

Amid Some Positive Indicators, New Projects Limited

By **Jeff Awalt**, Executive Editor

Oil and natural gas prices climbed higher in 2021, prompting increased drilling and production among mostly independent producers in some regions, but a host of political and COVID-related economic concerns kept markets on edge and highly reactive for much of the year.

While an improved upstream outlook had positive implications for the midstream sector, global pipeline construction remained comparatively sluggish as project developers maintained a cautious approach, with capital spending aimed primarily at projects already underway.

A consensus among industry analysts calls for oil and gas prices to remain rela-

tively strong and continue to drive strong upstream cash flows in 2022. But midstream benefits are expected to remain limited as many producers focus on shoring up their balance sheets and increasing shareholder returns.

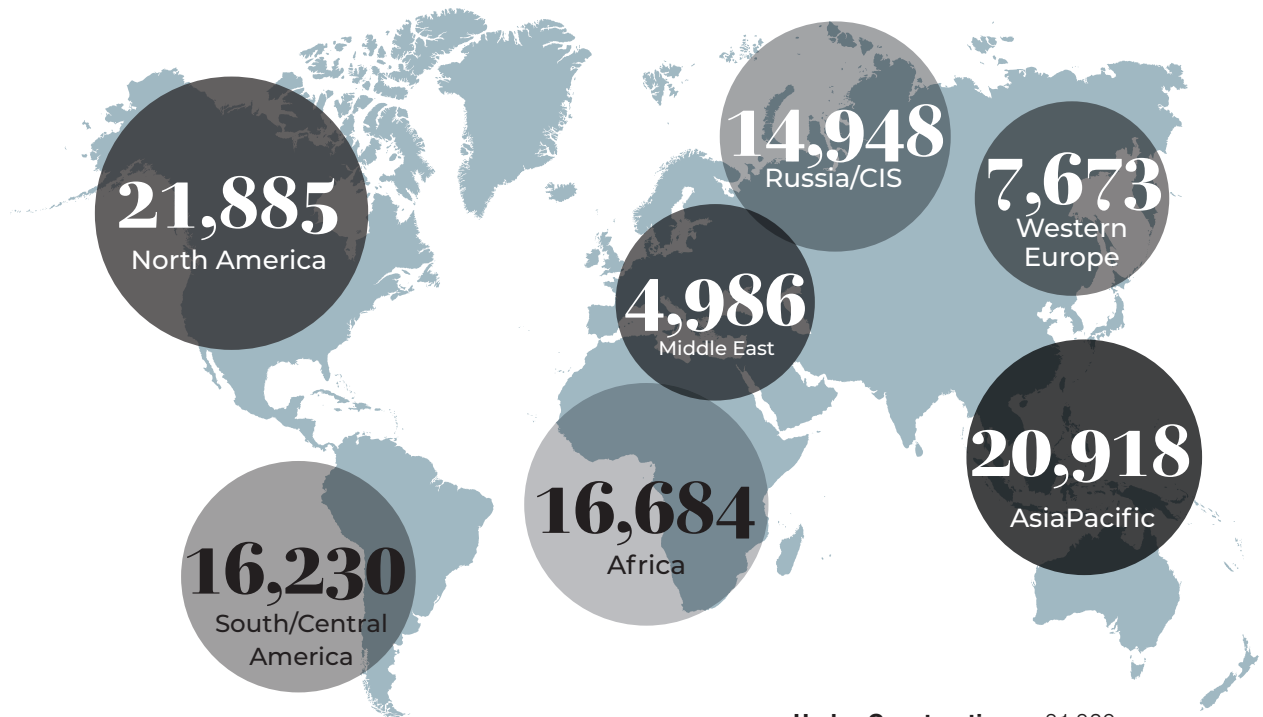
These trends were reflected in *Pipeline & Gas Journal's* annual analysis of pipeline construction activity, which found 103,324 miles of pipelines either planned or under construction worldwide at the start of 2022. Of those, 71,495 miles represent projects in the engineering and design phase, and 31,829 miles are in various stages of construction.

The figures reveal an 8.8% decline in

total mileage compared with the 113,305 miles of pipelines that were planned or under construction in our 2021 survey.

Total mileage was either flat or down in every region, compared with the year-earlier survey, with the North America and Asia-Pacific regions posting the largest declines – though for varying reasons.

Total pipeline mileage under construction across seven global regions at the start of 2022 includes: North America, 21,885 (-13.4%); South America, 16,230 (-1.0%); Western Europe/EU, 7,673 (-8.8%), Africa, 16,684 (-1.0%), Asia-Pacific/Australia, 20,918 (-13.6%), Middle East, 4,986 (-4.3%), Russia/CIS, 14,948 (-5.9%).



Under Construction:31,829

Planned:71,495

Total Miles:..... 103,324

North America

Pipeline Miles Under Construction: 4,044

Pipeline Miles Planned: 17,841

Total: 21,885 (2022 expectation: decline of 13.4%)

Pipeline construction activity in North America remains soft overall after a multi-year period of rapid capacity expansion ran head-first into the market collapse of 2020.

Since then, environmental and political challenges to large midstream projects have only grown as U.S. President Joe Biden's administration has taken a more adversarial stance toward all fossil fuels in pursuit of stricter national climate policies – a shift that became clear with the effective cancellation of the Keystone XL project on his first day in office.

S&P Global Ratings revised its midstream industry risk assessment downward to intermediate risk from low-risk in 2021, incorporating the “increasing environmental and social risks posed by climate change, greenhouse gas emissions, and the use of hydrocarbons over the longer term.”

All these factors have steered U.S.-dominated North American midstream construction away from major greenfield projects and toward more upgrades and expansions of existing systems. On the other hand, the difficulty in building new infrastructure is increasing the value of existing pipelines and infrastructure, and that trend is making the U.S. midstream sector ripe for more consolidation.

In fact, one of the clear industry trends of 2021 was a move among U.S. utility companies to sell or spin off their midstream assets in order to focus capital spending within their lower-risk, regulated businesses. In one of the largest of these transactions, Energy Transfer acquired 100% of Enable Midstream Partners from CenterPoint Energy and OGE Energy. In another, DEI sold its gas transmission and storage assets to Berkshire Hathaway Energy.

It would be easy to take a dim view of North American midstream prospects based on these high-profile events, but despite challenges, there is still a substantial level of construction planned or underway by historical standards and many analysts maintain a positive outlook for the sector.

“Despite the ongoing transition to a lower carbon intensive economy, we expect that existing midstream assets will continue to be needed over the next several decades because the U.S. will continue to rely on the

consumption of hydrocarbons to meet most of the country's energy needs,” S&P wrote. “As such, we expect that the midstream industry will continue to play a critical role in the broader energy value chain.”

North American pipelines under construction during 2021 included natural gas projects that added more than 4 Bcf/d of new capacity in the United States. Capacity from the Permian Basin at the Waha Hub in West Texas to the Agua Dulce Hub. Located in Southeast Texas, the Agua Dulce Hub is a supply point for pipelines crossing the states southern border into Mexico.

Upon partial completion in August, the Acadiana Expansion added 894 MMcf/d of takeaway capacity to Kinder Morgan's Louisiana intrastate pipeline, which delivers natural gas from the Haynesville Basin to the Sabine Pass LNG terminal. The full project is slated for completion during the first half of 2022.

Other additions came from the Cameron Extension Project on the Texas Eastern Transmission (TETCO) interstate pipeline, which feeds the Calcasieu Pass LNG terminal, and Portland Natural Gas Transmission System's Westbrook Xpress Phases 2 and 3, which added 81 MMcf/d of capacity from Canada to New Hampshire. A new compressor station in Westbrook, Maine, will add another 50 MMcf/d of capacity.

Among the more ambitious U.S. projects unveiled in 2021, Navigator CO2 Ventures announced plans to construct a 1,200-mile (1,931-km) carbon capture pipeline system designed to capture and store 12 million tons of CO2 per year. The project, which would span five states, is supported by the BlackRock Global Energy & Power Infrastructure Fund, and Valero is the anchor customer, Navigator said.

But the second half of 2021 also saw a continuation of North American pipeline delays and cancellations. In late September, PennEast Pipeline announced that it would stop developing its 120-mile, 1.1 Bcf/d natural gas pipeline from Pennsylvania

to New Jersey despite winning a U.S. Supreme Court ruling in a lawsuit allowing it to seize state-owned or -controlled land in New Jersey.

As recently as August, PennEast said it still hoped to finish the first phase of the pipeline in 2022, although it still lacked a water quality certification in New Jersey and other permits. Originally, PennEast had hoped to finish the project in 2019.

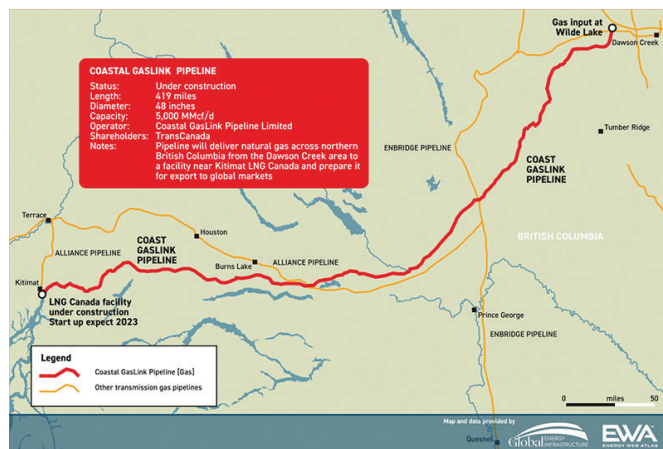
In Canada, work is continuing into 2022 on two high-profile oil and gas pipeline projects and new and expanded export facilities on its Pacific Coast.

TC Energy's Coastal GasLink project continued to make progress and reached the 50% completion mark in the second half of 2021, despite numerous delays caused by Indigenous protests and legal challenges.

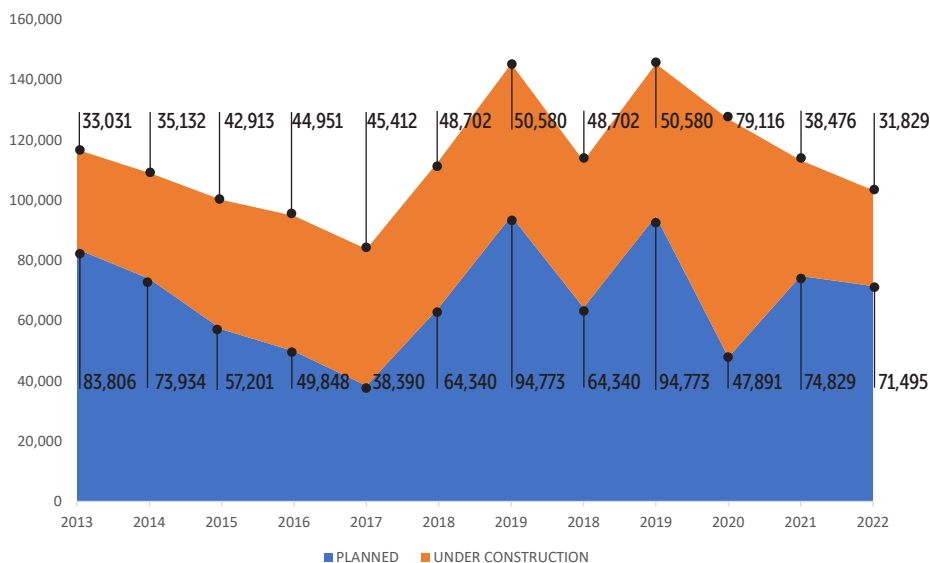
Upon completion, the 416-mile (670-km) pipeline will deliver natural gas across Northern British Columbia to the LNG Canada facility now under construction in Kitimat, B.C. LNG Canada's Joint Venture Participants include Shell, Petronas, PetroChina, Korea Gas and Mitsubishi Corporation.

Also in Western Canada, expansion of the government-owned Trans Mountain Pipeline is making steady progress. The expansion is essentially a twinning of the existing 715-mile (1,150-km) pipeline between Strathcona County, near Edmonton, Alberta and Burnaby, B.C. It will create a pipeline system with the nominal capacity of the system going from approximately 300,000 bpd to 890,000 bpd. Export capacity from Burnaby is also being expanded.

In addition to recent pipeline expansions that increase the capacity for natural gas imports from the United States, Mexico has also been investing in a comprehensive



10-Year Total Mileage



expansion of its domestic pipelines and power generating facilities to meet electricity demand in growing regions of the country. The Cuxtal Project in Mexico's Yucatan region is a centerpiece of the expansion.

Energía Mayakan, which has operated Engie's 497-mile (800-km) gas pipeline since 1999, began construction in 2021 of the series of pipeline expansions. The next phase will increase pipeline capacity to than 500 MMcf/d to serve five existing generation plants and two future plants, and the final phase will extend the Mayakan gas pipeline to connect the city of Vallaloid to Cancun with a 106-mile (170-km), 240 MMcf/d pipeline. Construction is expected to take a little more than two years.

Asia-Pacific/Australia

Pipeline Miles Under Construction: 10,007

Pipeline Miles Planned: 10,911

Total: 20,918 (2022 expectation: Decline of 13.6%)

China's economy has cooled in recent months, and the completion of major pipeline extensions to carry Russian gas from the Power of Siberia across the mainland has reduced its total pipeline mileage planned for 2022 and beyond. But it has continued to develop its natural gas infrastructure, with numerous projects related to both imported and domestic gas.

China Oil and Gas Pipeline Network, or PipeChina, said in October that it had invested 24.45 billion yuan (\$3.8 billion) to expand its gas infrastructure, and was targeting a daily gas supply capacity of 60 MMcm by end of 2021. Amid a severe power crunch, China's central government was urging energy firms to boost gas supply

to meet winter heating demand.

PipeChina expects gas transmission capacity via its roughly 30,500-mile (49,000-km) pipeline network to reach 268 Bcm per annum, allowing it to supply more than 110 Bcm of natural gas this winter and next spring, it said in a statement.

China's state planner has also approved a 960 million yuan (\$149 million) coal-bed methane pipeline project linking the northern provinces of Shanxi and Shaanxi, the National Development and Reform Commission said in September. The 46-mile (74.1 km) pipeline is designed to transmit 2 Bcm of gas each year and will be managed by subsidiary of China's CNOOC.

The project is part of the gas pipeline connecting Shenmu city in Shaanxi province and Anping county in Hebei province. Another part of the pipeline, with annual transmission capacity of 5 Bcm from Shanxi to Hebei, was approved in 2019.

Australia's government has continued its push for a natural gas-fired economic recovery with a recent announcement that it will commit A\$58.6 million (\$45.3 million) to boost gas supply, storage and pipeline capacity in its 2021-22 budget.

Australia's Natural Gas Infrastructure Plan said gas will be needed from the Beetaloo shale basin in the Northern Territory from 2025, the proposed Narrabri project in New South Wales from 2026 and one or two basins in Queensland from 2028.

Those developments will require the construction of five new pipelines and expansions of existing pipelines, according to the plan. It calls for two gas storage projects in the state of Victoria and an expansion of the

South West Victorian gas pipeline. The government commitment is intended to help the projects reach Final Investment Decisions (FID) more quickly, so they can be built in time to address potential gas shortages.

Western Gas, owner and operator of the Equus Gas Project, said earlier in 2021 that it has signed an MOU with APA Group to assess the potential development of a new pipeline that would supply offshore gas to western Australia domestic gas customers and East Coast markets. The offshore pipeline would run from the Equus fields to the Ashburton North Strategic Industrial Area, the release states, and gas supply to the east coast would be via an onshore transcontinental pipeline.

In South Asia, Pakistan signed an agreement with Russia to build the Pakistan Stream gas pipeline, according to a Reuters report, which said Russian Energy Minister Nikolai Shulginov and Pakistan's ambassador in Moscow, Shafqat Ali Khan, both signed the agreement.

Also in the region, Bangladesh's government announced funding for a \$453 million natural gas project that includes the addition of seven wellhead compressors in the Titas Gas Field and construction of a 112-mile (181-km), 36-inch natural gas transmission pipeline between Chittagong and Bakhrabad. The pipeline project expands the capacity of an existing 24-inch transmission line and completes a full looping of an existing pipeline.

Africa

Pipeline Miles Under Construction: 1,668

Pipeline Miles Planned: 15,016

Total: 16,684 (2022 expectation: Decline of 1%)

African nations have continued their pursuit of an ambitious array of oil export pipelines and largely domestic natural gas pipelines for electricity generation, LNG production and other uses, but some of those projects were facing greater funding challenges during 2021 as Chinese lending has softened and environmental pressures on institutional sources continue to mount.

In Nigeria, a spokesperson for state oil company NNPC said negotiations were ongoing in 2021 with the Chinese lenders to cover \$1.8 billion in project costs so it can continue construction of the 614-km (384-mile) Ajaokuta-Kaduna-Kano (AKK) pipeline.

Nigeria began building the AKK pipeline in June 2020 to help generate 3.6 gigawatts of electric power and support gas-based industries along its route. The project was to be funded under a debt-equity financing model, backed by sovereign guarantee and repaid

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NNPC awarded engineering and construction work along three sections of the pipeline to Oando, OilServe, China First Highway Engineering Company, Brentex Petroleum Services and China Petroleum Pipeline Bureau.

Chinese lenders had originally been lined up to fund the bulk of the estimated \$2.5 billion to \$2.8 billion cost of the project, which is central to President Muhammadu Buhari's plan to develop gas resources and boost development in northern Nigeria.

Nigeria was seeking the funds after Chinese lenders, who had pledged to provide most of the project's financing, did not disburse cash as quickly as expected, sources told Reuters. It was viewed as the latest sign of falling Chinese financial support for African infrastructure projects after years major lending for energy, rail and other projects.

Zimbabwe has signed a \$1.3 billion joint venture agreement with British-based Coven Energy to develop a fuel pipeline from the Mozambican port city of Beira to the capital city Harare, the minister of information said. The pipeline would complement an existing one that also links the two cities and make landlocked Zimbabwe a fuel hub for the southern Africa region.

Construction is expected to take four years. Unlisted Coven Energy will form a 50-50 joint venture company with state-owned National Oil and Infrastructure Company, a government spokesperson said. Zimbabwe has suffered perennial fuel shortages in the past, although supplies are said to have improved in recent months after the government allowed companies to sell the commodity in U.S. dollars.

In Johannesburg, South Africa's Standard Bank said it hired an independent environmental and social advisor to help assess its involvement in Total's East African Crude Oil Pipeline that environmental groups have opposed.

Activists have urged the CEOs of 25 banks not to participate in loans to fund the construction of the \$3.5 billion East Africa Crude Oil Pipeline, arguing in an open letter that the pipeline would threaten local communities, water supplies and biodiversity in Uganda. France's Total and its partner China National Offshore Oil Corporation plan to construct the 896-mile (1,443-km) pipeline to transport oil from Uganda's Lake Albert to neighboring Tanzania for export.

South/Central America & Caribbean

Pipeline Miles Under Construction: 2,789

Pipeline Miles Planned: 13,441

Total: 16,230 (2022 expectation: decline of 1%)

Pipeline construction activity in the South and Central Americas region has been expanding gradually in recent years as energy trade has grown between some nations and governments have acted to encourage investment around major production areas, such as Argentina's Vaca Muerta shale play – home to the world's second-largest shale gas reserves and fourth largest shale oil reserves.

Brazil has been among the most aggressive pursuers of energy expansion in the region, including the introduction of a new law that allows power companies to distribute natural gas for industrial use – an area that used to be under state monopoly. Under the bill, companies interested in building gas pipelines will need a simple authorization rather than a more complex concession contract.

Brazil also is negotiating with Argentina

on the construction of a billion-dollar pipeline from the Vaca Muerta. Brazilian President Jair Bolsonaro told supporters on social media last year that the gas pipeline from Argentina is one of the options his government is looking at to reduce the price of gas in Brazil.

Argentina is proposing an 888-mile (1,430-km) pipeline running from the shale gas reserves in the Neuquen province to the border with Brazil at Uruguaiana and 373 miles (600 km) from there to the city of Porto Alegre, connecting to Southern Brazil's gas distribution network. Project costs have been estimated at \$3.7 billion for Argentina and another \$1.2 billion for the Brazilian section.

The Republic of Panama and Dallas-based Energy Transfer announced that they have signed a Memorandum of Understanding (MOU) to study the feasibility of joint participation in a proposed Trans-Panama Gateway Pipeline project.

The non-binding MOU would expand Energy Transfer's international operations into new markets while providing Panama the opportunity to establish itself as a distribution center of petroleum products to markets globally. The project would include the development, construction and operation of a terminal on the Pacific side of Panama and another on the Atlantic side, connected by a pipeline for the receipt, transportation and export of liquefied petroleum gas (LPG) to international markets.

"Any decisions made by the parties will be based on the outcomes of joint feasibility studies and an economic analysis related to the transportation of LPG in Panama," Energy Transfer said of the proposed project.

Guyana is projected to become one of South America's top oil producers within the next few years, but Exxon Mobil's offshore oil developments also produce natural gas, and the Guyana government plans to build infrastructure to tap this resource for electric power generation.

Guyana's electricity is currently expensive and unreliable, because it is mostly generated by burning imported fuel oil and distributed through an aging transmission system. Bloomberg reported in October that Guyana plans to start work in 2022 on a major gas-fired power plant, which will be constructed with the expectation that a 135-mile (220-km) subsea natural gas pipeline will also be built to supply its feedstock.

Russia & CIS

Pipeline Miles Under Construction: 6,930

Pipeline Miles Planned: 8,018

Total: 14,948 (2022 expectation: Decline of 5.9%)

A longtime political clash over Russia's



Nord Stream 2 natural gas pipeline to Germany heightened in late 2021 as Russian troops amassed on the Ukrainian border, prompting renewed threats of sanctions from Western nations already opposed to the project and a promise from Germany that it will not accept gas from the line if Russia invades.

Against this backdrop, Nord Stream 2 AG said in mid-December that it had finished pre-commissioning activities and started filling its second pipe with natural gas in preparation to bring the system online.

Russia's Gazprom completed construction of the twin pipeline in September, but it has yet to obtain final regulatory approvals from Germany and the European Union amid the troop buildup. Some project opponents have accused Russia of deliberately undersupplying Europe to win approval to begin flows through Nord Stream 2, contributing to gas prices spikes across Europe.

Regardless, Germany's energy regulator, meanwhile, said full certification of the project would not happen before the second half of 2022.

The twin 1,234-km Nord Stream 2 project has a total capacity of 55 Bcm annually, the same as Gazprom's original Nord Stream Pipeline, which lies almost in parallel on the bed of the Baltic Sea. It was originally scheduled to begin flowing gas by the end of 2019. The United States and some European countries have opposed the pipeline over concerns it would deprive Ukraine of transit fees and make the continent more dependent on Russian energy.

Afghanistan's Taliban-appointed government has told Turkmenistan it would ensure the completion and security of the \$10 billion Turkmenistan-Afghanistan-Pakistan-India (TAPI) gas pipeline. Construction commenced in 2018 on the Afghan section of TAPI, and Uzbekistan announced it would join the formerly \$8 billion project. The 1,130-mile (1,818-km) pipeline will deliver gas from Turkmenistan to Pakistan and India.

TAPI reportedly received an investment from Saudi Arabia as it began construction on the difficult Afghan section. Turkmenistan has already built its segment of the pipeline designed to ship 33 Bcm per year. It remains unclear, though, when the remaining length of the pipeline will be built.

Western Europe/EU

Pipeline Miles Under Construction: 3,513

Pipeline Miles Planned: 4,160

Total: 7,673 (2022 expectation: Decline of 8.8%)

Greece and Egypt have agreed to expand

their cooperation on LNG supply and look into the possibility of constructing a subsea gas pipeline between the two countries, the Greek energy ministry said. The two sides signed an MOU in Cairo as a step toward specific agreements between Greek and Egyptian companies, the ministry said in late November.

Greece, which mainly imports gas from Algeria, Azerbaijan, Russia and Turkey, has been looking to diversify its resources and become an energy hub in southeastern Europe. In October, Greece and Egypt agreed on a plan to build an undersea cable linking their electricity grids.

Separately, Greece and Bulgaria last year sought to reduce their reliance on Russian gas with an agreement that will allow Bulgaria to participate in a planned LNG terminal in northeastern Greece.

That project, which has strong support from the United States, is aimed at boosting energy diversification in southeastern Europe, a region largely reliant on Russian natural gas. Under the agreement, Bulgaria's state-controlled Bulgartransgaz will acquire a 20% stake in the Greek company, Gastrade, that is developing the LNG terminal outside the Greek city of Alexandroupolis.

Greece has also joined Cyprus, Israel and Greece with plans for the East Med Pipeline, which would supply east Mediterranean gas to Europe as the continent seeks to diversify its supplies.

Wood announced in October that it has been awarded the consenting and environmental assessment and front-end engineering design (FEED) contracts for Cadent's HyNet North West, a project aimed at unlocking a lower carbon economy for

northwest England and North Wales.

From 2025, the project is slated to produce, store, and distribute hydrogen, as well as capture and store carbon from industry in northwest England and North Wales. It will have the potential to reduce CO2 emissions by 10 tpa by 2030, developers said.

Middle East

Pipeline Miles Under Construction: 4,100

Pipeline Miles Planned: 886

Total: 4,986 (2022 expectation: Decline of 4.3%)

Talks between Iraq and Jordan about an oil pipeline to Jordan's Aqaba port city have reached an "advanced stage," the Iraqi oil ministry said in November, nudging along a project the two countries agreed to back in 2012. The ministry noted that the cost should be brought under \$9 billion for the project to go ahead.

The pipeline would carry crude oil to the Jordan Petroleum Refinery Company's plant in Zarqa to meet Jordan's needs and to the Aqaba Port for export purposes. The first phase of the project would be constructed in Iraq across a 435-mile (700-km) stretch between Rumaila and Haditha.

Egypt's petroleum minister Tarek El-Molla and Israel's energy minister Karen El-Harr have discussed "future plans" for Israeli gas to be liquefied at Egyptian natural gas liquefaction plants for re-export, the ministers said in a previous joint statement in August.

In nearby Iran, President Hassan Rouhani finished construction of a 620-mile (1,000-km) crude oil pipeline from Goreh to Jask in June, noting its strategic value as a secondary export route "whenever the Strait of Hormuz faces danger." About 20 MMbpd of oil passes through the narrow straight, making it vulner-

