“I don’t think the federal government should give handouts to Big Oil to the tune of $40 billion in fossil-fuel subsidies,” Biden said Jan. 27.

A likely Democratic objective is expanding a tax credit currently valued at as much as $7,500 for the purchase of an electric vehicle, such as those made by Tesla Inc. and Ford Motor Co. Automakers have encouraged lawmakers to expand the incentive by lifting a per-manufacturer cap on available credits.

Lawmakers also may restructure the credit to better target it to lower-income motorists and ensure its benefits don’t flow mostly to wealthy Americans; that could come in the form of a phase-out for higher-income taxpayers.

Existing tax credits help support construction of energy-efficient commercial buildings, wind farms and solar arrays, as well as the capture of carbon dioxide. But some clean-energy advocates have asked Congress for tax incentives to better support the development of large, grid-scale power-storage systems that can help bolster intermittent renewable energy production.

Neal said he believes that an infrastructure bill could get bipartisan support. That’s a view shared by Republican Senator Shelley Moore Capito of West Virginia, who was one of several lawmakers to meet with Biden about infrastructure on Thursday.

Bipartisan Outreach

“The president listens. He’s interested in a give and take,” Capito, the top GOP member of the Senate Committee on Environment and Public Works, told reporters after the meeting. “It’s been very sincere and very clear. No promises

made, but he knows that our committee could work.“

Capito said the lawmakers are still discussing how to pay for such a plan, a challenge that’s halted infrastructure talks in the past. Lawmakers have resisted increasing the tax on gasoline, which since 1993 flows to the Highway Trust Fund, and the scope of the plan will likely require other tax hikes, including on U.S. businesses and their foreign profits.

Neal signaled that any tax increases wouldn’t immediately go into effect, citing the continuing Covid-19 crisis.

“We need to put the pandemic and the recession behind us before we have this conversation,” he said.

— With assistance by Erik Wasson

Russia energy stocks get a boost from Biden’s green push

Bloomberg /Moscow

US President Joe Biden’s push to slash carbon emissions may inadvertently give a short-term boost to energy companies in one of the world’s biggest polluters.

Investors are betting that Russian oil giants such as Lukoil PJSC, Rosneft PJSC and Tatneft PJSC will rally as they mop up market share from rivals in the US and other countries seeking to switch to clean energy. An index of Russian energy stocks has returned 8% in dollar terms so far this year as crude prices rallied, compared with 2% for European oil and gas companies.

“Governments will likely limit global companies’ capacities to drill and extract resources,” said Eduard Kharin, who helps oversee $1bn of assets at Alfa Capital Asset Management in Moscow. “The global majors are entering a new market, a new industry where there are a lot of unknowns, and the return on capital is unclear.”

Russia is the world’s fourth-biggest carbon emitter, but unlike other major polluters, the government doesn’t have a plan to transition away from fossil fuels. Instead, its state-owned energy companies benefit from some of the world’s lowest production costs and tax breaks, making them well placed to gain in the short term.

Global oil companies will stop investing in exploration and shift to clean energy, “but somebody still needs to produce oil,” said Ekaterina Iliouchenko, a money manager at Union Investment Privatfonds GmbH in Frankfurt, who increased exposure to Russian oil stocks last year. “That’ll be the Russians and Saudi Aramco”.

Rosneft and Lukoil have been among the best performers in Russia’s benchmark equity index so far this year, handing investors total returns of 15% and 12% in dollar terms. They’ve also outperformed an index of global energy stocks.

Of course, any benefits will be short lived if major economies are serious about speeding up the shift to clean energy to limit global warming. Biden is planning to set a net-zero

target for the US for 2050, meaning that 70% of the world economy will soon have made commitments to be carbon neutral by the middle of the century.

Many international funds are also coming under increasing pressure to cut companies that contribute to global warming from their portfolios. President Vladimir Putin was quizzed at an online investment forum late last year over how his country plans to cut emissions, and Swedbank Robur subsequently excluded oil and gas companies from its Russia and Eastern Europe funds.

Rosneft this month signed an agreement with BP Plc to co-operate to produce “low-carbon solutions,” but critics pointed out that the plan is at odds with the Russian company’s focus on expanding hydrocarbon production.

Biden signed an executive order late last month suspending new oil and gas leases on public lands, directing federal agencies to purchase electric cars by the thousands and seeking to end fossil-fuel subsidies.

The move could hurt US shale producers, whose output helped put a cap on gains in global oil prices in recent years.

A raft of European oil companies have recently set climate targets, with BP stunning investors by promising to eliminate emissions from its operations by 2050.

Denmark moves forward on North Sea ‘energy island’

AFP/ Copenhagen

Denmark has said that it has approved plans to build an artificial island in the North Sea that could generate wind power for at least 3mn households.

Parliament in June adopted a political environmental framework aimed at reducing the country's CO2 emissions by 70% by 2030, which included plans for the world's first "energy hubs" on the island of Bornholm in the Baltic Sea and in the North Sea.

On Thursday, parliament went further by approving a plan to place the North Sea hub on an artificial island, with a wind power farm that will initially supply 3GW of electricity.

That could later be scaled up to 10GW – enough for 10mn households – according to the ministry of climate, energy and utilities, much more than needed for Denmark's population of 5.8mn.

"Clearly this is too much for Denmark alone and this also why we see this as a part of a bigger European project," Climate Minister Dan Jorgensen told AFP, adding that Denmark wanted to also export excess energy to the rest of Europe.

Plans also include the use of "electrolysis" to extract hydrogen for use in the production of renewable fuels for things like maritime transport.

The island, “the largest construction project in the history of Denmark”, is to be majority owned by the Danish government in partnership with private companies and is expected to cost around 210bn Danish kroner ($34bn, €28bn).

Rather than a traditional offshore wind power farm, the island will function as an “energy hub” allowing connections from other countries’ wind power farms and cables to efficiently distribute the incoming energy.

Its final size is yet to be decided but it is expected to cover between 120,000-460,000sq m, according to the ministry.

The total number of wind turbines has not been finalised either, but estimates range between 200 and 600 units at “a previously unseen scale”, with the tip of the blades reaching as high as 260m (850’) above the sea.

While the project is a step in the plan to provide enough energy to electrify Denmark, Jorgensen also said they hoped the project could offer guidance for bigger countries looking to transition their societies in the face of climate change.

“We know that as a small country, only responsible for about 0.1 percent of the world’s greenhouse gas emissions, it doesn’t matter that much to the climate what we actually do in Denmark,” he said. “We hope that it will have a bigger influence by influencing others.”

The project’s next steps include environmental impact assessments and talks with potential investors, so construction is still some years off.

According to the ministry, initial construction is likely to begin around 2026 and finished sometime between 2030 and 2033.

Solar Stocks Have Been

Thriving—Here's Why That Could Continue

The solar industry has been on a tear. Several stocks in the sector hit all-time highs last month. Investors seem eager for more solar companies to go public. But is this surge more sustainable than prior booms?

Earlier boom times ended painfully. Several renewables companies went public in 2014 and 2015—or spun off their operating power-plant units—amid a clean-tech wave. But the collapse of SunEdison Inc.—the world's largest renewables company before its 2016 bankruptcy—stung the solar industry. Some investors began prioritizing profitability over growth. No solar companies went public in the U.S. between late 2016 and early 2019, according to Bloomberg data.

Now, clean-tech companies are going public at a dizzying pace. Since October, at least two solar companies have gone public via initial offerings and another agreed last month to do so through a merger with a blank-check company. They join several electric-vehicle and battery companies that have also gone

public with special purpose acquisition companies. There have been 32 clean-tech SPAC deals over the past 12 months, according to Pavel Molchanov, an equity analyst at Raymond James.

One big reason: It became clear early in the pandemic that solar wouldn't just weather this difficult time, but possibly thrive during it. By mid-December, the U.S. was projected to install a record 19 gigawatts of new solar capacity last year, according to Wood Mackenzie and the Solar Energy Industries Association. Meanwhile, a sustainability-focused index that includes some solar companies, the WilderHill Clean Energy Index, last year surged more than 200%, topping the 58% gain in 2019. California-based SunPower Corp. rose as much as 14% on Friday, and is up about 70% this year. And the underlying drivers propelling clean tech look sturdy in the near-term: supportive policies in Europe and the U.S., a push to green electric grids as well as trillions of dollars in funds focused on the energy transition.

"It's a mega-trend that's essential for the future of this world," says Jeff McDermott, head of Nomura Greentech.

But the success and future promise of the industry doesn't mean that solar has become an easy business for executives—or for investors. Active Solar, for instance, was the best-performing stock-picker in Europe last year with a 183% return, but did so after twice losing most of its investors' money. Guinness Atkinson Asset Management, an investment management firm, found that the total rate of return of the median stock among solar-equipment companies was 98% last year, but -32% in 2018. In fact, among all of the clean-tech sub-sectors it studied, the total rate of return for solar equipment was the lowest between 2010 and 2020 at 65%.

Installation "volumes are going through the roof, but profitability can be quite different," Molchanov says. "We have seen countless companies that have grown revenue rapidly

over the years but profitability has been pressured.” There remains “relentless commoditization including margin compression” that affects multiple solar segments, including modules, inverters and power-supply agreements.

The overlapping trends of decarbonization and electrification—plus the struggles of oil—attracted many investors to solar last year. That’s a far cry from 2016, when the experience of SunEdison soured many on the industry. The company had fueled its ascent on financial engineering and cheap debt before its 2016 bankruptcy.

Nearly five years later, the price of solar power has fallen markedly, such that the resource is now the cheapest in many markets. (This is obviously a plus for solar’s competitiveness, but not necessarily the best development for manufacturers). Solar companies are increasingly confident that investors will reward them for focusing on just a few things—power-plant ownership, installations, panel-making, or components—rather than feeling the need to be vertically integrated like once before.

One major change is how clean power and other climate-forward businesses are now seen outside the industry. More than ever before, these companies are seen as a financial opportunity—not just good public relations.

— With assistance by Drew Singer, and Will Wade

Green Energy Firms to Help

Power Spanish IPO Revival in 2021

Spain’s national stock market, home to a solitary listing in 2020, is gearing up to host a flurry of green energy providers in the coming months.

At least four companies including Repsol SA are working on possible initial public offerings of renewable assets in Madrid, according to people familiar with the matter. Driving the trend is an increasingly environmentally-conscious investor base and a national government intent on generating power from sustainable sources.

“The public market is paying more than the private sector for these types of assets now. This is in stark contrast to 18 months ago,” said Inigo Gaytan de Ayala, global head of equity capital markets at Banco Santander SA. “Time is of the essence and first-mover advantage is critical. Companies want to move swiftly and make the most of this favorable window.”

Companies that produce renewable energy have raised $336 million via IPOs on European exchanges over the last 12

months, according to data compiled by Bloomberg. By far the largest listing came from Soltec Power Holdings SA, a green power generator and manufacturer of certain devices for solar panels.

Soltec's was the only IPO on a Spanish exchange in 2020, when the coronavirus crisis kept many companies and investors away from public markets. The deal pipeline is looking decidedly healthier this year, with Capital Energy, Opdenergy SA and Ecoener Emisiones all weighing plans to list in the country in the spring, the people said, asking not to be identified discussing confidential information. Two other privately-owned renewables firms are also considering IPOs, one of the people said.

Representatives for Capital Energy and Ecoener said the companies were analyzing possible IPOs, though no final decisions have been taken. Spokespeople for Opdenergy and Repsol declined to comment.

Political Push

"The strong level of activity Spain is currently enjoying in the renewable segment is probably a combination of different factors," said Angel Arevalo, global head of advisory at Banco Bilbao Vizcaya Argentaria SA. Among these, he said, are the country's large renewable resources, falling generation costs and "strong local political commitment to alternative energy."

Spain's government has been working to boost renewable power in its generation mix from around 50% today to 70% by 2030, and 100% before 2050. Last month, Spain held its first power auction in four years and awarded 3 gigawatts of new wind and solar capacity. The country is set to become a recipient of European rescue funds to help rebuild its economy in the wake of the Covid-19 pandemic and a large allocation of these could go to clean energy projects.

"Spain is structurally a great base for renewable companies,

particularly for firms that focus on solar energy given climate," said Jerome Renard, head of European equity capital markets at Bank of America Corp. "The country saw investments in that industry very early on, and therefore benefits from a whole ecosystem of expertise."

So far in Spain, stock performance from the sector has been stellar.

Shares in Soltec have risen 137% since it went public. Grenergy Renovables has also more than doubled from when the Spanish power producer moved from the country's alternative market to main exchange in late 2019. BBVA's Arevalo said renewables in Spain were offering "better returns for investors compared to other geographies."

Mainstream Asset

Investment banks are also preparing to pick up more mandates tied to sustainable energy initiatives. Gonzalo Garcia, co-head of investment banking at Goldman Sachs Group Inc. in Europe, the Middle East and Africa, said in a January interview that the shift toward renewables would be one of the key market themes for banks this year.

Capital Energy is working with Goldman Sachs and UBS Group AG to gauge investor interest ahead of its potential share sale, a person familiar with the matter said. Repsol is working with JPMorgan Chase & Co. on its renewables IPO plan, people said.

Representatives for Goldman Sachs, JPMorgan and UBS declined to comment.
"In the past, renewables used to attract specialist investors with a focus on the energy sector," said Renard at Bank of America. "It has now become completely mainstream, reaching a much wider base of investors."

Carbon-Neutral Or Green LNG: A Pathway Towards Energy Transition

LNG producers have started to look for ways to minimise or counterbalance their carbon footprints, says Dr Hussein Moghaddam, Senior Energy Forecast Analyst, Energy Economics and Forecasting Department

According to the latest, 2020 edition of the GECF Global Gas Outlook 2050, the demand for natural gas is expected to rise by 50% from 3,950 billion cubic metres (bcm) in 2019 to 5,920 bcm in 2050, as gas remains the cleanest-burning hydrocarbon. In spite of that, meeting global targets for climate change mitigation is one of the biggest challenges. Significant

emissions are released through the combustion of gas to drive the liquefaction process, while any carbon dioxide (CO^2) detached before entering the plant is frequently emitted into the atmosphere.

Subsequently, investors, regulators, and customers exert mounting pressure on the gas industry, as it needs to do more to accomplish climate objectives and focus on reducing emissions.

More than 120 countries have already developed a climate risk strategy that sets target to reduce greenhouse gas (GHG) emissions to net-zero by 2050. As natural gas has a central role to play in mitigating carbon emissions, LNG producers have started to look for ways to minimise or counterbalance their carbon footprints, thus ongoing LNG decarbonisation efforts are likely to expedite. Accordingly, top LNG producers, traders, and consumers have indicated their plans in order to decarbonise the LNG supply chain. This is being done in two ways: by offsetting emissions from individual cargoes retrospectively, as well as by building low-emission liquefaction terminals. As a result, the “Green LNG” term has appeared as a new product within the LNG industry.

The carbon-neutral or Green LNG market is an emerging prospect whereby “Green” indicates either the reduction of GHG, or the offset of GHG emissions, linked to some, or all elements of the LNG value chain – from production of upstream gas and pipeline transportation, to liquefaction, transportation, regasification, and downstream utilisation of natural gas.

Companies in the LNG value-chain can diminish GHG emissions in numerous ways. For instance, by using biogas as feedstock; by decreasing emissions from upstream, pipeline, and liquefaction facilities; by applying renewable energy to power their liquefaction plants; respectively, by using carbon capture, and storage (CCS), or carbon capture, utilisation and storage

(CCUS) technologies by reinjection of CO^2 into the subsurface after it had been detained during the processing of the feed gas before liquefaction.

Therefore, it should be taken into account that carbon-neutral does not mean that the LNG cargo generates zero emissions, rather that LNG sellers can counterbalance their GHG emissions by obtaining offsets to compensate for all or part of their GHG emissions or the utilisation of carbon credits, which reinforce reforestation, afforestation or other green projects.

It is worth nothing that last year the leaders of the G20 endorsed the concept of the circular carbon economy (CCE) and the GECF is the part of this process. The CCE aims to include a wide range of technologies such as CCS/CCUS as a way to promote economic growth and to manage emissions in all sectors.

In contrast, Qatar Petroleum (QP) is the company that applies a combination of strategies to reduce its emissions. Its future LNG production will be low-carbon based, as the company is building a CCS facility alongside its 126 mtpa liquefaction capacity expansion by 2027.

As part of its new sustainability strategy, QP has announced that its aim is to reduce the emissions intensity of its LNG facilities by 25% by 2030. The capture and storage of CO^2 from its LNG facilities of about 7 mtpa by 2027 is another goal. Furthermore, QP aims to drop emissions at its upstream facilities by at least 15%, as well as cut flaring intensity by over 75% by the end of this decade. Additionally, by 2030, QP is attempting to abolish routine flaring, and by 2025, the company would like to minimise fugitive methane emissions along the gas value-chain by establishing a methane intensity target of 0.2% over all of its facilities.

In certain supply contracts of the company, environmental

considerations are incorporated as well. In November 2020, QP signed the first long-term deal with “specific environmental criteria and requirements”, which was designed to minimise the carbon footprint of the LNG supplies with Singapore’s Pavilion Energy, and to provide 1.8 mtpa of LNG over a 10-year period.

In order to fulfil the objectives of decreasing GHG emissions, CCS also helped the case in Australia. Chevron is the operator of the 15.6 mtpa Gorgon LNG offshore Western Australia and has injected more than 4 million tonnes of CO2 in the CCS facility since its commissioning in August 2019.

Meanwhile, NOVATEK has embraced a long-term methane emissions reduction target by 2030 in Russia, mainly to diminish methane emissions per unit of production by 4% in the production, processing and LNG segments. Moreover, the company aims to decrease GHG emissions per tonne of LNG produced by 5% [5]. In this regard, NOVATEK and Baker Hughes, which provides engineering and turbomachinery at Yamal LNG, signed an agreement to introduce hydrogen blends rather than solely running methane from feed gas into the main process for natural gas liquefaction to reduce CO2 emissions from NOVATEK’s LNG facilities.

Bio-LNG will have a significant role in the coming years to form the heavy road and water transport in the Netherlands. The construction of the first Dutch bio-LNG installation was launched in Amsterdam last November. Renewi (the waste management company), the Nordsol (for processes the biogas into bio-LNG) and Shell (to sell this bio-LNG at its LNG filling stations) have developed this project. Biogas is made up of roughly 60% methane and 40% CO2. An additional CO2 cutback takes place due to the recycling of the CO2 by-product in the market, which results in a 100% CO2 neutral fuel [7].

Inpex, which is Japan’s biggest oil and gas producer, has recently disclosed its strategy to become a CO2 net-zero company by 2050 by developing its renewable and hydrogen

energy together with the utilisation of carbon capture technologies. Japan has also stated in October 2020 that the country would become carbon-neutral by 2050.

Two major LNG importer regions, namely Asia-Pacific and Europe, have already set policies regarding long-term decarbonisation targets. It is worth noting that most of the carbon-neutral LNG cargoes have been supplied by companies are in Asia to a certain extent, where carbon policies and investor pressure are fairly fragile.

According to the 2020 Edition of the GECF Global Gas Outlook 2050, it is forecasted that LNG imports to Asia will increase to about 800 bcm (585 mt) by 2050, and with 71% of global LNG imports, the region is set to be the driving engine for global LNG demand growth. As concerns with air quality rise in numerous Asian countries, the most realistic solution to attain a decarbonised society in the future by minimising the level of CO2 on a global scale, is the combination of natural gas and renewable energy. Thus, emissions and cleaner-burning fuels are going to be the centre of attention.

Europe could be the predecessor for carbon-neutral LNG in the long-term, by sticking to its new methane strategy, which was revealed by the European Commission (EC), and in accordance with their 2050 carbon-neutral goal. Importantly, the EC suggested LNG producers to engage with their international partners to explore possible standards, targets, or incentives for energy supplies to the EU.

Which part of the LNG value-chain should take responsibility?

An LNG seller will probably need to diminish and offset GHGs, which emphasises the need for robust offset markets in order to be completely carbon-neutral through the entire LNG value-chain.

Accordingly, this highlights challenges for legacy LNG projects with limited means to decrease carbon, making them

dependant on expensive market mechanisms. LNG producers have to keep the balance between the competitive fuel pricing and the expensive emissions reduction initiatives. Therefore, the question of who pays the additional costs to produce Green LNG is yet to be decided.

As noted, the balance of carbon emission is feasible for any LNG facility and can lead to carbon-neutral LNG cargoes. Although, this is probably not a sustainable long-term process and does not directly cope with the project's emissions, it is a good transformation for general LNG decarbonisation.

However, the GECF proposes that both sellers and buyers have to contribute to achieving emission targets. The discussions with respect to these issues should involve all LNG industry players, such as sellers, buyers, traders and policymakers, respectively. A more focused perspective that targets minimising emissions in upstream and liquefaction might be more feasible for LNG producers. This will also associate with the already ongoing efforts from them, as they have to control their carbon footprints under more pressure from the public and investors.

In conclusion, as LNG demand keeps expanding, the demand for Green LNG will grow as well. Green LNG can help ensure that natural gas preserves its role as a crucial part of the energy mix, supporting climate goals over the energy transition period. As stated in the 2019 Malabo Declaration, at the 5^{th} GECF Summit of Heads of State and Government in Equatorial Guinea [10], the GECF Member Countries, reiterate the strategic role of the development, deployment and transfer of advanced technologies for more effective production, and the utilisation of natural gas to enhance its economic and environmental benefits.