Oil and gas ready for the energy transition
OVERVIEW

Oil and gas stays in the mix

Energy transition calls for a future rich in energy but low enough in greenhouse gas emissions to meet ambitious targets set forth in the 2016 Paris Agreement

RUSSELL MCCULLEY
London

While renewables will increasingly absorb much of the world’s growing energy demand, any plausible model charting a path forward shows that oil and gas will continue to make up a significant part of the energy mix.

The major oil and gas companies have largely supported the Paris Agreement’s goals and are taking action to reduce greenhouse gas emissions, individually and collectively through research partnerships and collaborative projects.

The chief executives of 10 major oil and gas operators came together in 2015 to create the Oil & Gas Climate Initiative (OGCI) and its investment arm, OGCI Climate Investments, which the companies have endowed with a $1 billion technology development fund spread over 10 years.

The group has said it hopes the collaboration will accelerate individual efforts to cut emissions and encourage similar initiatives at other companies.

‘Greening up’
The industry increasingly is being pressured to “green” up its act by policy makers, investors and an environmentally engaged public.

There is also a business case to be made for embracing emissions reduction, with gas promoted as a lower-carbon alternative to coal for fueling power plants.

“I don’t think we can ever do enough in this area,” said BP chief executive and OGCI chairman Bob Dudley, at the group’s recent meeting in London.

“What is clear is reducing emissions is not a race to simply produce renewables.

“You really are going to need oil and gas, with population growth and industrial growth, particularly in Asia and Africa. You can’t solve this issue with just renewables.”

OGCI is focusing its efforts on technologies that the organisation says will have an immediate impact on greenhouse gas emissions reduction and, at the same time, help foster the technology development, deployment and scale-up needed to tackle long-term climate change. To that end, the group is concentrating on carbon capture, utilisation and storage (CCUS), methane detection and reduction, and energy efficiency in transportation and oil and gas operations.

Speaking at the London meeting, Shell chief executive Ben van Beurden stressed the need for increased deployment of CCUS technology to meet carbon reduction targets, and called for government policies — specifically, effective carbon pricing mechanisms — to push it.

“Quest success” Shell’s Quest CCS project in western Canada has captured some 2 million tonnes of carbon dioxide in its first two years of operation, he said, adding that the roughly two dozen CCS projects operating or under construction around the world are only a start. “We need increased CCUS,” van Beurden said. “There is always going to be a significant amount of oil and gas in the mix.

“We can go as fast as we can on renewables, but even if you were to go to renewables 100% tomorrow, you would still have to deal with 82% of the energy system being somehow (tied to) fossil fuels,” van Beurden added.
by as much as 70% and water consumption by up to 80%.

The company says the technology uses a concrete manufacturers’ existing infrastructure, raw materials, formulations, production methods and specifications to produce a stronger material that cures in less than 24 hours.

Estimates vary but concrete manufacturing accounts for 5% to 7% of global greenhouse emissions.

OGCI also pledged support to Achates Power, a California-based developer of high-efficiency vehicle engines.

OGCI Climate Investments is joining a broader consortium of engine makers to help Achates Power ramp up worldwide deployment of the technology.

The investment fund will also throw its weight behind an unidentified UK project to design a full scale gas power plant with CCS, which could include carbon utilisation in a later development phase.

The power plant will be located in an industrial area where the CCSUS facility may accept CO2 generated by its neighbours.

OGCI Climate Investments has said it will help develop a commercially viable concept and a basic engineering design to help the project gain government support and attract private sector investors.

Rangarajan ready to overcome hurdles

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OGCI Climate Investments

chief executive Pratima Rangaranjan

has a business-like approach to greenhouse gas emissions reduction.

"My primary metric is impact," says Rangarajan, a chemical engineer whose resume includes a long stint in renewable energy.

"My secondary metric is financial. I think the two are actually indelibly combined — you can't scale if you don't have a business case," she tells Upstream.

The practical approach reflects the urgency of Rangarajan's mission — to best direct funds from the investment arm of the Oil & Gas Climate Initiative (OGCI) into projects and technologies that help meet the energy needs of a growing world population while significantly lowering the greenhouse gas impact of the oil and gas business.

"Our goal is to accelerate greenhouse gas reduction by making investments in technologies and solutions that are cost-effective and will scale globally," she says.

The $1 billion fund set up by the ten major oil companies in the OGCI coalition is initially concentrating on methane reduction, energy efficient transport, and carbon capture, utilisation and storage (CCUS) technologies.

The group's initial investments address CCUS and transportation, and this year will tackle the methane reduction challenge, Rangarajan says.

"The one I think we can attack the quickest and get the most impact from is methane," she says. "Methane has a more vivid impact in the short term. Getting rid of it gives us immediate relief on the global warming front."

It is also a problem that largely can be addressed with existing technology and operational changes.

"We at OGCI believe that methane reduction is a critical priority and the OGCI companies are going to take action on it. It is clear that we should support them on the investment side."

Many of the 10 OGCI companies recently signed on to a list of "guiding principles" regarding methane reduction that commits them to, among other things, improve monitoring and better manage methane emissions throughout the natural gas value chain.

The move is more than symbolic, Rangarajan says.

"I think it's very significant. This (methane) issue is bringing the industry to a common table — fierce competitors are sitting down together and saying, we believe and we care and we will work on it." On the transportation front, the organisation is looking at technologies that can make a marked improvement in engine efficiency, particularly in the heavy transport sector, where reducing emissions is more challenging compared with passenger transport, where electric cars are gaining traction.

"We are going to really focus instead on some of the under-served areas which haven't got as much excitement or money behind them, such as heavy duty and medium duty vehicles," Rangarajan says.

"It will take a little longer to have an impact", she says. "But we have to show successes in that area. So we need to seed many different parts of that value chain quickly to start pushing the technology and the cost picture along.

"I always have in my head a kind of triangle, which is technology, economics and scale. It's really an iterative cycle between those.

"With technology, as soon as you get scale, you hit economics. That drives more players into it and that drives more technology, scale and economics. You keep going around the three sides of the triangle until you really hit the maturity curve."

Government policy can help drive the economics of CCUS and help get the industrial sector — a major source of carbon dioxide emissions — on board, she adds.

"The initiative's $1 billion endowment, which extends over a 10-year period, is "not a typical venture fund", Rangarajan insists.

"Our job is to think about what the hurdles are," she explains. "If the hurdle is technology, then we can make a venture-type investment."

"If it's deployment, then we will try to go out and build an investable project. If it's testing and pilot work, that's where we will lead the charge.

"The remit is wide-ranging but we are not scattershot, she says. "There is no quick fix. But if you don't focus, you don't get much done."

Looking ahead:

OGCI Climate Investments

chief executive Pratima Rangaranjan

"If we are to have an impact on the climate, our work is really just beginning," she says.

"It is clear that there has to be a shift in hard human behaviour, and far-from-certain changes in human behaviour, writes Russell McCalley.

OGCI Climate Investments has said it will help develop a commercially viable concept and a basic engineering design to help the project gain government support and attract private sector investors.
Industry cleaning up its act on methane emissions

Oil and gas sector must make progress if it wants to make serious case for natural gas as cleaner fossil fuel

RUSSELL MCCULLEY
London

SEVERAL major international oil and gas companies in recent months have vowed to take action on methane emissions.

Late last year, eight companies — BP, Eni, ExxonMobil, Repsol, Shell, Statoil, Total and Wintershall — signed on to a set of “guiding principles” committing them to cut emissions from their operated natural gas assets, improve emissions data reporting and advocate better practices through-out the natural gas value chain.

Separately, efforts to reduce methane emissions were underway at several companies well before the agreement was signed. ExxonMobil, for one, announced in September that it had scaled up a leak detection and repair programme at sites operated by its North American onshore gas subsidiary XTO Energy.

The company plans to phase out high-breed pneumatic devices over the next three years, test and deploy equipment that cuts emissions, and help develop technologies to detect and accurately measure methane leaks.

“We are implementing an enhanced leak detection and repair programme across our production and midstream sites to continually reduce methane emissions, and are also evaluating opportunities to upgrade facilities and increase efficiency at both current and future sites,” XTO president Sara Ortwein said.

Supporting efforts

Such announcements come at a time when the industry is under increasing pressure from the public and shareholders to support efforts to reduce greenhouse gas emissions.

Methane reduction is seen as an easy way to put points on the emissions reduction scoreboard, because leaks largely may be detected and corrected with existing technologies.

Getting on board the methane emission reduction train makes business sense as well. Gas producers have touted natural gas as a cleaner alternative to coal and other fossil fuels and a preferred energy source to help achieve goals set forth in the Paris climate agreement.

Those claims could be jeopardised if the industry fails to make substantial cuts in the methane emissions that now plague the natural gas chain. Oil and gas operations account for an estimated 22% of global anthropogenic methane emissions, according to a statistic cited by the Oil & Gas Methane Partnership (OGMP).

Additionally, the International Energy Agency (IEA) has said that minimising methane emissions from upstream oil and gas operations could have as much climate impact as increased investment in renewable energy over the next few years.

While methane dissipates much faster than carbon dioxide, it has far more destructive short-term effects than CO2 — more than 84 times more impact than CO2 on warming during the first 20 years after it is emitted and 28 times more potency over a 100-year period, according to the OGMP.

The OGMP’s members, which now include BP, Engie E&P, Eni, Pemex, PTT, Repsol, Shell, Southwestern Energy, Statoil, and Total, have committed to an initial focus on nine “core” sources of emissions, including gas-driven pneumatic controllers and pumps, component and equipment leaks, venting and flaring during completion of hydraulically fractured wells, and leakage from some types of hydrocarbon liquid storage tanks.

Natural gas combustion produces about half as much CO2 as coal, but efforts to market it as a greener alternative have been undermined somewhat by widely varying estimates of how much methane is being emitted along the gas chain, from production to consumption.

The amount of methane released into the atmosphere also varies greatly among types of natural gas facilities, regional conditions and how well different companies monitor and manage emissions. Efforts are under way to establish better methods to collect, verify and report methane emission data, monitor and correct problems at oil and gas facilities.

There has been some progress so far — as the IEA indicates in its 2017 World Energy Outlook, methane emissions in the US have been steadily declining for years.

However, the report calls for “a step-change in ambition” to cut emissions “in an area where few countries have specific mitigation frameworks in place.”

As the IEA notes, the technolo-
methylene emissions

RESEARCHERS at Imperial College London’s Sustainable Gas Institute (SGI) are making sense of disparate data on methane emissions, and giving operators and policy makers some facts and technological strategies to work with as they seek to lower the energy industry’s greenhouse gas footprint, writes Russell McCulley.

Methane emissions occur throughout the natural gas supply chain, but estimates of the scale of the problem vary, making it difficult to determine how best to attack the problem and help reach ambitious climate goals.

The Sustainable Gas Institute was set up in 2014 to serve as a hub for research in energy system modelling and natural gas sustainability, which includes methane mitigation.

“Methane has a big part to play in this — it can negate carbon reduction benefits over other fuels if not addressed,” SGI research associate Paul Balcombe says of the industry’s role in meeting greenhouse gas reduction goals.

Around the start of this decade, as the North American shale gas boom was under way, reports emerged that suggested the amount of methane released by the upstream shale gas sector could be large enough to rival or exceed the environmental impact of coal.

“After that, there was a flurry of investigations,” Balcombe tells Upstream. “It’s a big issue, because methane is a strong greenhouse gas, much stronger than carbon dioxide in the short term.”

Since those alarms, methane emissions in the US have declined as shale operators have adopted better completions techniques. However, accurate emissions data is based onmonitoring in Canada and outside North America, he says.

SGI researchers have published studies that assess various emissions estimates and explain variations among different regions, reservoir types and stages along the natural gas supply chain.

The research is needed to determine how much methane emissions can be feasibly reduced, Balcombe says. “We’re never going to get to zero emissions. But research is key to understanding how much we can reduce methane emissions and do it in an economically viable way.”

The main sources of methane emissions in the gas supply chain are leaks and venting, he says, with a handful of “super emitters” — facilities or equipment that have extremely high emissions — accounting for a disproportionate share of the total.

Some solutions are readily available, such as replacing pneumatic gas-driven valves with valves that are less prone to leakage. Venting from liquid storage tanks — another large source of emissions — may also be monitored and addressed with existing technologies.

“A lot of research focus is going on at the moment to develop cheap, continuous monitoring. That would be something really useful, because then you could quickly detect and repair and significantly reduce the effect of these super emitters,” he says.

While it is impractical to expect continuous monitoring of every element throughout the gas supply chain, he says, reliable data on super emitters and weak spots can help companies target their emissions reduction efforts.

Much can be done with relatively uncomplicated tools, he says: “I think we can minimise methane emissions via effective operating and maintenance philosophies, and by using the best available techniques.”

The past few years have seen a growing awareness of the need to address methane emissions, in the public realm and in oil company boardrooms, he says.

“It’s been impressive how quickly some specific companies have really gotten on board with tackling the issue,” Balcombe says. “I think there’s an acknowledgement that we can’t brush this under the carpet. It’s really important, because if we don’t address these climate impacts, there isn’t going to be a role for natural gas.”

Muse inspires model for sector’s investments

RADICAL change in the way energy is produced, transported and consumed will be necessary to meet strict carbon budgets, writes Russell McCulley.

To develop strategies to reach those targets, policy makers rely on energy system models to provide evidence-based analysis.

Energy system models are valuable tools but have some limitations, says Adam Hawkes, co-director of the Sustainable Gas Institute. Researchers are developing what the group says will be a novel and transparent model.

Dubbed Muse, for modular system simulation, the new model will offer new information on technology and operational options and comprehensive details on the upstream supply chain.

Traditional models tend to assume that decision makers will act in concert and often include a degree of “technology optimism” that builds in future costs and benefits of technologies that may have no real track record, Hawkes tells Upstream.

“These models are valuable and useful, but we want there to be a counterpoint to those models where you have rather more heterogeneous decision making in each of the sectors and regions around the world,” he says.

Muse will look at the entire energy system, from where gas can and cannot compete with other energy sources in a lower carbon future.

“SGI will roll out a version of the model this year but the project will evolve as new trends and technologies emerge.

“It’s a long process, a large model and it’s new,” Hawkes says. “But we are now producing full scenarios for all 28 regions in the world with a time horizon to 2100.”

PHOTO: AP/SCANPIX

Source: IEA
Norway nears milestone for its CCS drive

Three projects shortlisted for state support to build full-scale carbon capture facility as government approaches decision time on first scheme

BEATE SCHJOLBERG
Oslo

Norway is approaching decision time for what could become the country’s first full-scale project to capture and store carbon dioxide from an onshore factory and store it in reservoirs under the North Sea.

The government last year shortlisted three industry projects, some or all of which may get state support to build a full-scale capture facility. All three aim to cut carbon dioxide emissions from land-based industrial sites.

If completed, the project could become Europe’s first full-scale industrial application of carbon capture and storage (CCS), according to Gassnova, a state agency set up to handle Norway’s activities within carbon capture and storage.

Although the early phases of the Norwegian project are progressing, a final investment decision by Norway’s parliament is not scheduled until 2019.

The three industry candidates for a full-scale capture facility were picked in 2016 after a feasibility study, and are now working
Norway nears milestone for its CCS drive

In the mix: Statoil’s test scheme at Mongstad

27 January 2018

Statoil no stranger to carbon storage projects

NORWAY’S flagship operator Statoil, no stranger to carbon storage projects

Beate Schjolberg

writes

statoil already operates two of the world’s 13 existing carbon capture and storage (CCS) projects in operation, at the Norwegian Sleipner and Snøhvit fields.

It is also a partner at the onshore In Salah field in Algeria, which captured and stored CO2 underground between 2004 and 2012.

All three projects are the result of high CO2 content in the produced gas, making it necessary to reduce the CO2 content before sending the gas on to customers.

This can be done by mixing it with gas with lower CO2 content from other fields, but this is not always practically possible.

The Norwegian projects were also spurred by a country-specific CO2 emission tax for petroleum production introduced in 1996, which gave Statoil and its Sleipner partners a financial incentive to seek alternatives to sending the excess CO2 into the atmosphere.

The Sleipner West CO2 project started in 1996, stripping out about 1 million tonnes per annum of CO2 and reinjecting it into a saline formation in the Utsira formation about 900-metres underground, in the middle of the North Sea about halfway between Norway and Scotland.

Since 2014, Statoil has also used the same facility to store CO2 from the nearby Gudrun field.

Through the years, Statoil has used several technologies to monitor the Sleipner storage reservoir to make sure the CO2 stays put, including time-lapse seismic surveys, gravity surveys, seafloor mapping and controlled-source electromagnetic surveys.

In 2008, Statoil added the Snøhvit field in the Barents Sea to its CCS projects. The subsea field sends its gas to an onshore liquefied natural gas plant, where the excess CO2 is removed and returned offshore via a 140-kilometre pipeline before being reinjected into formations more than 2000-metres below the seabed.

For the Norwegian full-scale industrial CCS project, Statoil and partners Shell and Total have had years of studies focused on the Smølaheia area east of the Troll field in the North Sea as the best site for CO2 storage. The reservoirs are located between 1000 and 2000-metres below the seafloor, about 50-kilometres from shore.

If successful, a CO2 storage project at Smølaheia could receive gas from several European countries and could also bring wider business opportunities in the future, according to Statoil.

Only days after securing the Gassnova storage concept study contract last June, the company teamed up with energy groups Gassnivie and Vattenfall to evaluate turning a Dutch gas-fired power plant into running on hydrogen.

“The technology for producing hydrogen by converting natural gas into hydrogen and CO2 is proven and known. The new element is to design a large-scale value chain,” Irene Rummelhoff, Statoil’s executive vice president for new energy solutions, said at the time.

“If the Norwegian CCS demonstration project is realised, this may open up for future CO2 storage from other projects, including the joint Vattenfall, Gassnivie and Statoil project.”

The potential CO2 reduction is significant. Vattenfall’s Magnum power plant in the Netherlands has three combined cycle gas turbines, each emitting about 1.3 million tpa of CO2.

If all three turbines are converted to run on hydrogen, emissions could be cut by 4 million tpa, or 2.4% of the Netherlands’ 2016 CO2 emissions.

for its CCS drive

on concept studies. They are the Norcem cement factory in the town of Brevik, owned by German player HeidelbergCement Group, fertiliser company Yara’s ammonia plant in Porsgrunn, and the Klemetsrud waste-to-energy facility in Oslo, owned by the Finnish Fortum group.

A number of milestones were passed in 2017, including study contract awards to the three industrial companies in April, a contract for front-end engineering and design studies for storage to Statoil in June, a subsequent partner agreement between Statoil, Shell and Total for storage, and a November decision to locate the intermediate storage tanks at Kollsnes.

Statoil’s contract was also expanded to include the preparatory work for the transport part of the chain, which has previously been studied by Knutsen OAS Shipping and Larvik Shipping on behalf of Norway’s pipeline operator Gassco.

Statoil has pointed to an area east of the North Sea Troll field called Smølaheia as suitable for CO2 storage.

Realising the project

If the project is realised, this CO2 storage site could eventually also receive gas for storage from other locations on the European mainland, Statoil has said.

Several countries have expressed interest, including Sweden, which has a lot of heavy industry and aims to be carbon neutral by 2045.

The current time schedule calls for a concept decision in the second half of this year, resulting in a document that can form the basis for an investment decision in parliament in the second quarter of 2019. The full project could be in operation in 2022, Gassnova estimates.

As for costs, the feasibility study indicated a price tag of between Nkr7.2 billion and Nkr12.6 billion (between $880 million to $1.6 billion) for a full-scale capture, transport and storage chain, depending on how much gas is to be captured and from where, and how many transport vessels will be needed.

An updated figure is due later this year in the decision document, which will be decisive for whether Norway is willing to fork out the cash for the next step.
Gas flaring still a burning issue for industry

Total volume on rise despite efforts to reduce global figures

AMANDA BATTERSBY
Singapore

A STAGGERING 150 billion cubic metres of associated natural gas produced with oil is burned or flared annually, causing more than 350 million tonnes of carbon dioxide to be emitted to the atmosphere.

Flaring increases in Russia, Iran and Iraq in 2016 combined to reverse the gradual reduction in global flaring seen in recent years. Satellite data indicated global gas flaring in 2016 was 149.4 Bcm of gas compared to 142.3 Bcm in 2015.

"Flaring increased significantly in Russia, Iran and Iraq and decreased significantly in the US," said the Global Gas Flaring Reduction Partnership (GGFR).

Although Russia flared 2.8 Bcm more gas than the previous year, it still has a relatively low size of its oil production near to the global average. However, Iran and Iraq have higher a flaring intensity.

"In the rest of the world, flaring has been in moderate decline over the last two years while oil production levels have remained unchanged."

Flaring in 2016 in the US decreased by more than 2 Bcm to less than 9 Bcm, mostly from oil shale projects in the Bakken formation in North Dakota state and the Permian and Eagle Ford formations in Texas.

"Since the additional flaring is mostly caused by an uptick in oil production at existing oil production sites, one could conclude that increasingly governments and oil companies are ensuring new oil fields are developed without routine flaring," said a GGFR official.

Global initiative

The World Bank together with several governments, oil companies and development institutions in 2015 launched a global initiative that commits endorsers to not routinely flare associated gas in new oilfield developments and to end routine flaring at existing oil producing sites by 2030.

More than 70 governments, oil companies and development institutions that combined account for about 54% of global gas flaring have now endorsed the Zero Routine Flaring by 2030 Initiative. "Flaring of gas contributes to climate change and impacts the environment through the emission of CO2, black carbon and other pollutants," said the World Bank.

It also wastes a valuable energy resource that could be used to advance the sustainable development of producing countries.

The bank noted that if 140 Bcm of gas were used for power generation, it could provide 750 billion kilowatt hours of power — or more than the annual electricity consumption of the African continent.

While associated gas cannot always be used to produce power, it can often be utilised in a number of other productive ways or conserved.

The World Bank in October 2016 announced a new programme that provides funding for "flare-out" project development.

The call for project proposal ideas, sponsored by the GGFR and the Global Infrastructure Facility (GIF), is intended to support the initiation of viable solutions to monetise flared and/or vented associated gas from upstream onshore and offshore oil production facilities.

It is intended for Zero Routine Flaring endorsers that have the capacity to develop and implement commercially viable flare-out projects.

Awarded proposals will obtain funds from GIF for pre-feasibility and/or project preparation and structuring work on identified project opportunities.

Selected proposals will be granted up to $500,000 to prepare or finalise project pre-feasibility work, while up to $5 million will be made available to projects that have progressed beyond that stage.

However, these higher amounts of between $1 million and $5 million will be reimbursable after financial closing on a project. Proposals have to be submitted by 31 January 2018 to the World Bank.

Evaluation will then be carried out during February by the Evaluation Committee, which will include staff from the World Bank Group, the European Bank for Reconstruction and Development and the Inter-American Development Bank.

Proponents of successful ideas will be notified by 28 February and the bank’s aim is to announce the successful proposals on 2 March.

However, without a global cost penalty for carbon emissions, there are few commercial incentives to capture flared gas, noted DNV GL.

Financial barriers can also impede efforts to reduce flaring and emissions, especially in nations with developing economies.
2002 and 2006. Flaring from SPDC facilities decreased further in 2006, mainly due to production outages as well as operational improvements. Progress was also made on several gas gathering projects.

"However, the planned start-up dates for two major gas gathering projects continue to be delayed by security issues and a lack of adequate joint venture funding from our government partner," said Shell.

Nigerian government officials reckon that flaring today still causes annual losses of $2.5 billion and a bill has been tabled to outlaw flaring in the country.

Sources point to the ridiculously low suggested fine of 10 naira (less than three US cents) for flaring, under almost 40-year old legislation, as one reason why the issue has never really been tackled.

"Gas flaring is as old as the discovery of crude oil in Nigeria. While it remains a global environmental malaise with attendant environmental consequences, we must move with the rest of the world to seriously put an end to it. Gas flaring is not inevitable. "While statistics may not be accurate, the quantity of gas flared in Nigeria exceeds over 40% of the gas flared annually across Africa, which amounts to about $7 billion in waste," a Nigerian senator told news portal Vanguard. State-owned Nigerian National Petroleum Corporation (NNPC) painted a rosier picture, claiming that it had reduced flaring from 36% in 2006 to 10% a decade later and this had pushed Nigeria down to seventh position on the global flaring scale from second.

NNPC official Mallam Bello Rabiu said the drastic reduction in flaring was achieved through "aggressive gas commercialisation anchored on the Gas Master Plan". He added that the government had designed a National Gas Policy that seeks to end flaring by 2020.

Rabiu noted that the federal government has provided a guarantee of payment to gas suppliers through the Central Bank of Nigeria and the World Bank as part of incentives to get the oil and gas companies to commercialise more of their gas.

"This is a very important step that the NNPC has been working on since 2008", he said.

Academic sources claim that scientists studying the environmental impact of gas flaring in the Niger Delta are hampered by the lack of available official flaring emissions data although it is widely believed that flaring is a major contributor to air pollution in the region.

Test modelling showed that a significant reduction in pollution could be brought about by stopping flaring at a few key projects and by improving flaring efficiency.

OMV gets set for ZRF push

AUSTRIA'S OMV has managed to reduce its direct annual carbon dioxide emissions by almost 1 million tonnes over the past decade through a combination of flaring and venting reduction and energy efficiency projects, writes Amanda Batterby.

By adopting the Zero Routine Flaring policy, OMV will further reduce its direct CO2 emissions by around 1.5 million tonnes per annum, according to the World Bank.

"We have set ourselves targets to manage and reduce the carbon footprint of our operations. The phasing out of routine flaring and venting is one of our essential objectives to combine resource efficiency with economic long-term success", says OMV chief executive Rainer Seele.

The operator has implemented several projects, some phased, to end routine flaring and otherwise utilise the gas.

In Tunisia, OMV aims to achieve ZRF with the implementation of the South Tunisia Waha gas valorisation project.

Associated gas from the operator's Cherouk concession had to be flared since 2007 due to the lack of any gas utilisation infrastructure. During the initial stage of the project, previously flared gas was compressed, treated and exported via a new five-kilometre pipeline to the local market.

The second phase involves two vapour recovery units to capture the remaining low-pressure gas.

The third phase will be the construction of a 50-kilometre trunk line to transport associated gas from OMV’s Anaguid field to the Waha gas valorisation project.

The net result of these three projects is an annual CO2 emission reduction of 120,000 tonnes.

OMV plans to implement its Habban field electrification project in Yemen, where currently flared gas will generate on-site electricity, replacing the diesel technology used to produce the electricity required to enable field operations.

This project implementation is planned for 2019, subject to the security situation, added the World Bank.

Meanwhile, in Romania, OMV Petrom Upstream consumes the associated by-product gas to produce onsite electricity and heat via gas-to-power and combined heat and power plants.

OMV plans that such projects have been implemented, with a combined installed capacity of around 65 megawatts.

According to OMV, these projects not only saved 318,000 tonnes of CO2 emissions annually but have also had a positive impact on production costs by delivering significant operating costs savings. More than half of OMV Petrom Upstream’s onshore operations are now independent of external electricity supply.

The OMV Group’s long-term strategy is to ensure that OMV Petrom Upstream’s entire onshore electricity consumption originates from gas flaring reduction and utilisation projects.

Race to protect the planet: Page 30
Innovation: Iraq plans to build three new plants to process natural gas flared at its southern oilfields

FLARING
Race to protect the planet

Contractors eye innovative flare gas solutions to help industry reduce vented volumes

AMANDA BATTERSBY
Singapore

Leading contractors are already devising innovative technologies to help reduce global flaring while also delivering profitable solutions to their clients.

DNV GL notes that approximately 5% of annual gas production is flared or vented worldwide, with most flaring occurring at ageing and/or remote project locations.

“Based on real locations and field conditions, we have developed a methodology that uses gas flow rate and distance to market to select the most appropriate technical solutions on a case-by-case basis. The methodology could present new revenue opportunities, particularly for smaller-scale applications for operators, while helping them to reduce emissions and stay ahead of regulatory requirements,” said DNV GL.

The contractor has studied oilfield flaring projects in Russia, the US, Algeria and Vietnam that each came with different technical, regulatory and economic challenges.

“It’s a significant challenge to turn waste from flaring and venting into a profitable economic product with sound environmental benefits. However, our research shows that there are economically viable solutions that can assist in carbon abatement and develop flare gas for societal use,” said DNV GL.

The contractor noted that most of the existing solutions were for large-scale applications while most flaring is small scale.

Energy-intensive processes

Innovation is needed in applying associated gas to energy-intensive processes such as air separation and water desalination.

“Though some solutions might be immature for near-term implementation, current applications such as micro liquefied natural gas, compressed natural gas, natural gas hydrates and conversion methods can deliver significant benefits, and are proving to do so in some cases in certain markets like North America,” said DNV GL.

“The objective is to support the industry in raising the standards of safer, smarter and greener performance. This will reduce CO2 emissions and local pollution and ultimately improve the quality of life for the individual,” added DNV GL chief executive Elisabeth Torstad.

Meanwhile, GE Oil & Gas (BHGE) has established a unique relationship with Iraq’s Oil Ministry that includes an agreement to partner on an end-to-end solution to reduce gas flaring at its oilfields and utilise the gas for power generation.

“This solution could translate into more than 200 megawatts per site and the recovery of several thousand barrels per day of liquid petroleum gas in Iraq, today the world’s second largest flaring nation — burning some 16 bcm of gas annually.

Iraqs has plans to build three new plants to process the natural gas currently flared at its southern oilfields and use the fuel for power generation, according to the country’s Oil Minister Jabar al-Luaibi.

“The ministry is seeking to end the flaring of associated gas in the next few years, despite the economic and financial challenges,” Luaibi has said.

Egypt’s Energy Minister Tarek El Molla in December stated his commitment of reducing gas flaring, and the nation will be signing up to the World Bank’s Zero Routine Flaring by 2030 initiative.

The ministry and the European Bank for Reconstruction & Development (EBRD) last month jointly hosted a workshop titled Ending Routine Flaring of Associated Gas in Egypt in Cairo.

“The EBRD is deeply involved in initiatives in its countries of operations to reduce gas flaring. Gas flaring is not only a climate change hazard, it is also a waste of an important resource,” said ElectraTherm.

Innovation: Iraq plans to build three new plants to process natural gas flared at its southern oilfields

EBRD natural resources director Eric Rasmussen

Gas flaring is not only a climate change hazard, it is also a waste of an important resource.

The EBRD has a fund that makes recommendations on options for gas flaring regulatory reform that would help improve the regulatory framework and thereby increase the utilisation of the associated gas produced in Egypt.

This work builds on past technical assistance provided by the EBRD to identify viable technical solutions to reduce flaring in the country.

Recommendations include steps to strengthen the framework for monitoring and reporting gas flaring, underpinned by adopting industry-wide standards for measurement, streamlining the investment approval process, clarifying regulatory responsibilities and providing an enhanced role for stakeholder engagement.

Egypt’s flared gas could be used in several ways after processing, including on-site electricity generation with engines or turbines, reinjection for enhanced oil recovery, gas-to-liquid conversion to produce synthetic fuels, or as feedstock for the petrochemical industry.

The North African nation today is the world’s 11th largest gas flarer, burning more than 2 bcm each year that could meet 5% of domestic demand.

Class action lawsuits

Gas flaring is also a contentious issue at some shale oil projects in the US.

Oil companies have already faced class action lawsuits related to flaring in the state of North Dakota, which has the US’ highest volumes of flared gas.

In 1999, only 3% of produced gas was flared in the state, but this had increased to around 36% by early 2014.

North Dakota petroleum legislation requires tax and royalties be paid for all natural gas flared beyond a well’s first year of production.

Once these 12 months are up, operators must cap the well, connect it to a gas gathering line, equip the well with an electrical generator that consumes at least 7% of the gas from the well, or find another approved approach that reduces flaring.

The US Energy Information Administration notes the North Dakota Industrial Commission’s current targets allow 15% of gas to be flared from November 2016 through October 2018 and 12% for November 2018 to October 2020. The target falls to 9% of production beginning 1 November 2020.

US contractor ElectraTherm has collaborated with compatriot Hess for a Power+ Generator project at a North Dakota oil well.

“The Power+ system generated electricity from captured gas that would otherwise have been flared. “In collaboration with distributor Gulf Coast Green Energy, the project successfully demonstrated an effective means of flare reduction, and changed the landscape for industries where flaring was previously believed to be the only solution,” said ElectraTherm.

“We captured a wasted fuel source that was being flared to the atmosphere and put that fuel to use in the oilfields,” ElectraTherm chief executive John Fox said.

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CARBON PRICING

Paying the price for carbon emissions

Pricing mechanism could give oil and gas companies incentive to adapt strategies

ANAMARIA DEDULEASA
London

A growing number of oil and gas companies are supporting a price on carbon, a move that could appear to be counter-intuitive due to its cost on the sector. It could prove, however, to be an opportunity for the industry to innovate, experts have said.

The carbon emissions targets set under the Paris Agreement have sparked worldwide policy changes. Essentially, instead of telling companies where and how to reduce emissions, a carbon price gives an economic signal and allows fossil fuel players to decide whether to discontinue polluting activities, reduce emissions, or continue polluting and pay for it, according to the World Bank.

In practice, companies either pay a tax for every tonne of carbon dioxide they emit or operate under a cap-and-trade system, which imposes a maximum allowed emissions cap. Companies that want to exceed the limit can buy credits from others that pollute less.

Corporate strategies

In the aftermath of these policy changes, supermajors such as BP, Shell and ExxonMobil, as well as giants including Total and Statoil, have endorsed a more standard carbon price to which they can adapt their long-term corporate strategies.

“The carbon emissions targets set by the Paris Agreement, together with potential policy changes, are starting to influence investors’ capital decisions and shape companies’ long-term corporate strategies,” Gavin Law, head of gas and power at global consultancy Wood Mackenzie, tells Upstream. “More countries are placing a price on carbon or imposing carbon-related regulations. This increases cost,” Law adds.

According to WoodMac research, while there is a direct exposure and risk for oil and gas companies, it is less than initially expected.

“Under a $40 per tonne carbon dioxide cost — which we believe represents a realistic average — the value of companies’ upstream assets could be reduced by up to 7%, depending on the regulatory regime,” says WoodMac upstream consulting director Amy Bowe.

“However, we expect this will actually be closer to 2% under the most likely fiscal and regulatory scenario. In this scenario, liquid asset costs would increase by about $0.80 per barrel on average, although the impact could be more than twice that for high-intensity operations.” She adds: “Under this most likely scenario, total value at risk would be an estimated $45 billion. This is far less than many expect in terms of the direct impact of carbon costs on company portfolios.”

Between 2013 and 2017, the number of global companies that factor or are planning to factor an internal carbon price into their business plans jumped from 150 to 1400, the London-based non-profit global environmental disclosure platform CDP revealed.

CDP’s research also showed that companies use an internal carbon price to help manage climate risk as well as an opportunity to innovate.

“Carbon pricing is growing. More and more companies are utilising this tool. You could say it’s an obvious thing to do, like budgeting,” CDP’s director of carbon pricing Nicolette Bartlett tells Upstream. “More countries are placing a price on carbon or imposing carbon-related regulations. This increases cost,” Law adds.

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BUSINESSES and governments are increasingly using carbon prices to drive the cost-efficient transition to a low-carbon economy, however, a key challenge for implementation has been the fear of reduced economic competitiveness, writes Anamaria Dediuńska.

To date, 42 countries and 25 sub-national jurisdictions are pricing carbon. Together they are responsible for more than 22% of global emissions.

Additionally, the number of carbon pricing initiatives implemented or scheduled for implementation has almost doubled over the past five years, reaching 47 in 2017. These actions will cover almost half of global carbon dioxide emissions, the World Bank said.

Figures from energy consultancy Ecasys indicate that carbon pricing mechanisms raised some $22 billion in revenues last year, up from $14 billion in 2014 — funds meant to support the fight against climate change.

However, despite the benefits that could spurt from the adoption of carbon pricing, a common concern is that it may threaten business competitiveness.

"Because the adoption of carbon pricing has yet to occur at a global level, there is the chance that firms operating in countries with a price on carbon may lose business, profits, or market share to competitors that do not have to account for a price on carbon," a World Bank report said.

"This unintended consequence of carbon pricing policies could result in carbon leakage, whereby carbon-intensive industrial investments, operations, and related greenhouse gas emissions are shifted from carbon-limited markets to less stringent ones," according to the report, "the fear of carbon leakage is the major political hurdle to the extended use of carbon pricing".

However, the World Bank added: "While there is little evidence to date that carbon leakage is occurring, it is the fear of such leakage that can deter politicians from even proposing carbon pricing as part of the policy response to climate change. Overcoming this barrier is a major challenge.

Early evidence from California, British Columbia and Quebec suggests carbon pricing is "neither an impediment to robust industrial growth, nor is it leading to the transference of greenhouse gas emissions to other countries via the shift of industrial activity.

Within Europe, Norway, Sweden, Switzerland and France also have adopted a carbon price without witnessing adverse effects on their industrial sectors and economic growth, analysts have said.

Meanwhile, more companies are vowing to join the fight against climate change and calling on governments for a carbon price.

UK supermajor BP has gone so far as to call for a "single global carbon price over time" and said different national prices are only a "first step".

"Putting a price on carbon, one that treats all carbon equally, would make energy efficiency more attractive and lower carbon energy sources, such as natural gas and renewables, more cost competitive," BP said.

"Any national carbon pricing mechanism should address the impacts of unequal international competition. Otherwise, there is a risk of carbon leakage."

Driving investment to battle climate change

CARBON pricing is seen as a way to bring down greenhouse gas emissions and drive investment in the technologies needed to meet Paris Agreement targets to limit global warming to less than 2 degrees Celsius this century, writes Anamaria Dediuńska.

As of 2017, 42 nations and 25 sub-national jurisdictions are pricing carbon, and more such initiatives are to be implemented. In total, these actions will cover almost half of global carbon dioxide emissions, according to the World Bank.

"A price on carbon helps shift the burden for the damage back to those who are responsible for it, and what can reduce it. Instead of dictating who should reduce emissions where and how, a carbon price gives an economic signal and polluters decide for themselves whether and how to address the costs of their pollution activity, reduce emissions, or continue polluting and pay for it," the World Bank said.

"In this way, the overall environmental goal is achieved in the most flexible and least-cost way to society.

"The carbon price also stimulates clean technology and market innovation, fuelling new, low-carbon drivers of economic growth," it said. A carbon tax imposes a direct fee on greenhouse gases emitted by carbon-intensive goods and services.

Under a carbon price scheme, oil and gas producers pay a per-tonne price for emitting carbon. The tax provides a financial incentive to seek solutions to reduce emissions and adapt the production of lower carbon technologies.

End consumers are also hit, as businesses and households ultimately pay more for carbon-intensive goods and services.

Advocates say revenues generated from carbon taxes, levies, and cap-and-trade schemes can support investments to fight climate change, reduce distortionary taxes, address fairness and competitiveness concerns, or drive government spending on public priorities.

Carbon pricing mechanisms raised an estimated $22 billion in 2016, according to the World Bank.