WORLDWIDE CONSTRUCTION UPDATE

Chris Smith
Robert Brelsford

Listed are major construction projects by processing and pipeline categories. Contractors, estimated completion date, and added capacity are provided when available.

Construction project abbreviations:

Engr.	Engineer	PE	Procurement engineering
Contr.	Contractor	CS	Construction supervision
Tech.	Technology	PD	Process design
Dsgn.	Design	DD	Detailed design
Constr.	Construction	JV	Joint venture
PM	Project management	Lic.	License
CM	Construction management	FEED	Front-end engineering and design
EPC	Engineering procurement construction		

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Added capacity listed in barrels per day (b/d) unless otherwise specified.

Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
ANGOLA	Quanten Consortium Angola LLC	Soyo, Zaire Province	Grassroots refinery	100	Engineering	2024		Angola's Ministry of Mineral Resources and Petroleum (MIREMPET) in March 2021 awarded the country's previously announced tender for construction of a 100,000-b/d grassroots refinery in Soyo, Zaire Province, to US-based Quanten Consortium Angola LLC. Quanten will design, build, own, and operate the proposed deep-conversion refinery at Soyo, which will play a critical role in Angolan President João Lourenço's program of strengthening the African nation's economy by helping reduce the country's current reliance on expensive refined product imports. The refinery currently is slated for startup in 2024. The US-based Quanten Consortium Angola includes Quanten LLC and Cisco Systems Inc., both of San Jose, Calif., as well as TGT Inc., KBR Inc., American Exploration Co. Inc., all of Houston.
	Sonangol EP	Lobito, Benguela Province	Grassroots refinery	100,000	Engineering		JGC--EPC	In March 2021, Sonangol EP said it is advancing on its long-planned project to build a new refinery in Lobito, Benguela Province. Temporarily suspended in 2016, the project remains under reassessment based on new technical and financial assumptions following completion of an updated economic and financial feasibility study in 2020. Following the revised feasibility study—which considered the possibility of building the Lobito refinery in a single phase or in two phases, with a first-phase capacity of 100,000 b/d and a second-phase capacity of another 100,000-b/d, as well as inclusion of petrochemical production—Sonangol selected its preferred configuration for the future refinery and will soon update FEED for the project, on which JGC Corp. of Japan plans to deliver EPC.
	Sonangol EP	Luanda	New unit	378,000 tpy (gasoline)	Under constr.	2022		In February 2021, Angola confirmed it is continuing construction on a new unit at Sonangol's existing 65,000-b/d Luanda refinery, the country's only. Scheduled for completion in 2022 at a cost of $235 million, the new unidentified unit will increase the refinery's gasoline production to 450,000 tonnes/year from its current 72,000-tpy output rate, saving Angola about $200 million in expenditures on fuel imports.
	Sonangol EP (10%), Gemcorp Capital LLP (90%)	Malembo, Cabinda	Grassroots refinery	30,000	Engineering	2022		In February 2021, the Angolan Parliament voted unanimously to pass legislation authorizing a series of tax and customs incentives to advance construction of greenfield refinery on the Malembo plain, 30 km north of Cabinda, in the country's province of Cabinda. Approval of the incentive package follows the late-2020 final investment decision (FID) by state-owned Sonangol EP (10%) and partner Gemcorp Capital LLP (90%)—a London-based investment management firm—to proceed with the proposed three-phased project, the first $220-million tranche of which will include construction of a 30,000-b/d crude distillation unit, desalinator, kerosine treating unit, and auxiliary infrastructure, as well as a conventional float anchoring system, pipelines, and a more than 1.2-million bbl storage terminal. At an additional estimated cost of $700 million also covered by the FID, Phases 2 and 3 will add another 30,000 b/d of crude processing capacity, as well as units for catalytic reforming, hydrotreating, and catalytic cracking that will transform the site into a full-conversion refinery. Still on schedule for startup in first-quarter 2022, Phase 1 of the Cabinda refinery will be followed by commissioning of Phases 2 and 3 in second-quarter 2023 and second-quarter 2024, respectively.

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ARGENTINA	Raízen Argentina SA	Dock Sud, Avellaneda County, Buenos Aires Province	FCC gasoline hydrodesulfurization unit	10,200 b/sd	Engineering	2023	Axens--TL, equip	As part of a June 2021 contract, Axens will deliver a modular 10,200-b/sd FCC gasoline hydrodesulfurization unit outfitted with Prime-G+ process technology that will enable the refinery to upgrade the quality of its gasoline pool production to comply with more stringent Euro 5-quality fuel specifications in Argentina taking effect on Jan. 1, 2024. The new modular FCC gasoline hydrodesulfurization unit is one of several projects included under Raízen Argentina's $715-million investment program to modernize and expand operations at the Buenos Aires refinery during the 2020-23 period that, first announced in October 2020, will include works to increase the refinery's processing capacity, upgrade existing units and processes, as well as improve energy efficiency and environmental practices at the site. Raízen Argentina currently is advancing development of $71-million worth of new units for the refinery under the 2020-23 program, including construction of a new naphtha hydrotreater, diesel hydrotreater, hydrogen production plant, and water treatment plant. The spending program also includes plans for installation of a new crude distillation column at the site.
ARUBA	Government of Aruba; Refineria di Aruba NV (RdA)	San Nicolas	Refinery	235,000	Planning			In July 2020, the Aruban government and its wholly owned Refineria di Aruba NV (RdA) initiated the process to attract a new operator, as well as new investors, for former Valero Energy Corp.'s 235,000-b/d refinery and terminal in San Nicolas, Aruba, following official termination in early 2020 of a previous deal with Citgo Petroleum Corp.'s Citgo Aruba Refinery NV for the refinery's proposed restart. Aruba's Prime Minister Evelyn Wever-Croes and RdA issued a two-tiered request for expression of interest (REOI) inviting experienced and qualified parties interested in reviving the mothballed refinery and its associated assets to respond with required documentation by July 17, the Aruban government told OGJ via e-mail on July 1, 2020. The two REOI processes (REOI 1, REOI 2), which the government and RdA will conduct simultaneously, outline three key requirements by which eligible interested parties must agree to abide regarding the refinery's operations, stipulating that all future activity should be aimed at making a significant contribution to the Aruban economy and labor market; observe local regulations and industry best practices on environment, health, and safety; and observe the Kingdom of the Netherlands foreign affairs policy as well as the economic and trade sanctions maintained by the US Office of Foreign Assets Control. The two-tracked REOI 1 was seeking parties interested in resuming oil processing activity at the site via leasing and operating its existing installations and-or modernizing those installations (Track a); as well as parties interested in advancing additional industrial developments—such as LNG transshipment, petrochemical installations, alternative clean industry initiatives, renewable energies, etc.— at locations still available within the refinery area (Track b). REOI 2, however, invited parties interested in repurposing the aging refinery by replacing existing installations and establishing entirely new industries at the site. The government planned to announce results of this first phase of the refinery restart process by Aug. 14, 2020. Alongside the 235,000-b/d San Nicolas refinery and 3.75 sq m of long lease land, RdA's other assets at the site also include: • A transshipment terminal with a storage capacity of 10.7 million bbl and two tugboats. • 13 million bbl of total storage capacity. • Two reef berths, each with a capacity to handle an ultra large crude carrier. RdA and Citgo's official early-2020 termination of the failed operating agreement followed Citgo's October 2019 return to the Aruban government of rights to seek other interested parties to operate the terminal and refinery after Citgo was forced to halt work on its originally planned $715-million rehabilitation program of the San Nicolas assets due to lack of funds in the wake of US sanctions placed on parent company Petroleos de Venezuela SA earlier in the year.
AUSTRALIA	Darwin Clean Fuels Pty. Ltd. (DCF)	Darwin, Northern Territory	Condensate refinery	60,000-100,000	Engineering		McDermott--Prefeasibility/FEED/EPC	Under the late-October 2019 contract—to be finalized after a final investment decision is reached—McDermott will deliver the feasibility study, technology, FEED, and EPC services for the refinery, which would be equipped with McDermott's proprietary technologies, including alkylation and sulfur recovery. Early phase engineering work is scheduled to begin immediately and be completed by first-quarter 2020.
	ExxonMobil Corp.	Altona,Victoria	Crude distillation	10,000	Planning			Expansion, upgrading program.
	ExxonMobil Corp.	Altona,Victoria	Jet fuel treater	2,000	Under constr.			Expansion to 12,000 b/d from 10,000 b/d.
AZERBAIJAN	State Oil Co. of Azerbaijian Republic	Heydar Aliyev, Baku	PSA unit	30,100	Planning	2021	Honeywell UOP--TL	

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BAHRAIN	Bahrain Petroleum Co.	Sitra	Refinery expansion	93,000		2022	TechnipFMC,Samsung Engineering,Tecnicas Reunidas--EPCCWorley Parsons--PM	Upgrade. $56 million.
	Bahrain Petroleum Co.	Sitra	Diesel hydrotreating		Under const.	2022	Chevron Lummus Global--TL	
	Bahrain Petroleum Co.	Sitra	Delayed coking		Under const.	2022		
	Bahrain Petroleum Co.	Sitra	Vacuum gas oil hydrocracking		Under const.	2022	Chevron Lummus Global--TL	
	Bahrain Petroleum Co.	Sitra	Sulfur recovery		Under const.	2022		
	Bahrain Petroleum Co.	Sitra	Residue hydrocracking		Under const.	2022	Chevron Lummus Global--TL	
BANGLADESH	Eastern Refinery Ltd.	Chittagong	Crude distillation	60,247	Engineering		Engineers India--PMC	Expansion
BOLIVIA	Yacimientos Petrolíferos Fiscales Bolivianos (YPFB) Corp.	Santa Cruz de la Sierra	Grassroots renewable diesel plant	9,000	Planning	2024		The government of Bolivia and state-owned Yacimientos Petrolíferos Fiscales Bolivianos (YPFB) Corp. in March 2021 unveiled plans for construction of a grassroots renewable diesel production plant at YPFB subsidiary YPFB Refinación SA's 24,000-b/d Guillermo Elder Bell refinery in Santa Cruz de la Sierra. Part of Bolivian President Luis Arce Catacora's 2020-25 government plan to secure the country's energy security, the proposed plant will process 450,000 tpy of vegetable oils and waste-animal fat feedstocks to produce 9,000 b/d—or 3 million bbl/year—of renewable diesel. Specific feedstocks considered for processing at the proposed $250-million plant include soybeans, totaí, motacú, jatropha, used cooking oils, palm, and pine nuts, among other products, which will be sourced from domestic private companies and business ventures. YPFB said it expected to launch a tender to secure an EPCC partner for the project during third-quarter 2021, with plant startup targeted for fourth-quarter 2024. The operator also confirmed it already has entered confidentiality agreements to explore data and information regarding process technologies for the plant with service providers Axens Group of France, Honeywell UOP LLC, and Haldor Topsoe AS. Alongside contributing to increased energy efficiency and improved environmental performance, YPFB's planned renewable diesel plant at Santa Cruz—which, once completed, will be the first of its kind in South America—will be a definitive step in establishing energy independence for Boliva, which up to now spends more than $1 billion to import diesel into the country. In addition to two crude units with capacities of 18,000 b/d and 6,000 b/d, respectively, YPFB's Santa Cruz refinery hosts two 3,200-b/d catalytic reforming units and a 6,000-b/d light gasoline isomerization unit.
BRAZIL	Petróleo Brasileiro SA	Baixada Fluminense, Rio de Janeiro State	Hydrotreating unit upgrade	4,500 cu m/ day (diesel)	--	2023		In March 2021, Petróleo Brasileiro SA (Petrobras) announced a project involving the revamp of an existing hydrotreater to improve the quality and quantity of low-sulfur diesel production at its 239,000-b/d Duque de Caxias (REDUC) refinery in the Baixada Fluminense area of Brazil's Rio de Janeiro state. Alongside reducing sulfur content of diesel to 10 ppm from 500 ppm to meet domestic and international market specifications, the hydrotreating unit upgrade also will nearly double Diesel S10 (10 ppm sulfur) production at the site to 9,500 cu m/day from its current 5,000 cu m/day output. Scheduled to be completed by second-half 2023 at a proposed investment of 140 million Brazilian real, the unit revamp comes as part of the company's broader strategic objective of producing cleaner, higher-quality, more efficient fuels that have less impact on the environment. Petrobras said it plans to undertake similar unit upgrades in the coming years to expand Diesel S10 production at its 434,000-b/d Refinaria de Paulínia (REPLAN) refinery in Paulínia, São Paulo, and 252,000-b/d Refinaria Henrique Lage (REVAP) refinery in São José dos Campos, São Paulo. While the operator disclosed no further details regarding the REPLAN and REVAP project, the company did confirm implementation of these two projects would increase overall Diesel S10 production up to 16,500 cu m/day.

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BRUNEI	Zhejiang Hengyi Group Co. Ltd. (Hengyi Industries Sdn. Bhd.)	Pulau Muara Besar island	Alkylation	800,000 tpy	Engineering	2023	DuPont Clean Technologies--TL/E/D	In late-August 2020, Zhejiang Hengyi Group Co. Ltd. subsidiary Hengyi Industries Sdn. Bhd. let a contract to DuPont Clean Technologies to license technology for an alkylation unit to be built at Hengyi Industries' 8-million tpy integrated refining and petrochemical complex on Pulau Muara Besar island in Brunei. DuPont Clean Technologies will supply its proprietary technology licensing, engineering services, and equipment for an 800,000-tpy (20,750-b/sd) STRATCO alkylation unit to enable the Pulau Muara Besar refinery to generate low-sulfur, high-octane, low-Reid vapor pressure (RVP) alkylate with zero olefins and zero aromatics for production of gasoline that complies with China 6-quality standards for cleaner fuels. The refinery will use alkylate produced by the new unit to produce fuels for supply to Brunei's domestic market as well as for export abroad. The new STRATCO alkylation unit is scheduled for startup in 2023. Hengyi Industries officially commissioned the Pulau Muara Besar refinery's first $3.45-billion phase in November 2019. A second phase, which includes plans for further expansion of the site's aromatics and cracker plant as well as increasing the refinery's crude processing capacity by 14 million tpy to 22 million tpy, is scheduled for commissioning in 2022. The Pulau Muara Besar refinery is jointly owned by Hengyi (70%) and the government of Brunei (30%).
	Zhejiang Hengyi Group Co. Ltd. (Hengyi Industries Sdn. Bhd.)	Pulau Muara Besar island	Polypropylene	1,000,000 tpy	Engineering		Lummus Technology--TL/E/D	Hengyi Industries Sdn. Bhd. let a contract in late-October 2020 to Lummus Technology LLC's Lummus Novolen Technology GmbH to deliver technology licensing, basic design engineering, training, and technical services for a new 1-million tpy polypropylene unit at its 8-million tpy integrated refining and petrochemical complex on Pulau Muara Besar island in Brunei. A timeframe for the polypropylene unit project was not disclosed. Hengyi Industries officially commissioned the Pulau Muara Besar refinery's first $3.45-billion phase in November 2019. A second phase, which includes plans for further expansion of the site's aromatics and cracker plant as well as increasing the refinery's crude processing capacity by 14 million tpy to 22 million tpy, is scheduled for commissioning in 2022. The Pulau Muara Besar refinery is jointly owned by Hengyi (70%) and the government of Brunei (30%).
BULGARIA	PJSC Lukoil (Lukoil Neftochim Burgas AD)	Balkan peninsula, Burgas, Bulgaria	Polypropylene	280,000 tpy	Engineering		Lummus Technology--TL/D/E	In October 2020, PJSC Lukoil let a contract to Lummus Technology LLC's Lummus Novolen Technology GMBH to provide technology licensing for a grassroots petrochemical unit to be built at subsidiary Lukoil Neftochim Burgas AD's 139,000-b/d integrated refining and petrochemical complex on the Balkan peninsula, about 15 km from Burgas, Bulgaria. As part of the contract, Lummus will license its proprietary Novolen gas-phase polypropylene (PP) technology for a new 280,000-tonnes/year PP unit at the refinery, as well as deliver basic design engineering, training and services, and catalyst supply for the project. Lummus disclosed no details regarding a value of the contract or a timeframe for its work on the proposed project. Award of the contract for the proposed PP unit follows Lukoil's completion of feasibility studies in 2019 for PP production projects at both the Burgas refinery and subsidiary LLC Lukoil Nizhegorodnefteorgsintez's (NNOS) 337,100-b/d Kstovo refinery in central Russia's Nizhny Novgorod region. In September 2020, Lukoil also let a contract to Lummus Novolen Technology to license technology and deliver associated services for NNOS's PP unit. The PP units at Burgas and Kstovo will use a feedstock of propylene produced by the refineries' existing catalytic cracking units, according to Lukoil.
CAMEROON	SONARA	Limbe refinery	Vacuum distillation		Engineering		Amec Foster Wheeler--EPC	
	SONARA	Limbe refinery	Crude distillation		Engineering		Amec Foster Wheeler--EPC	Expansion to 3.5 million tpy.
	SONARA	Limbe refinery	Catalytic reformer		Engineering		Amec Foster Wheeler--EPC	

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Canada	Covenant Energy Ltd.	Saskatchewan	Grassroots hydrogenation-derived renewable diesel (HDRD) and sustainable aviation fuel (SAF) refinery	6,500 b/d	Engineering	2024	Haldor Topsoe AS--TL, equip; Gas Liquids Engineering Ltd.--PM	The proposed HDRD refinery—on which preliminary FEED and feedstock studies, as well as a marketing, demand, and pricing study, have been completed—will process 100% vegetable oil—including Canadian prairie-grown canola oil—into premium renewable diesel to support Canada's goal of carbon neutrality by 2050 under the country's clean-energy diversification strategy. The planned refinery also would produce renewable hydrogen from renewable LPG or naphtha instead of conventional fossil feedstocks. The HDRD refinery—which alongside producing renewable diesel and SAF also would produce arctic-grade renewable diesel—would create demand for a collocated crushing plant at the site equipped to crush 35 million bushels of canola seed to produce the refinery's 325,000-350,000-tpy canola oil feedstock requirement. Covenant Energy said current design of the refinery additionally would enable the operator to invest in doubling the site's production capacity at a later time.
	Kitimat Clean Ltd.	Kitimat, BC	Refinery	400,000	Planning	2024		Proposed bitumen-processing refinery.
	NARL Refining LP	Come-by-Chance, Newf.	Delayed coking		Planning	2023		
	NARL Refining LP	Come-by-Chance, Newf.	Crude flexibility; expansion	30,000	Planning			
	Parkland Fuel Corp.	Burrard Inlet, North Burnaby	Renewables coprocessing expansion	56 million l./ year	Under constr.	2021		In February 2021, Parkland Fuel Corp. said by yearend it would expand coprocessing of Canadian-sourced canola and tallow biofeedstocks with conventional crude oil in 2021 by nearly 125% from 2020 at subsidiary Parkland Refining (B.C.) Ltd.'s 55,000-b/d refinery on Burrard Inlet in North Burnaby, near North Vancouver, BC. Following low-capital investments and work completed during its 2020 turnaround to enable coprocessing of about 44 million l. of canola and tallow biofeedstocks from Canadian sources by yearend, the Burnaby refinery plans to increase coprocessed volumes to 100 million l. during 2021 to deliver customers low-carbon fuel options that include diesel containing up to 15% renewable content. The Burnaby refinery regularly processes light and synthetic Canadian crudes such as Edmonton Par 80% and Syncrude 20% into gasoline, diesel, jet fuel, asphalt, heating fuel, heavy fuel oil, butane, and propane for distribution throughout British Columbia. Parkland Fuel purchased the Burnaby refinery—which was the first in Canada to use existing infrastructure and equipment to coprocess biofeedstocks such as canola oil and oil derived from animal fats (tallow) alongside crude oil to produce low-carbon fuels— and related downstream assets from Chevron Canada Ltd. in 2017.
	Tidewater Midstream and Infrastructure Ltd.	Prince George, BC	Grassroots renewable diesel complex	3,000 b/d	Planning	2023	Haldor Topsoe--TL	In April 2021, Tidewater Midstream and Infrastructure Ltd. let a contract to Haldor Topsoe AS to provide process technology for a proposed renewable diesel and hydrogen complex to be built at the operator's existing 12,000-b/d refinery in Prince George, BC. Topsoe will license its proprietary HydroFlex and H2bridge technologies for the complex, which would include a pretreatment plant to allow Tidewater increased flexibility for processing of various renewable feedstocks. HydroFlex technology would be used to produce 3,000 b/d of renewable diesel from a mix of 100% biomass-based feedstocks, while H2bridge technology would enable the complex to produce renewable hydrogen from renewable LPG or naphtha instead of conventional fossil feedstocks. If approved, the proposed Prince George renewable diesel and hydrogen complex—which could reach startup as early as 2023—will require a total investment of about $225 million, of which Tidewater's net capital contribution would be about $125 million.
Chechnya	OJSC Grozneftegaz	Grozny	Refinery	120,493	Planning		Genoil--TL/Constr.	
Chile	Empresa Nacional del Petroleo (Enap)	Hualpén, Bío Bío	Refinery modernization, upgrades	140-tonnes/ day (wet gas sulfuric acid); 1,600 cu m/day (sour water stripping); 816 cu m/ day (amine recovery plant, MDEA)	Under const.		Técnicas Reunidas--EPC; Haldor Topsoe--TL	In late 2020, Empresa Nacional del Petróleo (Enap) subsidiary Enap Refinerías SA let a contract to Técnicas Reunidas SA to provide EPC services for a series of new processing plants to be installed at Enap Refinerías Bío Bío's (ERBB) 116,000-b/d refinery at Hualpén, in Chile's Bío Bío region. As part of the lump-sum turnkey contract, Técnicas Reunidas will execute EPC services for a wet gas sulfuric acid (WSA) plant, sour water stripping plant (SWS) and an amine recovery plant (MDEA). Técnicas Reunidas's scope of work under the contract includes delivery of engineering, equipment, materials supply, construction, precommissioning, commissioning, run tests and startup of the 140-tonnes/day WSA Plant plant equipped with technology licensing by Haldor Topsoe AS, the 1,600-cu m/day SWS Plant, and the 816-cu m/ day MDEA plant. Valued at about $100 million, the lumpsum turnkey contract—the largest project awarded by ENAP in the last 3 years—has a duration of 27 months. The project comes as part of Enap's investment program to fulfill environmental regulations required by Chilean authorities to develop eco-friendly processes in the country's refining sector.

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	Empresa Nacional del Petróleo (Enap)	Concón, Valparaíso	Wet gas scrubber		Engineering		DuPont Clean Technologies--TL	In January 2021, state-owned Empresa Nacional del Petróleo (Enap) subsidiary Enap Refinerías SA let a contract to DuPont Clean Technologies to provide technology licensing for a new unit aimed at reducing and controlling atmospheric emissions from the operator's 104,000-b/d Aconcagua refinery in Concón, in Chile's Valparaíso region. DuPont Clean Technologies will deliver technology licensing and equipment for its proprietary BELCO wet scrubbing system to improve emissions control from the refinery's 31,449-b/sd FCCU. While DuPont did not disclose a timeline for commissioning, the service provider did confirm that, once in operation, the new BELCO wet scrubber will reduce sulfur oxide (SOx) and particulate emissions from the FCCU to well below Chilean emissions requirements. The contract for the Aconcagua refinery follows Enap's earlier award to DuPont Clean Technologies for a BELCO wet scrubber for the FCCU at Enap Refinerías' 116,000-b/d Bío Bío refinery at Hualpén, in Chile's Bío Bío region. The wet gas scrubbers at Enap's Aconcagua and Bío Bío refineries come as part of the operator's program to fulfill several short and long-term commitments to Chilean legal and regulatory authorities under which Enap pledges to invest in projects and initiatives intended to reduce impacts of its refining operations on the surrounding areas.
CHINA	Chemical (Lianyungang) Co. Ltd.	Lianyungang City, Jiangsu Province	HyK Distillates Hydrocracking Unit	69,283	Engineering		Axens--TL	Based on Axens' HyK distillates hydrocracking technology.
	Datong Coal Mine Group Co. Ltd.	Datong, China	Grassroots Polypropylene unit	430,000 tpy	Planning	2022		As part of the contract, Grace will license its proprietary UNIPOL PP process technology as well as its CONSISTA catalyst for the 430,000-tonne/year unit, which will enable the operator to produce more than 200 resin grades to provide more PP options to its customers, the service provider said.
	North Huajin Refining and Petrochemical Co. Ltd.	Liaodong Bay New Area, Panjin, Liaoning Province	Grassroots integrated refining, petrochemical complex	37,000 b/d (kerosine-diesel hydrotreater)	Under constr.	2023	Refining Technology Solutions--TL	In June 2021, North Huajin Refining and Petrochemical Co. Ltd. (North Huajin) has let contracts to Refining Technology Solutions LLC (RTS)—a subsidiary of DuPont Clean Technologies—to deliver licensing, basic engineering, and technical services for a 37,000-b/d combined kerosine-diesel hydrotreater (KDHT) that will be installed as part of the operator's proposed grassroots integrated refining and petrochemical complex in Liaodong Bay New Area, Panjin, Liaoning Province, China. The unit will help produce fuels complying with Jet 3 fuel and China VI diesel standards. Scheduled for startup by yearend 2023, the IsoTherming KDHT unit also will enable North Huajin's refinery reduce its energy requirements and minimize carbon dioxide emissions from the site in line with China's goal to become carbon neutral by 2060. The new KDHT comes under North Huajin's fine chemicals and raw materials project at the planned greenfield complex, which forms a key part of the broader revitalization of northeast China's rustbelt region. Further details regarding the proposed integrated complex were not disclosed, and no official information on the project—including a website for North Huajin—was discoverable online.
	PetroChina Co. Ltd. (Dalian Petrochemical Co.)	Dalian, Liaoning province	Alkylation unit		Under const.		McDermott--TL/E/D	CDAlky units to ensure gasoline-diesel production complies with with China 6-quality specifications capping sulfur content at maximum of 10 ppm starting in 2020.
	PetroChina Co. Ltd. (Jinzhou Petrochemical Co.)	Jinzhou, Liaoning province	Alkylation unit		--		McDermott--TL/E/D	CDAlky units to ensure gasoline-diesel production complies with with China 6-quality specifications capping sulfur content at maximum of 10 ppm starting in 2020.
	PetroChina Co. Ltd. (Urumqi Petrochemical Co.)	Urumqi, Xinjiang Uygar Autonomous Region	Alkylation unit		--		McDermott--TL/E/D	CDAlky units to ensure gasoline-diesel production complies with with China 6-quality specifications capping sulfur content at maximum of 10 ppm starting in 2020.
	PetroChina Guangdong Petrochemical Co. Ltd. (China National Petroleum Corp.'s PetroChina Co. Ltd.)	Jieyang Nandahai Petrochemical Industrial Zone, Guangdong Province	CCR platforming	120,500	Under const.	2023	Honeywell UOP--TL	Part of a refining-chemical integration project under way at PetroChina Guangdong Petrochemical's 400,000-b/d heavy crude oil processing and petrochemical site in the Jieyang Nandahai Petrochemical Industrial Zone of China's Guangdong province.
	PetroChina Guangdong Petrochemical Co. Ltd. (China National Petroleum Corp.'s PetroChina Co. Ltd.)	Jieyang Nandahai Petrochemical Industrial Zone, Guangdong Province	Hydrocracking	74,300	Under const.	2023	Honeywell UOP--TL	Part of a refining-chemical integration project under way at PetroChina Guangdong Petrochemical's 400,000-b/d heavy crude oil processing and petrochemical site in the Jieyang Nandahai Petrochemical Industrial Zone of China's Guangdong province.
	Saudi Aramco, China North Industries Group Corp., Panjin Sincen	Liaoning Province	Grassroots refining and petrochemical complex	300,000	Planning	2024		

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	Shandong Yulong Petrochemical Co. Ltd.		Grassroots integrated refining-petrochemicals complex	20 million tpy	Under constr.	0	Honeywell UOP--TL	In February 2021, Shandong Yulong Petrochemical Co. Ltd.—a joint venture of China's Nanshan Holdings Co. Ltd. (71%), Wanhua Chemical Group Co. Ltd. (20%), and Shandong Development & Investment Holding Group Co. Ltd. (9%)— let a contract to Honeywell International Inc. subsidiary UOP LLC to provide a suite of technologies for new units at the aromatics complex of Shandong Yulong's grassroots 20-million tpy integrated refining and petrochemical complex under construction as part of the first phase of the Yulong Island Refining and Chemical Integrating Project at Yulong Petrochemical Industrial Park, Yantai City, Shandong Province, China. Alongside technology licensing for a range of its proprietary advanced platforming and aromatics technologies, UOP's scope of delivery under the contract also includes engineering design, key equipment, catalysts, and adsorbents, as well as operator training and technical services for startup and continuing operations. Specific technologies and units UOP will provide under the contract include: • A UOP Unionfining naphtha hydrotreating unit and UOP CCR Platforming technology to convert naphtha into high-octane gasoline and aromatics for production of multiple synthetic materials. • UOP Olefin Removal Process (ORP) and UOP Sulfolane technology for aromatics extraction. • UOP Isomar isomerization technology. • UOP Tatoray technology for toluene disproportionation. Once completed, Shandong Yulong's complex aims to produce 3 million tpy of mixed aromatics. This latest contract for the nearly 127.4-billion yuan Yulong Island Refining and Chemical Integrating Project (Phase 1) follows Shandong Yulong's previous award to Lummus Technology LLC to deliver technology licensing to be implemented at the complex's two mixed-feed crackers, an ethylbenzene-styrene monomer (EB-SM) plant, and two polypropylene (PP) plants as follows: • The mixed-feed crackers of the complex's two ethylene plants—each with a capacity of 1.5 million tpy—will use Lummus's highly selective Short Residence Time (SRT) VII cracking heaters. • The 500,000-tpy EB-SM plant will be equipped with Lummus-UOP's EBOne and CLASSIC SM technologies. • The two 400,000-tpy PP lines will use Lummus Novolen Technology GMBH's proprietary Novolen gas-phase PP technology. Official project documents from China's Ministry of Ecology and Environment (MEE) revealed the Yulong Island complex—which, after gaining formal approval last year, began construction in late-October 2020—will include the following major units and available planned capacities: • One 10-million tpy atmospheric distillation unit. • One 10-million tpy combined atmospheric-vacuum distillation unit. • Two light hydrocarbon recovery units. • One 2.6-million tpy slurry bed residue hydrogenation unit. • One 1.2-million tpy solvent deasphalting unit. • One 100,000-cu m/hr residual oil hydrogen production unit. • Three 2.6-million tpy residual oil hydrotreating units. • One 1.5-million tpy wax oil hydrotreating unit. • One 2-million tpy wax oil hydrocracking unit. • One 500,000-tpy heavy oil, high-pressure hydrogenation unit. • One 3.4-million tpy diesel hydrotreating unit. • One 3.6-million tpy diesel hydrocracking unit. • One 1.4-million tpy kerosene hydrogenation unit. • One grassroots hydrogen centralized supply station. • One 4-million tpy catalytic cracking unit. • One 1.6-million tpy gas fractionation unit. • One 1-million tpy pyrolysis gasoline hydrogenation unit. • One 800,000-tpy aromatic extraction unit. • One 3-million tpy catalytic cracking unit. • One 700,000-tpy gas fractionation unit. • One 1.5-million tpy catalytic gasoline adsorption desulfurization (S-Zorb) unit. • Two 2.6-million tpy continuous reforming units. • One 3-million tpy aromatics combined plant. • One 220,000-cu m/hr coal hydrogen production unit. • Four 150,000-tpy sulfur recovery and tail gas treatment units. • One sour water stripping unit. • One solvent regeneration unit. • Two 1.5-million tpy ethylene plants. • Two 85-million tpy pyrolysis gasoline hydrogenation units. • Two 550,000-tpy aromatics extraction units. • Two 220,000-tpy butadiene extraction units. • One 500,000-tpy EB-SM plant. • Two 800,000-tpy ethylene glycol plants. • Two 400,000-tpy PP plants (Lummus Novolen-licensed). • Two 400,000-tpy PP plant (separate from Novolen-licensed units). • One 300,000-tpy PP plant (Japan Polypropylene Corp.-licensed HORIZONE process) • One 200,000-tpy low-density polyethylene-ethylene vinyl acetate LDPE-EVA unit. • One 400,000-tpy LDPE-EVA unit. • One 300,000-tpy high-density polyethylene (HDPE) unit. • Phase 1 of the development is scheduled to begin operation in 2022-23.
	Shenghong Petrochemical Group Co. Ltd.	Lianyungang City, Jiangsu Province	Alkylation	10,987 b/sd	Engineering	2021	DuPont Clean Technologies--TL, Eng., Equip.	The STRATCO alkylation unit will be designed to produce 10,987 b/sd of alkylate product, enabling the complex to generate low-sulfur, high-octane, low-RVP alkylate—with zero olefins—that meets the criteria of upcoming China VI standards which will take effect before start-up of Shenghong's 320,000-b/sd complex in 2021.

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	Shenghong Petrochemical Group Co. Ltd.	Lianyungang City, Jiangsu Province	H-Oil Hydro-cracking Unit	64,263	Engineering		Axens--TL	Based on Axens' ebullated-bed residue hydrocracking technology (H-Oil).
	Shenghong Refining & Chemical (Lianyungang) Co. Ltd. (SRCLC; Shenghong Petrochemical Group Co. Ltd.)	Lianyungang Petrochemical Industrial Base, Xuwei New District, Lianyungang City, Jiangsu Province	Refinery	16,000,000 tpy	Engineering		Honeywell UOP--TL, Eq.; KBR--TL/E/D	In mid-July 2020, Shenghong Refining & Chemical (Lianyungang) Co. Ltd. (SRCLC), a subsidiary of Shenghong Petrochemical Group Co. Ltd., let a contract to KBR Inc. to supply catalyst for a vinyl acetate monomer (VAM) project at its planned 16-million tpy integrated refining complex in Lianyungang City in China's province of Jiangsu. KBR will provide proprietary catalyst for SRCLC's grassroots 300,000-tonnes/year unit, which will include the first commercial application of Showa Denko K.K. (SDK) of Japan's proprietary VAM technology under a licensing agreement between KBR and SDK. The service provider neither disclosed a value of the SRCLC VAM contract nor revealed further details regarding the project. This latest contract for the VAM project follows SRCLC's previous award to KBR to deliver licensing and basic engineering design for the proposed SDK-based VAM unit. While Shenghong Petrochemical has released few details directly regarding SRCLC's proposed integrated complex—including any definitive timeframe for its commissioning, which previously was due for startup in 2019—the Ministry of Ecology and Environment of the People's Republic of China (MEE) provided an overview of the planned development in its "Reply on the Environmental Impact [Assessment] (EIA) Report of Shenghong Refining & Chemical (Lianyungang) Co. Ltd.'s Refining & Chemical Integration Project" issued in December 2018. To be located at Lianyungang Petrochemical Industrial Base in Xuwei New District, Lianyungang City, the proposed integrated complex will process imported crude oil for production of China VI-quality fuels, as well as produce 2.8 million tpy of aromatics and 1.1 million tpy of ethylene. Alongside its combined 16-million tpy atmospheric-vacuum distillation unit, the complex will include the following unit capacities: • Light hydrocarbon recovery, 4 million tpy. • Kerosine hydrogenation, 1.8 million tpy. • Delayed coking, 2 million tpy. • Hydrocracking (Unit 1), 3.5 million tpy. • Hydrocracking (Unit 2), 3.6 million tpy. • Residue hydrogenation, 3.3 million tpy. • Gasoline-diesel hydrogenation, 3 million tpy. • Sulfur recovery, 600,000 tpy. • Continuous reforming (two units), 3.2 million tpy each. • Paraxylene production, 2.8 million tpy. • Ethylene production, 1.1 million tpy. • Acrylonitrile production, 260,000 tpy. • Methyl methacrylate production, 90,000 tpy. • Ethylene vinyl acetate production, 300,000 tpy. Alongside its own integrated gasification combined-cycle power generation plant as well as 27 sets of other unidentified equipment, the complex also will include a terminal port in the Xuwei Port area of Lianyungang Port, which will include a 300,000-tonnes crude oil berth and four 50,000-tonne liquid chemical berths. While MEE lauded the proposed project for its ability to help meet domestic demand for cleaner products, as well as its potential to promote future development of the regional petrochemicals industry, the ministry determined the project's overall scope of construction and operation would negatively impact the region's environmental health. As a result, MEE stipulated the project—to move forward—must strictly implement various ecological environmental protection measures, as well as adopt the most stringent environmental risk prevention measures, environmental management systems, environmental monitoring methods, and emergency measures. Based on a search of information available to the public, Shenghong Petrochemical has yet to disclose a formal reply or revision of the project's EIA in response to MEE's December pronouncement.
	Sinochem Hongrun Petrochemical Co. Ltd.	Weifang City, Shandong province	Residual upgrading	24,099	Engineering	2020	ExxonMobil Catalysts & Licensing Co.--TL	
	Sinochem Hongrun Petrochemical Co. Ltd.	Weifang City, Shandong Province	Alkylation Unit		Planning		Honeywell UOP--TL	Based on Honeywell UOP-licensed ISOALKY alkylation technology.
	Tianjin Petroleum & Chemical Corp.	Tianjin Binhai New Area, Tianjin	Alkylation unit	7,700	Under constr.		DuPont--TL/E/D	$1.6 billion.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Zhejiang Petroleum & Chemical Co. Ltd. [Zhejiang Petrochemical Co. Ltd. (ZPC)]	Zhoushan, Zhejiang Province	Methylacetylene-propadiene (MAPD), phenylacetylene C3 liquid-phase selective hydrogena-tion; pyrolysis gasoline (Pygas) first and second-stage selective hydrogenation		Under const.	2021	Axens—Catalyst	In late-June 2020, Zhejiang Petroleum & Chemical Co. Ltd., also known as Zhejiang Petrochemical Co. Ltd. (ZPC), let a contract to Axens Group to supply catalysts for units to be built as part of the second phase of its 800,000-b/d integrated refining and petrochemical complex in Zhoushan, Zhejiang Province, China. Axens will deliver catalysts for the methylacetylene and propadiene (MAPD) and phenylacetylene C3 liquid-phase selective hydrogenation units, as well as catalysts for the pyrolysis gasoline (Pygas) first and second-stage selective hydrogenation units of the Zhoushan complex's Phase 2 two-train, 2.8-million tpy ethylene cracker currently under construction. This latest contract follows ZPC's earlier contract award to Axens to supply catalysts for Pygas selective hydrogenation units at the grassroots 1.4-million tpy ethylene plant built as part of the complex's Phase 1 development. First commissioned in late 2019, the Phase 1 petrochemical plant quickly began producing olefins and aromatics to targeted specifications, Axens said in May 2020. The first 400,000-b/d phase of ZPC's complex was commis-sioned in late 2018, while Phase 2—which will nearly double processing and production capabili-ties at the site—is scheduled for commissioning during first-quarter 2021. ZPC—a joint venture of China-based Rongsheng Holding Group Co. Ltd. 51%, Juhua Investment Co. Ltd. 20%, Tongkun Investment Co. Ltd. 20%, and Zhoushan Marine Comprehensive Development and Investment Co. Ltd. 9%—previously said it would invest about 160 billion yuan to complete both phases of the project. In late 2018, Saudi Aramco also signed a memorandum of understanding with ZPC to acquire ownership interest in the complex (OGJ Online, Oct. 26, 2018). As part of the agreement, Aramco agreed to purchase the government of Zhoushan's 9% interest in the project, as well as provide long-term crude supplies to the complex.
	Zhejiang Petroleum & Chemical Co. Ltd. [Zhejiang Petrochemical Co. Ltd. (ZPC)]	Zhoushan, Zhejiang Province	Diesel hydro-cracker (1)		Under constr.	2021	McDermott--TL/E/D	
	Zhejiang Petroleum & Chemical Co. Ltd. [Zhejiang Petrochemical Co. Ltd. (ZPC)]	Zhoushan, Zhejiang Province	Paraxylene unit	80,329	Under constr.	2021	Honeywell UOP,HPS--TL/E/D	UOP's LD Parex process, including Sulofane, Isomar, and Tatoray technologies.
	Zhejiang Petroleum & Chemical Co. Ltd. [Zhejiang Petrochemical Co. Ltd. (ZPC)]	Zhoushan, Zhejiang Province	PDH unit	12,049	Under constr.	2021	Honeywell UOP,HPS--TL/E/D	UOP's Oleflex process.
	Zhejiang Petroleum & Chemical Co. Ltd. [Zhejiang Petrochemical Co. Ltd. (ZPC)]	Zhoushan, Zhejiang Province	Diphenyl carbon-ate unit	4,418	Under constr.	2021	McDermott--TL/E/D	
	Zhejiang Petroleum & Chemical Co. Ltd. [Zhejiang Petrochemical Co. Ltd. (ZPC)]	Zhoushan, Zhejiang Province	Hydrocracker		Under constr.	2021	Honeywell UOP,HPS--TL/E/D	UOP's Unicracking process.
	Zhejiang Petroleum & Chemical Co. Ltd. [Zhejiang Petrochemical Co. Ltd. (ZPC)]	Zhoushan, Zhejiang Province	PSA unit (1)		Under constr.	2021	Honeywell UOP,HPS--TL/E/D	UOP's modular Polybed PSA unit.
	Zhejiang Petroleum & Chemical Co. Ltd. [Zhejiang Petrochemical Co. Ltd. (ZPC)]	Zhoushan, Zhejiang Province	Continuous catalytic re-former (2)		Under constr.	2021	Honeywell UOP,HPS--TL/E/D	UOP's CCR Platforming process.
	Zhejiang Petroleum & Chemical Co. Ltd. [Zhejiang Petrochemical Co. Ltd. (ZPC)]	Zhoushan, Zhejiang Province	Alkylation unit		Under const.	2021	McDermott--TL/E/D	
	Zhejiang Petroleum & Chemical Co. Ltd. [Zhejiang Petrochemical Co. Ltd. (ZPC)]	Zhoushan, Zhejiang Province	PSA unit (4)		Under const.	2021	Honeywell UOP,HPS--TL/E/D	UOP's modular Polybed PSA unit.
	Zhejiang Petroleum & Chemical Co. Ltd. [Zhejiang Petrochemical Co. Ltd. (ZPC)]	Zhoushan, Zhejiang Province	Continuous catalytic re-former (1)		Under constr.	2021	Honeywell UOP,HPS--TL/E/D	UOP's CCR Platforming process.
	Zhejiang Petroleum & Chemical Co. Ltd. [Zhejiang Petrochemical Co. Ltd. (ZPC)]	Zhoushan, Zhejiang Province	Sulfuric acid regeneration unit		Under constr.	2021	DuPont--TL/E/D	
	Zhejiang Petroleum & Chemical Co. Ltd. [Zhejiang Petrochemical Co. Ltd. (ZPC)]	Zhoushan, Zhejiang Province	Diesel hydro-cracker (2)		Under const.	2021	McDermott--TL/E/D	
	Zhejiang Petroleum & Chemical Co. Ltd. [Zhejiang Petrochemical Co. Ltd. (ZPC)]	Zhoushan, Zhejiang Province	PSA unit (3)		Under const.	2021	Honeywell UOP,HPS--TL/E/D	UOP's modular Polybed PSA unit.
	Zhejiang Petroleum & Chemical Co. Ltd. [Zhejiang Petrochemical Co. Ltd. (ZPC)]	Zhoushan, Zhejiang Province	RFCC	100,411	Under const.	2021	Honeywell UOP,HPS--TL/E/D	UOP's RCD Unionfining and RFCC processes.
	Zhejiang Petroleum & Chemical Co. Ltd. [Zhejiang Petrochemical Co. Ltd. (ZPC)]	Zhoushan, Zhejiang Province	PSA unit (2)		Under const.	2021	Honeywell UOP,HPS--TL/E/D	UOP's modular Polybed PSA unit.
	Zhejiang Petroleum & Chemical Co. Ltd. [Zhejiang Petrochemical Co. Ltd. (ZPC)]	Zhoushan, Zhejiang Province	Naphtha hydrotreater		Under const.	2021	Honeywell UOP,HPS--TL/E/D	UOP's Unionfining process.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
COLOMBIA	Ecopetrol SA	Barrancabermeja, Santander	Refinery modernization		Under constr.	0		Ecopetrol SA in February 2021 said it would invest nearly $780 million during the next 2 years on a series of projects aimed at ensuring operational and environmental sustainability of its 250,000-b/d Barrancabermeja refinery in Santander, Colombia. The proposed $777-million investment will cover works focused on conserving water, reducing emissions, and improving quality of fuel production at the site as part of Ecopetrol's broader strategy to reduce the refinery's impacts to air, water, and soil, as well as to guarantee its legal compliance with environmental regulations. Initiatives already under way as part of the 2021-23 investment program include a technology upgrade of the refinery's wastewater treatment plant—now 74% completed—as well as an upgrade and expansion of the complex's mild hydrocracking unit that will enable the refinery to reduce sulfur content of its gasoline production to 30 ppm by 2025 and 10 ppm by 2030. Alongside a modernization project to improve reliability of the refinery's water segregation system, the investment program also will include a project at the complex's sulfur plants to control emissions of sulfur oxides (SOx). Development of basic engineering on the SOx-emissions control project is currently under way. Currently processing about 225,000-b/d of crude oil, the Barrancabermeja refinery—which celebrated its 99th anniversary in February—houses 54 processing units, more than 315 storage tanks, and 32 industrial services.
CROATIA	INA Industrija Nafte DD	Rijeka	Modernization		Planning	2023		In December 2019, the operator took FID the more-than $600-million plan to modernize its 90,000-b/d Rijeka refinery as part of an organizational strategy to boost performance and competitiveness of its Croatian refining business. Part of its INA Downstream 2023 New Course program, the proposed investment plan—which intends to help reduce losses of the refining business by ensuring long-term sustainability and profitability of refining and marketing operations—will involve concentration of crude processing activities at the Rijeka refinery and conversion of the company's 44,000-b/d refinery in Sisak into a biorefining and petrochemical production site for bitumen, renewables, and potentially lubricants, as well as equipping it to perform as a modern logistics hub. The proposed 3-year conversion process coincides with the concurrent construction of a heavy residue upgrading plant—or delayed coking unit (DCU)—at the Rijeka refinery, which would include a delayed coker, a coke port, storage installations, as well related pipelines and off sites. The DCU aims to improve the refinery's production structure by increasing its output of more valuable products, such as motor fuels.
	INA Industrija Nafte DD	Rijeka	Delayed coking		Engineering	2023	KT-Kinetics Technology--EPC	KT's scope of work under the December 2019 contract will include execution of engineering and procurement of all equipment and materials, as well as construction and erection work for a new delayed coking unit with coke handling and ship loading, sour water stripper, amine recovery units, and revamping of the existing hydrocracker, sulfur recovery unit, and utilities and off site units. Alongside debottlenecking of existing units and implementation of grassroots ones, the EPC contract also covers work on coke storage and sea jetty construction at the site in a project that will involve more than 60% of the existing refinery.
	INA Industrija Nafte DD	Urinj	Residual upgrading		Planning			$400 million.
CURACAO	Refineria Di Korsou NV	Emmastad	Refinery modernization		Planning			In December 2019, Refineria Di Korsou signed an asset purchase and sale agreement with privately held Klesch Group, under which Klesch will take operational control of RdK's 320,000-b/d Isla refinery at Emmastad, Curacao, as well as an associated utilities plant and the Bullenbay oil terminal. With the APSA now signed, the parties will continue working to meet the agreed conditions, with the aim of signing two remaining agreements by the end of second-quarter 2020 to finalize the deal, under which Klesch has initiated major investments in upgrading refining and other equipment at the sites to improve processing, storage, and environmental performance, and will pay $15 million annually, subject to an inflation rate of up to 2%, to lease the lands on which the assets are located. Refineria Isla Curazao—whose official lease was set to expire on Jan. 1, 2020—will temporarily continue to operate the refining and storage assets until Klesch officially takes over, according to local media reports out of Curacao.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
EGYPT	Amreya Petroleum Refining Co.	Amreya Free Zone	Refinery modernization		Planning			In late-December 2020, the US Trade and Development Agency (USTDA) awarded Egyptian General Petroleum Corp. subsidiaries Amreya Petroleum Refining Co. (APRC) and Suez Oil Processing Co. (SOPC) to fund feasibility studies for proposed modernization and upgrading at each of the operators' existing refineries in northern Egypt. Part of USTDA's ongoing collaboration with Egypt's Ministry of Petroleum & Mineral Resources (MOPMR) to help realize the joint US-Egyptian priority of transforming the country into a leading energy hub, the grants to SOPC and APRC—worth a combined $1.4 million—will fund studies for projects aimed at increasing efficiency and profitability of the two refineries, as well as works designed to reduce environmental impacts at both sites. The feasibility study for APRC's planned modernization at its 4-million tpy refinery in Amreya Free Zone, west of Alexandria on the Mediterranean Sea, will evaluate projects designed to improve overall efficiency and profitability of the site by up to 25% while reducing its greenhouse gas emissions by about 20%. Worth nearly $706,000, USTDA's grant to APRC will provide necessary project studies on energy management systems, as well as works to improve operational performance and increase levels of automation through the refinery, which APRC seeks to increase production capacity between 10-25% from the current 81,000-b/d output. US firms were to submit their proposals to APRC by Mar. 18, 2021.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Assiut Oil Refining Co.	Assiut	Hydrocracking complex	2,500,000 tpy	Under const.	2022	ENPPI-Petrojet--EPCC; TechnipFMC--D/EPC	In November 2020, Assiut National Oil Processing Co. (ANOPC)—established in 2018 by Egyptian General Petroleum Corp. subsidiary Assiut Oil Refining Co. (ASORC)— approved TechnipFMC PLC to advance engineering, procurement, and construction (EPC) services for new units to be installed at ANOPC's proposed 2.5-million tpy grassroots hydrocracking complex in Assiut, Egypt. As part of a more than $1-billion contract, TechnipFMC will deliver EPC on the following major units for the proposed Assiut hydrocracking complex (AHC): • Vacuum distillation unit (VDU). • Diesel hydrocracking unit. • Delayed coking unit. • Distillate hydrotreating unit. • Hydrogen production unit, which will be equipped with TechnipFMC's proprietary steam-reforming technology. The service provider's scope of work under the contract also covers EPC on other unidentified process units, interconnections, off sites, and utilities. This latest EPC contract for the AHC follows ASORC's previous award to TechnipFMC for delivery of front-end engineering and design on the project. Also in July 2020, Egypt's Ministry of Petroleum & Mineral Resources (MOPMR) confirmed signature of contracts for the AHC with TechnipFMC's operating center in Rome, Italy, as well as with the service provider's subcontractors Engineering Co. for Petroleum & Chemical Industries (ENPPI) and Petroleum Projects & Technical Consultation Co. (Petrojet). Egypt's minister of MOPMR Tariq El -Molla said the AHC—the largest of MOPMR's refining projects under implementation in Upper Egypt—is one of Egypt's most important in helping to meet rising domestic demand for petroleum products, as well as in helping to reduce the country's current reliance on and associated costs for foreign product imports. El-Molla also confirmed the AHC now will require a total investment of $2.8 billion to complete, up from MOPMR's most recent estimate of $2.5 billion earlier in the year. As of early 2020, the AHC was scheduled to be completed in 2022. MOPMR and construction partners have yet to disclose any specific details regarding the degree to which, if any, the COVID-19 pandemic may impact the project timeline. In February 2020, ENPPI confirmed ANOPC awarded a contract for the AHC's construction to a consortium of ENPPI and partners Petrojet and TechnipFMC. ENPPI said it was to deliver EPC, precommissioning, commissioning, and startup tests for the complex's VDU, distillate hydrotreating unit, sulfur recovery unit (SRU), and sulfur solidification unit (SSU). ENPPI revealed in its 2018 annual report that it was previously awarded a contract by TechnipFMC under which ENPPI was to act as a subcontractor for early works on the AHC. As part of that subcontracting agreement, ENPPI's scope of work—alongside the VDU, distillate hydrotreating unit, SRU, SSU, as well as on-site and off-site storage areas—was to cover basic engineering, finalization of the licencors' process design package, procurement services for long-lead items, and open-book cost estimates to define the project's overall EPC cost. Once in operation, ANOPC's AHC will process 2.5 million tpy of heavy fuel oil (mazut) from ASORC's nearby 4.5-million tpy Assiut refinery—about 400 km south of Cairo—to produce about 2.8 million tpy of Euro 5-quality diesel and other high-value products, according to MOPMR and Petrojet. Alongside revising AHC's Euro 5-quality diesel production capacity from an earlier estimate of 2.5 million tpy, El-Molla in July 2020 also confirmed the new hydrocracking complex will produce the following: • 400,000 tpy of naphtha. • 100,000 tpy of LPG. • 300,000 tpy of coke. • 66,000 tpy of sulfur. ANOPC—which ASORC established specifically to build and operate the AHC—earlier confirmed Petrojet already had undertaken site preparation works in Assiut for construction of the complex.
	Middle East Oil Refinery Co.	Alexandria	Refinery expansion	60,000	Under constr.	2022	TechnipFMC--EPC	As of January 2020, EGPC's MIDOR was progressing with its project to further expand crude processing capacity of its 115,000-b/d Amreya refinery to 160,000 b/d. As main contractor on the project, TechnipFMC's scope of work includes debottlenecking existing units and delivering new units, including a crude distillation unit (CDU), vacuum distillation unit (VDU), and a hydrogen production plant based on proprietary steam reforming technology, as well as various process units, interconnecting off-sites, and utilities. Scheduled to be completed in first-quarter 2022, the $2.3-billion project will boost the refinery's production of high-octane gasoline by 600,000 tpy, diesel by 1.3 million tpy, LPG by 145,000 tpy, coke by 226,000 tpy, and sulfur by 65,000 tpy.
	Middle East Oil Refinery Co.'s	El Amreya Free Zone	Refinery		Under constr.	2022	TechnipFMC PLC, EPC	

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Ministry of Petroleum & Mineral Resources (MOPMR)	New Al-Alamein City	Grassroots integrated complex	2,500,000 tpy	Planning	2024		Egypt's MOMPR said in January 2020 it is evaluating a project to construct a new integrated refining and petrochemical complex at New Al-Alamein City on Egypt's northwestern coast, near Marsa Matrouh governorate. The complex would have crude and condensate processing capacity of 2.5 million tpy for production of a variety of high-quality fuels and petrochemical products to meet local demand, with any surplus exported via the Al Hamra terminal near the Mediterranean Sea. The $8.5-billion project, if realized, would be completed by yearend 2024 and supplied by Western Desert crude.
	Red Sea Refining and Petrochemical Co.	Suez Canal Economic Zone (SCZone)	Grassroots refining-petrochemicals complex	4,000,000 tpy	Engineering		Bechtel--EPC	State-owned Red Sea Refining and Petrochemical Co. (RSNRPC) said in May 2021 it is moving forward with plans to build a grassroots integrated refining and petrochemicals complex on the Gulf of Suez at the Suez Canal Economic Zone (SCZone) in Ain Sokhna, Suez Province, Egypt, east of Cairo. As part of a contract signed with Main Development Co. (MDC)— the SCZone's main developer—RSNRPC will establish what will become Ain Sokhna's largest refining and petrochemical complex on 3.56 million sq m within the zone's southern sector in line with the Egyptian government's plan to help meet increased demand for transportation fuels and petrochemical products in Egypt's domestic market as well as create opportunity for exports abroad. Requiring an overall investment of $7.5 billion, RSNRPC's proposed Ain Sokhna complex—which will produce polyethylene, polypropylene, polyesters, bunker fuel, and other high-value petroleum and chemical products—is a project under the downstream pillar of Egypt's Ministry of Petroleum & Mineral Resources' (MOPMR) petroleum sector modernization program (PSMP) to help transform Egypt into a strategic hub for global oil and gas trade. In addition to Egypt's domestic market of 92 million people, production from the planned complex theoretically would be able to reach 1.8 billion consumers in Europe, the Asia Pacific, the Middle East, and Africa via the SCZone's multiple port facilities. RSNRPC's project development contract with MDC follows state-owned Egyptian Petrochemicals Holding Co.'s (ECHEM) February 2020 signing of a heads of agreement (HOA) Bechtel Corp. for execution of engineering, procurement, and construction (EPC) on a proposed integrated refining and petrochemicals complex in the SCZone While few details of the proposed complex were revealed at that time, Bechtel confirmed to OGJ in a May 4, 2021 e-mail the ECHEM and RSNRPC projects are one in the same. Project documents from MOPMR dated February 2021 indicate RSNRPC's complex—formerly estimated to cost of $6.2 billion—will process about 4 million tpy of crude oil to produce 2.7 million tpy of petrochemical products and 1.2 million tpy of petroleum products. The complex is scheduled to be completed by yearend 2024.
	Suez Oil Processing Co.	Al Zaytiyat, Suez	Vacuum distillation unit asphalt plant	726,000 tpy	Engineering			Scheduled to break ground in fourth-quarter 2021 is SOPC's $68.5-million project to add a 726,000-tpy VDU asphalt plant, removing lighter fractions from residues of the refinery's existing CDU, and enabling improved processing of heavy-end feedstock fractions from both SOPC's CDU and that of state-owned Nasr Petorleum Co.'s (NPC) nearby Suez refinery. Once completed, SOPC's VDU asphalt plant will produce 396,000 tpy of asphalt and 323,000 tpy of vacuum gas oil. While EBRD referenced the addition of a new main VDU and distillate hydrotreater to be included as part of SOPC's planned coker revamp and VDU asphalt plant projects in a Jan. 29, 2020, prequalification invitation to potential service companies for work on the projects, further details regarding the scope of these units have yet to be made available. The financier, however, did confirm the combined projects would reduce SOPC's greenhouse gas emissions and water demand by 289,000 tpy and 385,000 cu m/year, respectively.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Suez Oil Processing Co.	Al Zaytiyat, Suez	Delayed coking		Engineering			EGPC subsidiary Suez Oil Processing Co. (SOPC) is executing a multitiered energy efficiency and upgrade program to modernize the existing delayed coking complex, replace the existing VDU, add a new distillate hydrotreating unit to replace two existing units, add a grassroots VRU, and build a new asphalt production plant based on a VDU system at its refinery about 3 km west of Suez, at the entrance of the Suez Canal, MOMPR and the European Bank for Reconstruction and Development (EBRD) said in early 2020. As currently planned, the coker complex refurbishment project will involve installation of a new delayed coking unit with all supporting units to replace existing units at the complex, ERBD said. Alongside ensuring more stable production, cutting plant outage periods, and reducing energy demand, the revamp would return the complex to its initial design capacity of 5,000 tonnes/day, ERBD said. The project—which will involve replacing the complex's old six-drum coker design with a modern two-drum unit with key improvements in coke processing, off-gas utilization, and final coke storage—would allow the refinery to maximize production of Euro 5-quality diesel, gasoline, and LPG to meet growing domestic demand. An associated VRU also would be built as part of the project to help reduce hydrocarbon emissions from flaring and improve production yields. At an estimated cost of $589 million, the coker revamp project is scheduled for start of construction in November 2021.
EQUATORIAL GUINEA	Ministry of Mines and Hydrocarbons (MMH)-Marathon Oil Co.	Punta Europa, Malabo	Refinery	5,000	Planning		VFuels Inc.--E/D	Under an April 2020 contract—which is scheduled to be completed within 12 weeks of the contract's signature—VFuels will deliver engineering and design of the proposed 5,000-b/d modular refinery to supply finished products for consumption by Equatorial Guinea's domestic market. The refining project comes as part of MMH's initiative of the Year of Investment 2020, which is seeking investments for a modular refinery and storage tanks in the continental region, as well as promotion of other projects derived from methanol, among others.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
FRANCE	TotalEnergies SE	Grandpuits, Seine-et-Marne; Gargenville, Yvelines	Refinery-to-renewables conversion		Engineering	2024	NextChem SPA--FEED	TotalEnergies SE said in late-September 2020 it is ending crude oil processing activities at its 101,000-b/d Grandpuits refinery at Seine-et-Marne near Melun and operations at nearby Gargenville depot at Yvelines in northern France to convert the site into a zero-crude industrial platform by 2024. As part of an investment totaling more than €500 million, the Grandpuits platform will focus on four new industrial activities, including production of renewable diesel; production of bioplastics; plastics recycling; and operation of two photovoltaic solar power plants. While TotalEnergies discontinued crude oil refining at the site in first-quarter 2021, the company said local consumers and airports in the Greater Paris region will not be impacted, as they will remain supplied by TotalEnergies's existing 219,000-b/d Donges refinery near Saint Nazaire—which is currently undergoing a €450 million modernization—and 253,000-b/d Normandy-Gonfreville 'l Orcher refinery. Alongside forming part of TotalEnergies' overall net-zero strategy to meet carbon neutrality, the decision to cease oil refining at Grandpuits also comes in the wake of a several-month audit of the 260-km Ile-de-France pipeline (PLIF)—which carries crude feedstock from the Port of Le Havre to the refinery—following a February 2019 leak along the line that forced a nearly 6-month shutdown of the Grandpuits refinery. As a result of the leak—which led to a 900-cu m spill of hydrocarbons that polluted just over 4 hectares of soil as well as waterways—PLIF's maximum working pressure was reduced to ensure safe operations, allowing the refinery to operate at only 70% of its capacity and threatening its long-term financial viability. The recent audit found that the refinery's normal operations could be restored only by replacing the PLIF at a cost of nearly €600 million, prompting TotalEnergies's decision to end refining activities at Grandpuits and invest in an industrial transformation of the site to meet France's plans for the energy transition up to 2040. As part of the zero-crude industrial repurposing project at Grandpuits, TotalEnergies is building a new renewable diesel unit aimed at contributing to France's roadmap for incorporating 2% of sustainable aviation fuel by 2025 and 5% by 2030. Scheduled for startup in 2024, the new biorefinery will process 400,000 tonnes/year of primarily animal fats from Europe and used cooking oil—supplemented with other vegetable oils like rapeseed but excluding palm oil—primarily from local suppliers to produce the following: • 170,000 tpy of sustainable aviation fuel. • 120,000 tpy of renewable diesel. • 50,000 tpy of renewable naphtha for production of bioplastics. Production of biofuels—which reduce carbon emissions by at least 50% compared to their fossil equivalents—are one component of TotalEnergies's strategy to meet the challenge of carbon neutrality. A second project involves construction of Europe's first polylactic acid, or polylactide (PLA), manufacturing site. To be built by Total Corbion PLA BV—a 50-50 joint venture of TotalEnergies and Corbion NV—the proposed €200-million plant—to be funded equally by TotalEnergies and Corbion—will produce 100,000 tpy of PLA bioplastic from a feedstock of sugar by 2024. The Granpuits site-conversion project also includes construction of France's first chemical recycling plant. To be developed by TotalEnergies (60%) and partner Plastic Energy Ltd. (40%), the plant will use a pyrolysis melting process to convert plastic wastes into a liquid called TACOIL, which will be used as feedstock for production of polymers with identical properties to virgin polymers suitable for use in food-grade applications. The new recycling plant is intended to help meet TotalEnergies's objective of producing 30% of its polymers from recycled materials by 2030. TotalEnergies's wholly owned affiliate, Total Quadran SAS—which specializes in renewable energy development and production in France—also will build and operate two photovoltaic solar plants, one with capacity of 28 MWp (at the Grandpuits site) and the other with capacity of 24 MWp (at the Gargenville site). TotalEnergies said the two solar plants will contribute to the company's goal of providing green electricity to all its industrial sites in Europe. TotalEnergies previously completed a €275-million conversion of its former 153,000-b/d at La Mède refinery on the French Riviera into France's first biorefinery. Commissioned in mid-2019, the 500,000-tpy biorefinery also includes a logistics and storage platform, a solar energy farm, and a training center.

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GREECE	Motor Oil (Hellas) Corinth Refineries SA (MOH)	Agii Theodori, Corinth	Naphtha complex	22,000	Engineering	2021	TechnipFMC--EPCM	As part of the January 2020 contract, TechnipFMC will deliver EPCM services for the proposed 22,000-b/d naphtha complex, which will include a naphtha hydrotreating unit, a platforming unit, and an isomerization unit. The project also involves upgrading existing but unidentified utilities and offsite units to meet the requirements of the new complex. Once completed, the complex will enable MOH to increase its production of Euro 5-quality gasoline as part of the operator's strategy to expand production of clean fuels. Valued at between $75-250 million, the EPCM contract follows MOH's previous award to TechnipFMC for execution of front-end engineering design on the naphtha complex, which has been completed. On May 29, 2019, privately held MOH's board of directors approved construction of the naphtha treatment complex at total budgeted expenditure of €310 million. The complex is scheduled for completion by yearend 2021.
GUINEA	Brahms Oil Refineries Ltd.	Kamsar	Refinery	12,000	Engineering		SNC-Lavaling Group Inc.--PM/FEED/EPC	Brahms Oil Refineries Ltd. and Africa Finance Corp. (AFC) agreed in December 2019 to codevelop Brahms's refinery and storage project, which will include a 12,000 b/d modular refinery (producing gasoil, kerosene, gasoline, and fuel oil), 76,000 cu m of crude oil storage, 114,200 cu m of refined products storage, and transportation infrastructure. A local company, Societe de Raffinage Guineenne SA, has been established to build the project.
HUNGARY	MOL Group	Duna, Százhalombatta	Hydrogen		Engineering		Frames Group BV--EPC/Eq.; Membrane Technology and Research Inc.--TL	Hungary's MOL Group let a contract to Frames Group BV in mid-September 2020 to supply a new hydrogen recovery and purification system for converting low-purity hydrogen by-product into a high-purity gas stream for subsequent processing at its 8.1-million tpy Duna refinery along the Danube River in Százhalombatta, near Budapest. Frames will deliver its skid-mounted, ready-to-install hydrogen recovery and purification system that—equipped with highly sensitive membrane technology from strategic partner Membrane Technology and Research Inc.—will recover hydrogen from vent recycled gas produced by the refinery's mild hydrocracking unit to improve overall efficiency of hydrogen recovery at the refinery, as well as reduce operations costs at the site. Alongside supply of the system, Frames also will provide site interface engineering and on-site supervision during installation, commissioning, and system startup. The new hydrogen recovery and purification system at the Duna refinery comes as part of MOL Group's ongoing commitment to improving efficiency of its processing operations, which in this case, will allow the Dana refinery reduce the volume of makeup hydrogen it receives from hydrogen plants by maximizing use of hydrogen already produced at the site. The service provider disclosed neither a value of the contract nor a timeframe for startup of the hydrogen recovery system. This latest contract follows MOL Group's previous award to Frames for supply of its proprietary desalters (electrostatic coalescers) to be installed in the Duna refinery's crude distillation unit as part of a new project to enable the site to process a broader range of crudes.

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INDIA	Bharat Petroleum Corp. Ltd.	Kochi, Ambalamugal, Ernakulam district, Kerala	Petcoke gasification	1,200,000 tpy	Planning		Dastur International Inc.; Lummus Technology LLC—Feasibility study	Bharat Petroleum Corp. Ltd. (BPCL) let a contract to Dastur International Inc. and Lummus Technology LLC in July 2020 to jointly execute a feasibility study for a petcoke gasification project at BPCL's 15.5-million tpy Kochi refinery at Ambalamugal, Ernakulam district, in the Indian state of Kerala. Funded by the US Trade and Development Agency as part of its mission to promote development of sustainable infrastructure projects and foster economic growth in partner countries, the feasibility study will evaluate various options to arrive at the most appropriate and economically viable blueprint and technology architecture for the proposed project, which aims to enable the refinery to produce high-value petrochemical products and clean fuels like hydrogen in a cost-competitive and sustainable manner from its delayed coker's more than 1.2-million tpy production of petcoke. As lead contractor, Dastur will execute the project using its teams across the US and India, including Austin, Tex.-based affiliate Dastur Energy, which will provide knowhow and operating frameworks around gasification, carbon engineering, and low-carbon energy models, as well as expertise in the areas of intellectual property, energy engineering, energy supply chains, energy economics, energy policy, low-carbon fuels, and carbon capture used in conception and design of clean-energy systems. Affiliate MN Dastur & Co. also will participate in the project. The feasibility study comes as part of BPCL's strategy to transform its petcoke output into an environmentally friendly feedstock for production of clean-energy products ahead of what are likely soon-to-be increased regulatory restrictions on the refining byproduct. Earlier in 2020, BPCL's Kochi refinery became India's first exporter of very low-sulfur fuel oil that complies with the International Marine Organization's new regulations requiring ships to use marine fuels with a sulfur content below 0.5%. BPCL also is proceeding with a project to build an integrated petrochemical complex at the Kochi refinery that, once completed, will transform the manufacturing site into India's largest public sector unit refinery. Aimed at reducing India's dependence on chemical imports, the integrated refinery expansion complex (IREC) at Kochi will double the site's production of LPG and diesel, as well as enable production of feedstock for petrochemical projects at the plant. The proposed IREC petrochemical complex is scheduled to come on stream sometime during 2023-24.
	Chennai Petroleum Corp. Ltd.	Nagapattinam, Tamilnadu	Refinery	9,000,000 tpy	Engineering		Engineers India --FEED/E/D	In June 2020, Chennai Petroleum Corp. Ltd. (CPCL), a partly owned subsidiary of Indian Oil Corp. Ltd. (IOC), revised its cost estimate and is now seeking to form a joint venture for setting up its previously proposed 9-million tpy Cauvery basin grassroots refinery at Nagapattinam in Tamilnadu, India. CPCL's board of directors recommended a proposal to IOC's board for implementing the planned Cauvery basin refinery project, pending statutory approvals, through a JV at an estimated cost of 289.83 billion rupees (+/-10%). As part of the proposal, CPCL's board also accorded in-principle approval for incorporation of JV structure under which IOC and CPCL each would hold a 25% stake, with the remaining 50% to be held by outside financial, strategic, or public investors. Subject to necessary approvals, CPCL said it would invest up to 25 billion rupees in the project. CPCL's revised plan for moving forward with the proposed refinery follows its previously estimated total project cost of 274.5-274.6 billion rupees (±30%) in 2019 Designed to help meet future energy needs of India's Tamilnadu state, the planned Cauvery Basin project will involve dismantling of CPCL's existing 1-million tpy refinery at the site—which ceased operations on Apr. 1, 2019—for the new construction, according to the latest project documents from CPCL, the government of India, and Engineers India Ltd. (EIL), which completed a detailed feasibility report for the project. The proposed grassroots refinery, if approved, will include the following major units and capacities: • Combined crude-vacuum distillation unit; 9 million tpy. • Naphtha hydrotreating unit; 1.5 million tpy. • Isomerization unit; 570,000 tpy. • CCR unit; 625,000 tpy. • Diesel hydrotreating unit; 5 million tpy. • Vacuum gas oil hydrotreating unit; 3 million tpy. • INDMAX FCC unit; 2.43 million tpy. • INDMAX FCC gasoline hydrotreating (desulfurization) unit; 700,000 tpy. • OCTAMAX unit; 125,000 tpy. • Polypropylene unit; 475,000 tpy. • Delayed coking unit; 2.5 million tpy. • Hydrogen generation unit; 98,000 tpy. • Sulfur recovery unit (SRU) with independent tail-gas treatment unit (TGTU), Train 1; 432 tonnes/day. • SRU with independent TGTU, Train 2; 432 tonnes/day. EIL is currently carrying technology evaluation and process licensor selection for the planned refinery's process units, CPCL said in its latest annual report to investors. A definitive timeframe for the project, however, has yet to be disclosed.

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	HPCL Rajasthan Refinery Ltd.	Barmer, Rajasthan	Delayed coking	48,200	Engineering		Chevron Lummus Global--TL, Eng.	
	HPCL Rajasthan Refinery Ltd.	Barmer, Rajasthan	Refinery	181,000	Under constr.	2022	Engineers India Ltd.--EPC; McDermott--TL, Eng.; ABB Power Products and Systems India Ltd. (Hitachi ABB Power Grids)--Utilities; Chevron Lummus Global--TL/E/D	As part of an Oct. 8, 2020 contract—valued at more than 1-billion rupees—Hitachi ABB Power Grids will supply a 220/66-kv substation with gas-insulated switchgear to assimilate power from the state grid and deliver it smoothly and efficiently to the new refinery to ensure the complex has a reliable power source and avoid potential supply disruptions. This latest contract follows the JV's previous award to Chevron Lummus Global LLC (CLG)—a partnership of Chevron USA Inc. and Lummus Technology LLC—to deliver licensing and extended basic engineering design of a 48,200-b/d delayed coking plant at the complex based on CLG's proprietary delayed coking technology. HRRL also previously let a contract to McDermott for license and basic engineering design of two 420,000-tpy polypropylene units that will use Lummus' proprietary Novolen process reactors and proprietary NHP catalyst to produce a full range of polypropylene products at the new refinery On Aug. 24, 2020, HPCL said engineering and procurement activities for HRRL's greenfield refinery were progressing well, with site grading and construction of the boundary wall, major internal roads, power utility installations, and a water reservoir already completed. Construction of unidentified major process units, utility plants, an approach road, and fabrication of major long lead items also are now under way. Once completed, the refinery—which will take about 4 years to build—will be equipped to produce Bharat Stage 6-grade fuels (equivalent to Euro 6-quality) from a feedstock of both locally produced and Saudi Arabian crudes to meet increased demand for petroleum products in Rajasthan as well as other northern Indian states. During its first 8 years of operation, the refinery will be designed to process 1.5 million tpy of Rajasthan crude from nearby Mangla fields and 7.5 million tpy of imported Arab Mix crude—consisting of Arab Light and Arab Heavy grades—before switching to a full 9 million-tpy feedstock slate of Arab Mix beginning in its ninth year of operation. The complex will include the following nameplate processing capacities: • Crude distillation, 181,000 b/d. • Vacuum distillation, 96,400 b/d. • Naphtha hydrotreating, 36,100 b/d. • Isomerization, 5,200 b/d. • Continuous catalyst regeneration reforming, 6,000 b/d. • Diesel hydrotreating, 82,300 b/d. • Fluid catalytic cracking, 58,200 b/d. • Delayed coking, 48,200 b/d. • Polypropylene (two units), 490,000 tpy each • Butene-1, 59,000 tpy. • Linear low-density/high-density polyethylene (two swing units), 416,000 tpy each. • Vacuum gas oil hydrotreating, 70,300 tpy. • Dual-feed steam cracking, 820,000 tpy. • Low-pressure ethylene recovery, 77,000 tpy. • Benzene recovery, 96,000 tpy. • Pyrolysis gasoline hydrotreating, 11,000 b/d. • BTX fractionation, 11,000 b/d. • FCC gasoline depantanizing, 17,500 b/d. • Gasoline hydrotreating, 10,600 b/d. • FCC C5 Merox, 4,400 b/d. • Saturated LPG Merox, 3,300 b/d. • LPG depropanizing, 3,300 b/d. • Fuel gas treating, 1,425 tonnes/day. • Hydrogen generation, 37,000 tpy • Pressure-swing adsorption, 28,000 tpy. • Sour-water stripping (hydroprocessing), 100 cu m/hr. • Sour-water stripping (nonhydroprocessing), 250 cu m/hr. • Amine regeneration (three units), 480 cu m/hr each. • Sulfur recovery with tail-gas treatment (two units), 199 tonnes/day each.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Indian Oil Corp. Ltd.	Barauni, Begusarai District, Bihar	Refinery expansion	3,000,000 tpy	Engineering	2023	Engineers India Ltd.--EPC; L&T Hydrocarbon Engineering--EPCC; McDermott--TL/E/D	The 148.10 billion-rupee (±10%) project to expand crude processing capacity by 3 million tpy to 9 million tpy as well as add downstream polymer units at the Barauni refinery continues to progress. According to the latest project documents available from IOC, India's Ministry of Environment, Forest, and Climate Change (EFCC), and Envirotech East Pvt. Ltd.—which completed the project's environmental impact assessment study in November 2018—the Barauni capacity expansion will include construction of the new 9 million-tpy AVU to replace the refinery's three existing AVUs, which will be idled. The expansion project also will involve revamps and upgrades to increase capacity of current units at the refinery, including: expanding the refinery's existing 210,000-tpy naphtha hydrotreating (NHDT) and catalytic reforming combined capacity to 300,000 tpy; expanding capacity of the existing 1.4 million-tpy residue fluid catalytic cracking unit to 1.7 million tpy; expanding capacity of the existing 500,000-tpy Coker B to 662,000 tpy. The project also entails installation of major grassroots units, including: two new sulfur recovery units, each with a capacity of 80 tonnes/day; a new 304,000-tpy isomerization unit; a new 360,000-tpy NHDT unit designed to treat naphtha feed moving specifically to the isomerization unit; a new 1.2 million-tpy diesel hydrotreating unit; a new 61,000-tpy hydrogen generation unit; a new 1 million-tpy once-through hydrocracking unit; a new 562,000-tpy propylene recovery unit; a new 200,000-tpy polypropylene (PP) unit; a new 390,000-tpy LPG treatment unit; a new 880,000-tpy naphtha splitting unit; a new 500-tonnes/hr amine recovery unit; a new 220-tonnes/hr sour water stripping unit; a new 6,178-kg/hr flue gas amine treating unit. Designed to help meet growing domestic demand for petroleum products in India, the Barauni crude processing capacity expansion is currently scheduled for commissioning by April 2023.
	Indian Oil Corp. Ltd.	Haldia, Purba Medinipur, West Bengal	Catalytic dewaxing unit	270,000 tpy	Engineering	2023	McDermott--EPCC	As part of a June 2020 contract, McDermott will execute EPCC for a new catalytic dewaxing unit to improve quality and production capacity of lubricant base oils at the operator's 8-million tpy refinery in Haldia. Part of India's commitment to produce cleaner fuels, the Haldia catalytic dewaxing unit—which, once in service, will be the refinery's second—comes as part of IOC's capacity augmentation of its Bharat Stage VI (BS-VI, equivalent to Euro 6) plant to produce low-sulfur fuels and help reduce India's current reliance on imports of lube base oils. will be equipped to produce 100% premium API Group III base oils by processing unconverted oil from an upstream hydrocracking unit at the refinery. The unit also will have the capability to produce API Group II base oils, as well as white oil and transformer oil as specialty products. Granted final environmental clearance to proceed by India's EFCC on Jan. 5, 2021, the catalytic Isodewaxing unit will include construction of new off-site and auxiliary installations, as well as a new piping system to interconnect the grassroots unit to existing units at the refinery.
	Indian Oil Corp. Ltd.	Koyali, Vadadora, Gujarat	Refinery expansion	86,353	Engineering	2025	Amec Foster Wheeler--E/TL; McDermott International Inc.--TL	In late-September 2020, Indian Oil Corp. Ltd. (IOC) pproved the addition of a petrochemical and lube integration component to its previously announced project that will expand crude oil processing capacity of its 13.7-million tpy Koyali refinery at Vadodara in India's western state of Gujarat. The revised 178.25-billion rupee expansion and petrochemical-lube integration project will increase crude processing capacity of the refinery by 4.3 million tpy to 18 million tpy as well as result in proposed production of 500,000 tpy of polypropylene and 235,000 tpy of lube oil base stock at the site. Inclusion of the petrochemical-lube integration component comes as part of IOC's strategy to create a building block for future production of niche chemicals with a potential to increase petrochemical and specialty products integration index on incremental crude throughput to improve margins. Previously due for completion by yearend 2022, and aimed at improving the refinery's energy performance as well as its ability to meet growing regional demand for finished products, the expansion and reconfiguration project also aims to equip the plant with greater flexibility to weather future disruptions in the supply-demand scenario and more closely integrate its production with downstream petrochemical units. IOC—which during the last year completed its Bharat Stage (BS) 4 and BS 6-grade (equivalent to Euro 5 and Euro 6-quality) fuels to enable Gujarat to produce Bharat Stage (BS) 4 and BS 6-grade (equivalent to Euro 5 and Euro 6-quality) fuels in line with the Indian government's Auto Fuel Policy 2025 calling for 100% BS 6-quality fuel production—now plans to fully commission the long-awaited expansion and accompanying BS 6 fuel upgrading projects at the Gujarat refinery during 2024-25.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Indian Oil Corp. Ltd.	Panipat, Haryana	Petrochemicals		Under const.			In July 2020, IOC confirmed work was under way on a 16.36-million rupee petrochemicals project at the 15-million tpy integrated Panipat refining and chemical complex in Haryana, north of New Delhi. The project involves an expansion of the site's existing naphtha cracker to an ethylene production capacity of 947,000-tpy from 800,000 tpy, as well as unidentified revamps to the complex's 325,000-tpy MEG plant and 130,000-tpy butadiene extraction unit.
	Indian Oil Corp. Ltd.	Panipat, Haryana	Refinery expansion	15,000,000 tpy (overall capacity); 560,000 tpy (catalytic dewaxing)	Engineering	2024	Chevron Lummus--TL	Indian Oil Corp. Ltd. (IOC) in April 2021 let a contract to Chevron Lummus Global LLC (CLG) to license a suite of process technologies for the operator's previously announced plan to expand its 15-million tpy integrated Panipat refining and chemical complex in Haryana, India, north of New Delhi. CLG will provide licensing of its proprietary ISOCRACKING, ISODEWAXING, and ISOFINISHING technologies for a new catalytic dewaxing unit designed to produce mainly premium API Group III base oils by processing unconverted oil from an upstream hydrocracking unit. Alongside licensing, CLG's scope of delivery under the contract also includes delivery of basic engineering, proprietary equipment, catalyst, and technical services for the unit, which aims to help reduce India's current dependence on base oil imports. According to a 2018 summary of the project IOC submitted to the Indian government, the new catalytic dewaxing unit will have a nameplate capacity of 560,000 tpy. The contract follows IOC's February 2021 approval of the refinery expansion, which will increase crude processing capacity at the site by 10 million tpy to 25 million tpy. Designed to improve operational flexibility of the refinery to help meet domestic energy demand, the capacity expansion project—which will include installation of a polypropylene unit—would also increase production of petrochemicals and value-added specialty products to elevate margins and derisk IOC's companywide exposure to its conventional fuel business. Budgeted at an estimated cost of 329.46-billion rupees and approved in February 2021, the Panipat capacity expansion is slated for commissioning by September 2024.
	Indian Oil Corp. Ltd.	Paradip, Odisha	Needle coking	56,000 tpy	Planning			In September 2020, Indian Oil Corp. Ltd. (IOC) granted preliminary approval for construction of a grassroots needle coker unit at its 15-million tpy Paradip refinery in Odisha, on India's northeastern coast. IOC's board of directors cleared stage-1 approval for installation of the proposed unit that—to be equipped with IOC research and development group's in-house technology—will have a calcined needle coke (CNC) production capacity of 56,000 tpy. At an estimated cost of 12.680 billion rupees, the planned project will be IOC's first foray into the niche CNC product segment to help India meet its 80,000-100,000-tpy demand, which is currently met via CNC imports.
	Indian Oil Corp. Ltd.	Paradip, Odisha	Monoethylene glycol (MEG); ethylene recovery	MEG, 357,000 tpy; ethylene, 180,000 tpy	Under const.	2021		In late July 2020, IOC confirmed a 56.54-billion rupee ethylene glycol project is under way at the Paradip refinery that involves the addition of a new 357,000-tpy MEG plant as well as a 180,000-tpy ethylene recovery unit (ERU) at the manufacturing site. The MEG plant is due for startup by yearend 2021.
	Indian Oil Corp. Ltd.	Paradip, Odisha	BS-VI fuels		Under const.			In July 2020, IOC confirmed work was under way on a 33.61-billion rupee BS-VI fuels upgradation project approved in May 2019 at the Paradip refinery to enable production of BS-VI HSD (high-speed diesel) and MS. Alongside a revamp of the refinery's existing 5.2-million tpy diesel hydrotreater to expand unit capacity by 20%, the project includes installation of the following new units: a 1.10-million tpy isomerization unit; a 1.15-million tpy Indmax gasoline desulfurization (GDS) unit; two 60,000-tpy hydrogen generation units; and a 300,000-tpy kerosine desulfurization unit.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Indian Oil Corp. Ltd.	Paradip, Odisha	Paraxylene-purified terephthalic acid (PX-PTA)	PX, 800,000 tpy; PTA, 1, 200,000 tpy	Planning	2024	Technip Energies--EPCC (PX plant); Honeywell UOP--TL (PX plant)	In May 2021, Indian Oil Corp. Ltd. (IOC) let a contract to Technip Energies to deliver engineering, procurement, construction, and commissioning (EPCC) for the proposed 800,000-tpy paraxylene (PX) portion of its previously announced integrated PX-purified terephthalic acid (PX-PTA) complex to be built at the operator's 15-million tpy Paradip refinery in Odisha, on India's northeastern coast. The contract followed IOC's April 2021 award to Tecnimont SPA and Tecnimont Private Ltd. of Mumbai to provide EPCC on the PX-PTA complex's PX plant and related offsite installations. Production from the 800,000-tpy PX plant—which will receive its feedstock of reformate from the refinery's existing UOP LLC-licensed continuous catalyst regeneration (CCR) platforming unit—will be used as feedstock for the complex's adjacent 1.2-million tpy PTA plant. The 138.05-billion rupee PX-PTA project—already under implementation and previously scheduled for commissioning by October 2022—comes as part of the company's enhanced focus of further integration of its downstream refining and petrochemical operations to meet India's rising demand for plastics and textiles. Currently slated for startup in 2024, the new PX-PTA complex specifically complements IOC's other petrochemical-related projects at Paradip intended to support the government of Odisha's plan to establish the Paradip Petroleum, Chemicals, & Petrochemical Investment Region (PCPIR). In official project documents filed by IOC with the government of India, the operator said the PX plant will consist of an integrated, UOP-licensed aromatics block that includes the following proprietary units and technologies: • A xylene fractionation unit. • A Sulfolane unit. • A benzene-toluene fractionation unit. • A Tatoray unit. • A Parex unit. • An Isomar unit. The complex's PTA will consist of two sections, the first of which will use a feedstock of PX to produce crude terephthalic acid (CTA). A second section of the plant will then use the CTA to produce high-purity PTA. While IOC has yet to officially confirm specific process technologies to be implemented at the PTA plant, the operator previously said it had selected proprietary technology originally developed and licensed by BP PLC but now owned and licensed by INEOS AG's INEOS Aromatics business as of Jan. 1, 2021.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Numaligarh Refinery Ltd.	Brahmaputra valley, Golaghat district, Assam	Refinery expansion	3,000,000 tpy	Engineering	2024	Engineers India—FEED; Thyssenkrupp--EPCM; Honeywell UOP--TL	Numaligarh Refinery Ltd. (NRL) is progressing with expansion of its 3 million-tpy Numaligarh refinery in the Brahmaputra valley of Assam's Golaghat district, in far-northeastern India. The project will include a new 2-million tpy petrochemical fluidized catalytic cracking (PFCC) unit, LPG treatment and gasoline desulfurization units, as well as motor spirit (MS) blocks equipped with naphtha hydrotreating, continuous catalytic reforming (CCR), and isomerization units. Part of the government of India's Hydrocarbon Vision 2030 initiative to help meet growing demand of petroleum products in northeastern India, NRL's refinery expansion—which will increase overall crude oil processing capacity at Numaligarh by 6 million tpy to 9 million tpy—is scheduled to be completed by 2024. Officially approved by India's Cabinet Committee on Economic Affairs in January 2019, the originally planned 225.94 billion-rupee Numaligarh expansion—which also will include construction of a 180,750-b/d, 1,398-km crude pipeline from Paradip to Numaligarh, as well as a 120,500-b/d, 654-km products pipeline from Numaligarh to Siliguri—subsequently required an additional investment of 41.65 billion rupees to complete for a revised overall project cost of 267.59 billion rupees. According to a February 2020 environmental impact assessment for the refinery's expansion completed by Engineers India Ltd. (EIL), the project—which will involve construction of a new refining unit at the site designed to process imported sour crudes—will add the following major units and capacities at Numaligarh: • Combined crude-vacuum distillation unit (with naphtha stabilizer); 6 million tpy. • Naphtha hydrotreating unit; 1.2 million tpy. • CCR unit; 750,000 tpy. • Naphtha isomerization unit; 500,000 tpy. • PFCC unit; 1.95 million tpy. • FCC gasoline hydrotreating (desulfurization) unit; 580,000 tpy. • Diesel hydrotreating unit; 3.55 million tpy. • Hydrogen generation unit; 95,000 tpy. • Residue upgrading unit (ebulated bed, with vacuum gas oil hydrotreater); 2 million tpy. • LPG treating unit; unavailable. • Fuel gas treating unit; unavailable. • Sour-water stripping unit; unavailable. • Amine regeneration unit; unavailable. • Sulfur recovery unit, tail-gas treatment unit; 230,000 tpy each. The project additionally will involve a revamp of the refinery's existing 300,000-tpy delayed coking unit to increase its processing capacity to 570,000 tpy. The refinery's proposed expansion is one of three major projects on which the company is currently focused, the other two of which include the 130-km Indo-Bangla Friendship Pipeline (IBFPL) for transporting Numaligarh refinery's products from the Siliguri marketing terminal to Bangladesh, as well as India's first 2G bamboo biomass-based biorefinery—under joint execution by Assam Bio-Refinery Pvt. Ltd., a joint venture of NRL (50%) and partners Fortum Corp. of the Netherlands (25%) and Chempolis Ltd. of Findland—that will process 300,000 tpy of dry bamboo (500,000 tpy of green bamboo)—to produce about 49,000 tpy of bioethanol, 11,000 tpy of acetic acid, and 18,000 tpy of furfural alcohol. Ongoing progress on the refinery expansion project follows Bharat Petroleum Corp. Ltd.'s late-March 2021 divestment of most of its 61.65% interest in NRL to a consortium of government-owned Oil India Ltd. (OIL) and EIL, with the remainder of its shares slated for transfer to the government of Assam.
INDONESIA	PT Pertamina (Persero)	Bontang, East Kalimantan	Refinery	300,000	Planning	2025		To be integrated with some type of still-yet-to-be-identified petrochemical operation.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	PT Pertamina (Persero)	Borneo Island, Balikpapan, East Kalimantan, Indonesia	RFCC	90,000	Under constr.	2021	Axens--TL; Hyundai Engineering Co. Ltd.--EPC	In January 2020, Pertamina entered a principle agreement with Mubadala Investment Co. of the United Arab Emirates to further evaluate investment cooperation opportunities in the processing sector, including a potential joint investment to accelerate development of Pertamina's previously announced $3.9-billion Balikpapan Refining Development Master Plan (RDMP) project to upgrade and modernize its 260,000-b/sd Balikpapan refinery. Pertamina estimates the total investment needed for Balikpapan RDMP is about $5.5 billion. Alongside expanding the refinery's crude processing capacity by 100,000 b/sd to 360,000 b/sd, the proposed Balikpapan RDMP also will include construction of units that will equip the refinery to produce fuels meeting Euro 5-quality standards. The Balikpapan RDMP project comes as part of the Pertamina's broader 10-year, $30-billion plan to revitalize and expand operational capability of its Indonesian refineries by doubling existing overall processing capacity to 2 million b/d by 2026 to meet the country's growing demand for cleaner petroleum-derived products and reduce its dependence on foreign imports. Due to be completed in 2021, Balikpapan's RDMP Phase 1—which is to increase the refinery's crude processing capacity to 360,000 b/sd from 260,000 b/sd as well as enable production of fuels that conform to Euro 5-quality specifications—is to be followed by RDMP Phase 2, which will further expand Euro 5 fuel production.
	PT Pertamina (Persero)	Borneo Island, Balikpapan, East Kalimantan, Indonesia	Continuous catalytic reforming	33,000	Under constr.	2021	Honeywell UOP--TL/E/D; Hyundai Engineering Co. Ltd.--EPC	
	PT Pertamina (Persero)	Borneo Island, Balikpapan, East Kalimantan, Indonesia	Unionfining hydrotreater	13,000	Under constr.	2021	Honeywell UOP--TL/E/D; Hyundai Engineering Co. Ltd.--EPC	
	PT Pertamina (Persero)	Borneo Island, Balikpapan, East Kalimantan, Indonesia	Hydrotreating	80,000	Under constr.	2021	Axens--TL; Hyundai Engineering Co. Ltd.--EPC	
	PT Pertamina (Persero)	Borneo Island, Balikpapan, East Kalimantan, Indonesia	Sulfrex LPG SRU		Under constr.	2021	Axens--TL; Hyundai Engineering Co. Ltd.--EPC	
	PT Pertamina (Persero)	Borneo Island, Balikpapan, East Kalimantan, Indonesia	Refinery expansion	100,000 b/sd	Under constr.	2022	Hyundai Engineering Co. Ltd.--EPC	In late-May 2020, Pertamina let a contract to a division of Siemens AG to supply a range of compression and power generation equipment to be installed as part of Pertamina's previously announced $3.9-billion Balikpapan Refining Development Master Plan (RDMP) project to upgrade and modernize its 260,000-b/sd refinery on Borneo Island in Balikpapan, East Kalimantan, Indonesia. Siemens Gas and Power will deliver 17 of its proprietary reciprocating compressors, including eight HHE-VL compressors, two HHE-FB compressors, four HHE-VG compressors, and three HSE compressors. The HHE reciprocating compressors—which feature a heavy-duty, cast iron frame to reduce vibrations transmitted to associated piping, as well as provide maximum stability using internally ribbed walls and integral cross-member bearing saddle supports located between each crank throw—will be used in various refinery processing units and help ensure stabilized plant operation. The scope of delivery also will include a single-stage hot gas expander—which will recover waste heat (i.e., flue gas) from the RFCC reactor to produce about 20 Mw of free power to drive the plant's central air blower—along with a single steam turbine. As part of the order, Siemens Gas and Power also will supply four of its proprietary SGT-800 industrial gas turbines and five SST-600 steam turbines for the Balikpapan refinery's associated power plant. Installation and commissioning of the equipment included in Siemens' scope of delivery under the order are scheduled for 2022. Alongside expanding the refinery's crude processing capacity by 100,000 b/sd to 360,000 b/sd, the Balikpapan RDMP proposed overhaul also will include construction of units that will equip the refinery to produce fuels meeting Euro 5-quality standards, including a new 90,000-b/sd RFCC; 80,000-b/sd middle distillate hydrotreater; LPG sulfur removal unit; and propylene recovery unit. The Balikpapan RDMP project comes as part of the Pertamina's broader 10-year, $30-billion plan to revitalize and expand operational capability of its Indonesian refineries by doubling existing overall processing capacity to 2 million b/d by 2026 to meet the country's growing demand for cleaner petroleum-derived products and reduce its dependence on foreign imports. Earlier in 2020, Pertamina entered a principle agreement with Mubadala Investment Co. of the United Arab Emirates to further evaluate investment cooperation opportunities in the processing sector, including a potential joint investment to accelerate development of the $3.9-billion Balikpapan RDMP project, the first phase of which was previously scheduled for completion in 2021.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	PT Pertamina (Persero)	Cilacap	Hydrotreating	36,000	Engineering	2023	Axens--TL	In its latest 2020 update on its Refining Development Master Plan (RDMP) program, Pertamina said it is currently executing site preparation activities, selecting licensors, and revising basic engineering design on its Cilacap RDMP project, which aims to increase capacity of the refinery to 400,000-b/d from 348,000 b/d as well as improve quality of finished products to Euro 5-quality standards from their present Euro 2-quality specifications. Scheduled to be completed in 2025, the Cilacap RDMP project is slated to be on stream in 2026.
	PT Pertamina (Persero)	Plaju, Palembang, South Sumatra; Cilacap, Central Java	Renewable fuels		Engineering	2025	Honeywell UOP--TL/E	In late-September 2020, Indonesia's state-owned PT Pertamina let a contract to Honeywell UOP LLC to license process technologies for projects aimed at equipping two of its existing domestic refineries to begin production of advanced renewable fuels. UOP will deliver technology licenses, basic engineering, specialty equipment, catalysts, and training for both projects, which include construction of a new biorefinery at Pertamina's 118,000-b/d Plaju refinery in Palembang, South Sumatra, as well as the revamp of its 348,000-b/d Cilacap refinery in Central Java to enable production of biofuels. UOP will license its proprietary UOP Renewable Jet Fuel Process for the proposed Plaju biorefinery, which will process 20,000 b/d of vegetable oils and fats to produce advanced biofuels such as renewable jet fuel, renewable diesel fuel, and green LPG. At the Cilacap refinery, UOP said it will implement its proprietary Ecofining technology as part of a revamping project that will allow the refinery to process 6,000 b/d of vegetable oils and fats to produce unspecified advanced biofuels. The planned renewable-fuels projects at Pertamina's Plaju and Cilacap refineries come as part of Pertamina's strategy to meet the Indonesian government's goals for renewable fuel production using domestic biobased feedstocks, including the requirement that more than 5% of all domestic energy must come from biofuel by 2025. The additional biofuel production capacity to be provided by the Plaju and Cilacap refineries will help to reduce the nation's reliance on imported petroleum products—particularly low-sulfur fuels—while simultaneously supporting the local bioeconomy and rural employment opportunities in agriculture. Despite its recent award for biofuel production projects at Plaju and Cilacap, Pertamina's transition to production of renewable fuels via coprocessing, standalone units, and existing unit conversions has been under way for some time now, both at its Plaju and Cilacap refineries, as well as at its 170,000-b/d Dumai refinery in Riau. In July 2020, the Dumai refinery began 1,000-b/d production of green diesel (D-100) using 100% refined, bleached, and deodorized palm oil (RBDPO) following a pilot program that began at the site in December 2014 and entered official production in December 2018 with gradual injection of varying percentages of RBDPO and help of the Merah Putih catalyst made by the Research & Technology Center of Pertamina and Institut Teknologi Bandung (ITB), Pertamina said in releases dated Aug. 16, 2020 and July 23, 2020. The Plaju refinery's production of D-100—which is mixed with biosolar environmentally friendly fuel (B-20) and vegetable oil, or fatty acid methyl ester (FAME)—is proven to produce higher-quality diesel fuel with a higher cetane number. Production of green gasoline from 20% injection of RBDPO also has been successfully tested at the Plaju and Cilacap refineries in 2019-20, said Nicke Widawati, Pertamina's managing director, adding that—while other companies have processing palm oil into green diesel—Pertamina is the first to accomplish the feat for green gasoline production. Regarding the newly awarded technology licensing contract award to UOP for the proposed Plaju and Cilacap biofuel projects, Widawati said Pertamina's plan is to build a standalone biorefinery at both the existing Plaju and Cilacap refineries. The two new standalone refineries will produce both green diesel and green aviation fuel from 100% vegetable oil, Widawati confirmed. The current UOP contract award for the Cilacap refinery likely covers only the proposed revamp of a single unit at the site. Part of Pertamina's renewables-production-by-conversion-of-existing-equipment schema, the planned project entails modifying an idled unit at Cilacap to enable processing of 100% palm oil into green diesel, Joshua Nababan, Permamina's senior vice-president for business development said in a Mar. 17, 2020, release. The operator has yet to reveal details about the proposed standalone biorefinery at Cilacap. Pertamina, however, also is currently preparing the Cilacap refinery by yearend 2020 to be able to test production of green aviation fuel via coprocessing injection of 3% RBDPO, according to Widawati. Details of that project also have yet to be disclosed. Targeted for completion in 2024, Pertamina's Green Refinery program comes as part of the company's effort to realize Nawacita, which entails maximizing use of all of Indonesia's domestic natural resources—including its abundant palm oil resources—to build national energy security, independence, and sovereignty. Widawati said, in the future, plans to develop green energy not only from palm oil but also from other resources such as algae, wheat, sorghum, and more, in line with expectations that growth of new and renewable energy will exceed that of traditional fossil energy by 2030.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	PT Pertamina Rosneft Pengolahan dan Petrokimia (PJSC Rosneft-Pertamina)	Tuban, East Java	Grassroots integrated refining-petrochemicals complex	300,000	Under constr.	2025	Técnicas Reunidas--EPC; Lummus--TL/E; Chevron Lummus--TL; Grace--TL	In December 2020, PT Pertamina Rosneft Pengolahan dan Petrokimia (PRPP), a joint venture of PJSC Rosneft (45%) and Indonesian state-owned PT Pertamina (55%), let a contract to Lummus Technology LLC and Chevron Lummus Global (CLG) to license process technologies for PRPP's grassroots integrated oil refinery and petrochemical complex in Tuban, East Java, Indonesia. Lummus Technology will provide licensing and basic engineering for the following proprietary technologies: • Ethylene technology, including pyrolysis gasoline hydrogenation, C4 total hydrogenation, and BASF SELOP selective hydrogenation technology. • Ethylbenzene-styrene technology. • CDMtbe methyl tertiary butyl ether production technology technology. CLG's scope of delivery for the project includes licensing and basic engineering for its residue desulfurization technology to help optimize PRPP's production quality, yields, and run-lengths at the complex, as well as reduce the operator's capital investment operating costs at the site. The agreements also cover additional deliveries at later stages of the project, when Lummus Technology will supply its proprietary Short Residence Time (SRT) pyrolysis cracking heaters to help the complex's ethylene cracker achieve maximum yields. CLG will also later provide its proprietary ISOMIX-e reactor internals at the complex. Established in 2016, the PRPP JV is developing an integrated 300,000-b/d refinery and petrochemical complex at Tuban that, once in operation, will produce more than 1 million tpy of ethylene and 1.3 million tpy of aromatic hydrocarbons, including 1.2 million tpy of polypropylene (PP) products, 1.3 million tpy of paraxylene, and 650 of polyethylene. The complex is scheduled to be completed before 2025. PRPP awarded a November 2020 contract to W. R. Grace & Co. to provide licensing and technology of software for the Tuban complex's PP plant. Grace will deliver licensing of its proprietary all-gas-phase UNIPOL PP process technology and provide its CONSISTA catalyst for PRPP's PP plant, which will include two 580,000-tpy lines for a total PP production of 1.116 million tpy. Alongside licensing of UNIPOL PP technology, Grace also will license its UNIPOL PP UNIPPAC Process Control (UUPC) software for the project, the suite of which will enable PRPP to produce a broad range of PP homopolymers, random copolymers, and impact copolymers from a single catalyst.
IRAQ	Iraqi Ministry of Oil (South Refineries Co.)	Basrah	Refinery modernization		Engineering	2025	JGC Group (JGC Holdings Corp.)—EPCC	The Iraqi Ministry of Oil's (MOO) state-run South Refineries Co. in August 2020 let a contract to JGC Group of Japan subsidiary JGC Holdings Corp. to provide engineering, procurement, construction, and commissioning (EPCC) for a series of new units to be built as part of a modernization and upgrading project at the operator's 233,000-b/d refinery in Basrah, about 550 km southeast of the capital of Baghdad. As part of the lump-sum contract, JGC will deliver EPCC services for a new fluid catalytic cracking unit (FCCU), vacuum distillation unit (VCU), and diesel desulfurization unit, among others, that will be installed on land adjacent to the refinery's existing operations. Without identifying other units to be installed as part of the Basrah refinery upgrading project (BRUP), JGC confirmed major units to be installed under the contract will have the following processing capacities: • FCCU; 34,000 b/d. • VDU; 55,000 b/d. • Diesel desulfurization unit; 40,000 b/d. Scheduled to be completed in 2025, the BRUP—which is positioned as spearheading the modernization of Iraq's entire refining sector—will enable the Basrah refinery to increase production of gasoline to 19,000 b/d and diesel to 36,000 b/d, helping Iraq to reduce its reliance on petroleum product imports with domestic supply of fuels meeting global environmental standards. Funding for the BRUP will be procured through Japanese official development assistance loans from the Japan International Cooperation Agency (JICA) and will be the largest-scale reconstruction assistance from Japan since the 2003 Iraq war.
ITALY	ISAB SRL	Priolo, Syracuse Province, Sicily	Diesel hydrotreater revamp		Engineering	2024	DuPont Clean Technologies--TL	ISAB SRL, a subsidiary of PJSC Lukoil of Russia, let a contract to DuPont Clean Technologies in February 2021 for technology licensing on an upgrade of an existing processing unit to enable production of ultralow-sulfur fuel at its 320,000-b/d Priolo refinery in Sicily's eastern province of Syracuse. DuPont Clean Technologies will license its proprietary IsoTherming hydroprocessing technology to revamp the refinery's trickle-bed diesel hydrotreater as part of a project to increase unit capacity to 31,000 b/sd as well as extend catalyst-cycle length. The IsoTherming technology revamp also will allow ISAB the opportunity to process more-difficult cracked feedstock without sacrificing product quality or additional catalyst volume. Startup of ISAB's IsoTherming diesel hydrotreater at Priolo is scheduled to occur by 2024.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
IVORY COAST	Societe Ivoirienne de Raffinage (SIR)	Abidjan	Refinery modernization		Planning			Proposed modernization of the refinery; SIR has secured a €577-million debt financing to enable the project.
JAMAICA	Petrojam Ltd.	Kingston	Vacuum distillation unit		Engineering	2020	Sinohydro Corp. Ltd.--EPC	
	Petrojam Ltd.	Kingston	Tail gas treating		Engineering	2020	Sinohydro Corp. Ltd.--EPC	
	Petrojam Ltd.	Kingston	Wastewater treatment		Engineering	2020	Sinohydro Corp. Ltd.--EPC	
	Petrojam Ltd.	Kingston	Distillate hydrotreater		Engineering	2020	Sinohydro Corp. Ltd.--EPC	
	Petrojam Ltd.	Kingston	Sour water stripper		Engineering	2020	Sinohydro Corp. Ltd.--EPC	
	Petrojam Ltd.	Kingston	Delayed coker		Engineering	2020	Sinohydro Corp. Ltd.--EPC	
	Petrojam Ltd.	Kingston	Continuous catalytic reformer		Engineering	2020	Sinohydro Corp. Ltd.--EPC	
	Petrojam Ltd.	Kingston	Naphtha hydrotreater		Engineering	2020	Sinohydro Corp. Ltd.--EPC	
	Petrojam Ltd.	Kingston	Sulfur recovery unit		Engineering	2020	Sinohydro Corp. Ltd.--EPC	
	Petrojam Ltd.	Kingston	Amine treatment		Engineering	2020	Sinohydro Corp. Ltd.--EPC	
	Petrojam Ltd.	Kingston	Refinery expansion	14,000	Engineering	2020	Sinohydro Corp. Ltd.--EPC	
LIBERIA	Conex Petroleum Group Inc. (Conex Group JV Ltd.)	Monrovia	Refinery	10,000	Under const.	2020	VFuels LLC--EPC	Launched in April 2019, the modular refinery comes as part of the second-phase development of Conex's 55,000-tonnes petroleum storage terminal commissioned in 2016 at Monrovia. A factory acceptance test for the modular refinery was on schedule for March 2020, VFuels said.
LITHUANIA	Orlen Lietuva AB	Mažeikiai	Grassroots alkylation unit	6,000 b/sd	Engineering	2025	DuPont Clean Technologies--TL	PKN Orlen SA subsidiary Orlen Lietuva AB in February 2021 let a contract to DuPont Clean Technologies to provide technology licensing for a grassroots alkylation unit to be built at its 10-million tonnes/year refinery in Mažeikiai, Lithuania. DuPont Clean Technologies will supply alkylation and spent acid regeneration (SAR) technologies, including licensing, engineering, and technical services, for the proprietary STRATCO alkylation and MECS SAR units. The STRATCO alkylation unit will use LPG in the conversion process to produce 6,000 b/sd of alkylate, while the 75-tonnes/day MECS SAR unit will provide the refinery a consistent supply of sulfuric acid to be used as catalyst for the alkylation unit. Intended to help increase the Mažeikiai refinery's complexity, flexibility, and profitability to ensure its long-term competitiveness, the STRATCO alkylation and MECS SAR units—both scheduled for startup in 2025—will enable Orlen Lietuva to generate low-sulfur, high-octane, low-RVP alkylate with zero olefins that meets Euro 6-quality standards. Orlen Lietuva's ongoing modernization program at the Mažeikiai refinery also includes proposed construction of a residue conversion unit under the operator's planned bottom-of-the-barrel (BOTB) improvement project. With contracts for technology licensing, basic design, and procurement already awarded, Orlen Lietuva said it expects to complete the BOTB project in 2023 at an estimated budget of $385.3 million. Parent Orlen said a project to increase distillate yields also is under way at the Mažeikiai refinery. Further details regarding either the BOTB or distillate yields projects have yet to be disclosed.
MALAYSIA	Hengyuan Refining Co. Bhd.	Port Dickson, Negeri Sembilan	Euro 5 gas oil project		Under constr.	2020		The $26.61-million project involves a revamp of the refinery's existing hydrodesulfurization Unit No. 2 to help meet Malaysia's upcoming 10-ppmw Euro 5 gas oil sulfur specification—which takes effect on Sept. 1, 2020—and to reinstate the unit's capacity to 46,180 b/d.
	Hengyuan Refining Co. Bhd.	Port Dickson, Negeri Sembilan	Euro 4M-grade mogas		Under const.	2020		Targeted for completion during first-quarter 2020, the Euro 4M-grade mogas project involves installation of an integrated complex that is designed to desulfurize the full range cat-cracked gasoline produced by the refinery's long-residue catalytic cracking unit (LRCCU) to enable production of gasoline that meets the Euro 4M specification requiring sulfur content to be less than 50 ppmv.
	Hengyuan Refining Co. Bhd.	Port Dickson, Negeri Sembilan	Hydrogen Manufacturing Unit		Under constr.	2020		The $66.4-million development comes as part of a hydrogen generation (H2Gen) project for production of cleaner fuels at the refinery by September 2020.
	Sabah Oil & Gas Development Corp. Sdn. Bhd.	Sipitang Oil & Gas Industrial Park (SOGIP), Sabah, Malaysia	Refinery	70,300	Planning			SOGDC signed a head of agreement with Petroventure Energy Sdn. Bhd. (PESB) in December 2019 for construction of a proposed petroleum oil storage and refinery in SOGIP. As part of the HOA, SOGDC and PESB will explore the possibility of building the oil storage and refinery, which would require a total investment of about $2.3 billion. Further details regarding the proposed storage and refining complex could not be officially confirmed, but local media out of Sabah reported the refinery would have a nameplate crude processing capacity of about 70,300 b/d for production of gasoline and diesel. The storage terminal would have a capacity to house 2 million cu tonnes of oil. The entire project would take about 3-5 years to complete.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
MEXICO	Petróleos Mexicanos (Pemex Transformación Industrial)	Dos Bocas, Port of Dos Bocas, Tabasco	Refinery	340,000	Under const.	2022		The government of Mexico and Pemex Transformación Industrial, the processing arm of Mexico's state-owned Pemex, said in mid-October 2020 they are progressing with development activities for the country's previously announced 340,000-b/d refinery in the Port of Dos Bocas, Tabasco. To date, Phase 1 development of the refinery is now completed, bringing overall completion progress on the general project to 24%, Mexico's President Andrés Manuel López Obrador and Secretary of Energy Rocío Nahle García said. With a budget of 50 billion pesos allocated for this year, Phase 2 of the project—now under way—will include the start of advanced construction works, which will begin on June 2 and be completed in May 2022 for targeted commissioning of the refinery on July 1, 2022. Following commissioning of the 1.65-billion pesos Dos Bocas refinery in 2022 and scheduled completion of the ongoing rehabilitation programs at Pemex's existing six refineries by 2023, Mexico will have a combined capacity to process 1.54 million b/d of its own crude oil production to produce 1.40 million b/d of finished products to help achieve the country's energy independence.
MONGOLIA	Mongol Refinery State Owned LLC (Government of Mongolia)	Altanshiree, Domogovi province	Refinery	30,100	Under constr.	2022	Engineers India Ltd.--FEED/EPC	
MOZAMBIQUE	Empresa Nacional de Hidrocarbonetos EP	TBD	Refinery		Planning			Feasibility study due.
NIGERIA	Azikel Group (Azikel Petroleum Ltd.)	Obunagha-Gbarain, Yenagoa, Bayelsa State	Refinery	12,000 b/sd	Under const.		McDermott—EP/FEED; Honeywell UOP—TL; Ventech Engineering LLC—Constr.; Chemie Tech--EPC	Azikel Group subsidiary Azikel Petroleum Ltd. in March 2021 let a contract to UAE-based Chemie Tech LLC to serve as engineering, procurement, and construction (EPC) contractor for its previously announced 12,000-b/sd hydroskimming modular refinery in Obunagha-Gbarain, Yenagoa, Bayelsa State, Nigeria. As part of the lump-sum turnkey (LSTK) EPC contract, Chemie-Tech's scope of work involves—but is not limited to—overall single-point responsibility for all project management, residual process engineering, detailed engineering, procurement, fabrication, installation, construction, testing, precommissioning, commissioning, and performance-guarantee test run (PGTR) run activities for the refinery. Award of the LSTK EPC contract follows Chemie Tech's completion of front-end engineering design (FEED) of the refinery's outside battery limits (OSBL) areas as well early works on the project. Originally targeted for startup in 2018, the modular refinery's inside battery limits (ISBL) will host units for production of high-quality variants of LPG, gasoline, kerosine, aviation fuel, diesel, and heavy fuel oil. To be built on modules mounted on skids, the modular refinery will be equipped with an unspecified catalytic reforming technology from Honeywell UOP LLC to produce reformate that will be blended to produce a premium motor spirit (PMS; gasoline) with an 89 research octane number clear (RONC). The ISBL will consist of the following processing units: crude distillation unit with debutanizer; naphtha hydrotreater; naphtha splitter; catalytic reformer; diesel hydrotreater, and gasoline stabilizer. The ISBL unit will be equipped to produce the following: • PMS; 8,866 b/sd. • Automotive gas oil (AGO); 1,090 b/sd. • Kerosine-jet fuel; 1,452 b/sd. • Off gas, mixed LPG; 200 b/sd. While the refinery will receive a reliable feedstock of Nigerian Bonny Light crude and condensate via pipeline directly from Royal Dutch Shell PLC's Gbarian-Ubie Shell gas gathering facility at the site's eastern boundary, the operator has yet to confirm a definitive revised timeframe for the project's commissioning.
	BUA Group	Akwa Ibom	Refinery	200,000	Engineering	2024	Axens--TL/E	In May 2021, BUA Group let a contract to KBR Inc. to provide FEED for a new petrochemical unit to be built at subsidiary BUA Refinery's 200,000-b/d grassroots integrated refining and petrochemical complex under development in Nigeria's state of Akwa Ibom. FEED will examine and recommend sustainable technologies for the complex aimed at reducing greenhouse gas emissions to help limit the site's carbon footprint. BUA earlier let contracts to Lummus Novolen Technology GMBH to provide technology licensing for a polypropylene (PP) unit at the complex, as well as to Axens Group for delivery of basic engineering, proprietary equipment, catalysts, adsorbents, as well as training and technical services, for the planned multibillion-dollar RFCC-based complex that—alongside propylene, an essential component for the petrochemical industry used in PP-based plastics and packaging—will produce high-quality gasoline, diesel, and jet fuel meeting Euro 5-quality specifications for the Nigerian and regional markets. Sited in Akwa Ibom to take advantage of the location's proximity to raw feedstocks and export routes to regional countries, BUA Refinery's integrated complex—slated for commissioning in 2024—will help reduce Nigeria's dependence on imported fuels and petrochemicals, as well as reduce the country's costs of shipping its domestic crude production abroad for refining by other operators.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Dangote Group	Lagos, Lekki Free Trade Zone	Refinery	650,000	Under constr.	2022	Engineers India Ltd.--EPC	In July 2020, Nigerian conglomerate Dangote Industries Ltd. (Dangote Group) subsidiary Dangote Oil Refining Co. said it was proceeding with installation of key equipment at its long-planned 650,000-b/d grassroots integrated refining and petrochemical complex now under construction in southwestern Nigeria's Lekki Free Trade Zone. Sulzer Chemtech Ltd.—the sole supplier of column internals, packings, and trays for the project—completed design and supply of internals for all of the refinery's columns, which contractors are now currently installing at the site under guidance of Sulzer's engineers. As a result of multiple rounds of design checks, engineering studies, and discussions with technology licensors, Sulzer Chemtech was able to redesign the internals for what was to be the complex's previously planned 500,000-b/d refinery to suit its revised 650,000-b/d capacity without expanding the equipment footprint. The refinery aims not only help Nigeria meet its own fuel demand and become self-sufficient but also to add Nigeria to the list of top global exporters of gasoline, diesel, aviation jet fuel, as well as other petrochemicals and petroleum-based products, such as polypropylene (PP). Now scheduled to be completed by yearend 2022, Dangote's $12-billion Lekki integrated complex—which will become the world's largest single-train refinery upon commissioning—will include the 650,000-b/d crude distillation unit, a 3.6-million tpy PP plant, a 3-million tpy urea plant, and gas processing installations to accommodate 3 bcfd of natural gas that will be transported through 1,100 km of subsea pipeline to be built by Dangote Group. The refinery will have various processing units containing more than 65 columns and requiring more than 15 static mixers. Major processing installations will include a residue fluid catalytic cracker, mild hydrocracker, alkylation unit, naphtha hydrofining unit, as well as continuous catalytic reforming units for production of gasoline and diesel meeting Euro 5-quality standards and jet fuel adhering to international aviation specifications. The complex will be equipped to produce a combined 33 million tpy of petroleum products, including gasoline, diesel, kerosine, aviation fuel, and other petrochemicals.
	Eko Petrochem & Refining Co. Ltd.	Tomaro Island, Lagos	Refinery	20,000	Planning			Modular refinery.
	Kaduna Refining & Petrochemical Co. Ltd.	Kaduna State	Refinery modernization		Under const.	2022		Nigerian National Petroleum Corp. rehabilitation program.
	Niger Delta Petroleum Resources Ltd.	Rivers State	Refinery	10,000	Engineering			Expansion
	Nigerian National Petroleum Corp.	Assah North Ohaji South Area, Imo State	Refinery	100,000	Planning		KBR--PMC on FEED	New condensate refinery. As part of the December 2019 PMC contract for definition of FEED, KBR will act as co-consultant with NNPC subsidiary National Engineering and Technical Co. Ltd. to deliver technical consultancy services for four greenfield refineries in the ANOH and Western Forcados Areas. Scheduled to be completed over a 6-month period, KBR's specific scope of work includes providing strategic advisory consulting on elimination of condensate from Nigerian oil export streams.
	Nigerian National Petroleum Corp.	Western Forcados Area, Delta State	Refinery	100,000	Planning		KBR--PMC on FEED	New condensate refinery. As part of the December 2019 PMC contract for definition of FEED, KBR will act as co-consultant with NNPC subsidiary National Engineering and Technical Co. Ltd. to deliver technical consultancy services for four greenfield refineries in the ANOH and Western Forcados Areas. Scheduled to be completed over a 6-month period, KBR's specific scope of work includes providing strategic advisory consulting on elimination of condensate from Nigerian oil export streams.

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	Port Harcourt Refining Co. Ltd.	Rivers State	Refinery modernization		Under const.	2024	Tecnimont SPA--EPC	The Nigerian government's Federal Executive Council (FEC) in April 2021 let a contract to a subsidiary of Maire Tecnimont SPA to provide a suite of services for the major rehabilitation of Nigerian National Petroleum Corp. (NNPC) subsidiary Port Harcourt Refining Co. Ltd.'s (PHRC) Port Harcourt refining complex—which includes a 60,000-b/sd hydroskimming refinery and 150,000-b/sd full-conversion refinery—in Rivers state. Tecnimont SPA will deliver engineering, procurement, and construction (EPC) activities for the full rehabilitation project, which aims to restore the complex to a minimum of 90% of its nameplate capacity. Tecnimont will execute the project in phases over 24-32 months, with the final stage to be completed by yearend 2024, or 44 months from the April 2021 award date, according to the service provider. Without disclosing further details regarding specific projects to be carried out during the rehabilitation, Maire Tecnimont confirmed overall value of the EPC contract at about $1.5 billion. The project comes as part of NNPC's efforts to move forward with the presidential mandate to fix the country's federally owned refineries, which will include future works at NNPC subsidiaries Warri Refining & Petrochemcial Co. Ltd.'s 125,000-b/sd refinery in Delta state, and Kaduna Refining & Petrochemical Co. Ltd.'s 110,000-b/sd refinery in Kaduna state. The PHRC rehabilitation contract award follows local Nigerian media reports of FEC's February 2021 approval of the revised modernization plan at Port Harcourt, as well as NNPC's 2020 announcement that it is planning to relinquish control of Nigeria's three state-run refineries following completion of the long-planned program to rehabilitate and optimize processing capacities at the sites.
	PT Intim Perkasa Nigeria Ltd.	Akwa Ibom State	Refinery	10,000	Planning			Modular refinery.
	Sinopec International Petroleum Service Corp. (SIPS),Peiyang Chemical Equipment Co. (PCC),and African Infrastructure Partners	Edo State	Refinery	5,500	Planning			Modular refinery.
	Warri Refining & Petrochemical Co. Ltd.	Delta State	Refinery modernization		Under const.	2022		Nigerian National Petroleum Corp. rehabilitation program.
OMAN	OQ8 (formerly Duqm Refinery & Petrochemical Industries Co. LLC)	Duqm, Al Wusta Governate, Oman	Grassroots refinery	230,000	Under constr.		Galfar Engineering & Contracting SAOG--Site preparation; Saipem SPA,McDermott--EPC Package 3; Petrofac International Ltd.,Samsung Engineering Co. Ltd.--EPC Package 2; Tecnicas Reunidas SA,Daewoo Engineering & Construction Co. Ltd.--EPC Package 1; Amec Foster Wheeler--PM	As of May 2021, the project is 83.4% completed.
PAKISTAN	Falcon Oil PLC	Dera Ismail Khan, Khyber Pakhtunkhawa	Refinery	100,000	Engineering		Guandong Electrical Design Institute--EPC	
	Pakistan Refinery Ltd.	Karachi	Refinery		Planning		Amec Foster Wheeler--D	Upgrade and expansion project.
PHILIPPINES	Petron Corp.	Bataan	Unionfining unit		Engineering		Honeywell UOP--E/D/TL	Upgrading production capacity expansion project.
	Petron Corp.	Bataan	Merox unit		Engineering		Honeywell UOP--E/D/TL	Upgrading production capacity expansion project.
	Petron Corp.	Bataan	CCR Platforming unit		Engineering		Honeywell UOP--E/D/TL	Upgrading production capacity expansion project.
	Petron Corp.	Bataan	Naphtha hydrotreater		Engineering		Honeywell UOP--E/D/TL	Upgrading production capacity expansion project.
	Petron Corp.	Bataan	Condensate fractionation unit		Engineering		Honeywell UOP--E/D/TL	Upgrading production capacity expansion project.
	Petron Corp.	Bataan	Sulfolane unit		Engineering		Honeywell UOP--E/D/TL	Upgrading production capacity expansion project.
	Petron Corp.	Bataan	LPG unit		Engineering		Honeywell UOP--E/D/TL	Upgrading production capacity expansion project.
POLAND	Polski Koncern Naftowy SA (PKN Orlen)	Plock	Phenol	200,000 tpy	Planning		Honeywell UOP--TL/Eq.	As part of the February 2020 contract, UOP will deliver licensing for its proprietary Q-Max and Phenol 3G technologies to enable production of 200,000 tpy of phenol at the Plock site. Alongside technology licensing, UOP said it also will provide both a cumene unit and phenol unit with alpha methyl styrene hydrogenation, as well as basic engineering design services, key equipment, catalysts, adsorbents, and technical services for the new units.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Polski Koncern Naftowy SA (PKN Orlen)	Plock	Visbreaking		Under const.	2022	McDermott-Shell--TL; KTI Poland SA-IDS-BUD SA--EPCC	Polski Koncern Naftowy SA (PKN Orlen) started construction in July 2020 on its previously proposed and recently approved project to add a new visbreaking unit at its 327,300-b/d integrated refining and petrochemical complex in Plock, Poland. The new 1-billion zloty visbreaking unit aims to improve crude feedstock flexibility and efficiency by increasing the yield of light, high-margin products such as gasoline and diesel via in-depth conversion of vacuum residue from the refinery's crude distillation unit. Scheduled to be completed in 30 months, the new visbreaker—which will enable the refinery to increase its yields of fuel from every barrel of oil processed by several percentage points—should be ready for commissioning in December 2022. PKN Orlen did not disclose a capacity of the planned visbreaker, but the operator once again said the unit will be equipped with an unidentified visbreaking technology jointly licensed by Royal Dutch Shell PLC and McDermott International Inc. (formerly CB&I Nederland BV). While OGJ research based on information available from both Shell and McDermott's websites indicates the only historical, jointly licensed visbreaking technology offered by the companies was the Shell Soaker Visbreaking technology, McDermott confirmed to OGJ earlier this year that the visbreaking technology licensing partnership with Shell was terminated in March 2019. PKN Orlen previously let a 750-million zloty turnkey contract for design, procurement, construction, installation, commissioning, and start-up services for the new visbreaker to a consortium of KTI Poland SA and IDS-BUD SA.
QATAR	Qatar Petroleum	Messaieed	Refinery	250,000	Engineering		Axens--E	$60 million. Lump sum contract.
ROMANIA	Rompetrol Rafinare SA	Navodari	Refinery modernization		Planning	2022		In April 2020, the Kazakh-Romanian Energy Investment Fund (FIEKR) approved two new investment projects aimed at creating synergies to production processes at Rompetrol Rafinare Petromidia Navodari refinery. Scheduled to be completed in September 2022 at a cost of $35 million, the first project will involve construction and integration of a new dewaxing plant at Petromidia to enable the refinery to expand production of wintertime diesel fuels as well as increase output of aviation jet fuel. Designed to expand polymer production at Petromidia by more than 30% to help meet regional demand for petrochemicals, the second major project—scheduled for completion in June 2021—involves an $8-million conversion of the refinery's existing high-density polyethylene (HDPE) unit into a polypropylene (PP) plant to increase the site's current PP production of 90,000 tonnes/year to 120,000 tpy by 2022. While FIEKR will fully finance costs of the HDPE-PP unit conversion from its own resources, the fund will only cover about 30% of the new dewaxing plant, with the remaining project balance to be secured from local or international financial sources, according KMG International.
RUSSIA	PJSC Gazprom Neft (JSC Gazpromneft-MNPZ)	Moscow	Grassroots hydrocracking plant		Engineering		DL E&C--E/D/P	PJSC Gazprom Neft subsidiary JSC Gazpromneft-MNPZ in March 2021 let a preliminary contract to DL E&C Co. Ltd. of South Korea and its subsidiary Daelim RUS LLC to deliver a suite of services on construction of a new hydrocracking plant to be built as part of the operator's ongoing modernization and upgrade of its 12-million tpy Moscow. DL E&C will provide engineering design and procurement services, while Daelim RUS will supervise procurement and construction activities for the new unit. The preliminary agreement, which was to convert into a formal contract within 90 days, is valued at 327.1-billion won and will run for 42 months from the date of commencing work on the project. DL E&C—which parent company Daelim Industrial Co. Ltd. spun off Jan. 4, 2021 by dividing out its construction business—disclosed no additional details regarding the proposed hydrocracking plant.
	PJSC Gazprom Neft (JSC Gazpromneft-MNPZ)	Moscow	Phase 3 refinery modernization		Engineering	2025		In fourth-quarter 2020, PJSC Gazprom Neft said subsidiary JSC Gazpromneft-MNPZ ismoving forward with Phase 3 of the modernization program at its 13.1-million tpy Moscow refinery. Phase 3 modernization works will focus on further improving environmental performance and deepening refining capabilities at the site. Between the 2011 start and 2025 completion of GazpromNeft-MNPZ's refinery modernization program, Gazprom Neft's total investment in the Moscow site will reach more than 350 billion rubles. Gazprom Neft has invested more than 200 billion rubles in modernization activities at the Moscow refinery since 2011, with an additional 160 billion rubles due for investment on reconstruction works planned during the program's third phase. Gazprom Neft has yet to confirm specific projects to be included in Phase 3 of the Moscow refinery's modernization program. Overall modernization works at the Moscow refinery had reached 80% by yearend 2020.

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SAUDI ARABIA	Saudi Aramco	Ras Tanura	Continuous catalytic re-former	90,000	Engineering	2021	Tecnicas Reunidas--EPCC	
	Saudi Aramco	Ras Tanura	Naphtha hydrotreater	138,000	Engineering	2021	Tecnicas Reunidas--EPCC	
	Saudi Aramco	Ras Tanura	Isomerization unit	65,000	Engineering	2021	Tecnicas Reunidas--EPCC	
SINGAPORE	Neste Corp.	Singapore	Renewable diesel refinery expansion	1,300,000 tpy	Under constr.	2023		In March 2021, Neste Corp. said it is progressing with its €1.4-billion project to expand production of renewable products at its 1.3-million tpy renewable diesel refinery in Singapore. Currently under way and scheduled to begin commercial operation in 2023, the 1.3-million tpy capacity expansion at Singapore—which includes optionality to produce up to 1 million tpy of SAF at the plant—will bring Neste's total global renewable production capacity to 4.5 million tpy. The project comes as part of Neste's two strategic climate commitments, which include achieving carbon-neutral production by 2035 and reducing customers' greenhouse gas emissions by at least 20 million tpy by 2030.
SOUTH AFRICA	South African Petroleum Refineries (Pty.) Ltd.	Durban	FCC unit upgrade		Engineering		KBR--TL	In April 2021, South African Petroleum Refineries (Pty.) Ltd. (SAPREF), a 50-50 joint venture of Shell Refining SA and BP Southern Africa, let a contract to KBR Inc. to provide technology for an upgrade of the 33,000-b/d FCC unit at its 180,000-b/d refinery in Durban, South Africa. KBR will license its Catalyst Regeneration technology as well as deliver basic engineering, detailed engineering, and proprietary equipment for the FCC regenerator project, which will enable SAPREF to improve the unit's reliability and integrity by optimizing catalyst and air distribution, the service provider said. While SAPREF itself has not revealed details on the proposed FCC regeneration project, BP Southern Africa said on its website it planned to continue investing in upgrading SAPREF to ensure the refinery can meet domestic consumer demands for low-sulfur fuel, according to the company's website.
SPAIN	Repsol SA	Cartagena, Murcia Province	Biofuels production plant	250,000 tpy	Engineering		Axens--TL	In November 2020, Repsol SA let a contract to Axens Group of France to license technology for Spain's first advanced biofuels production plant to be built at the operator's 220,000-b/d Cartagena refinery in the country's southeastern province of Murcia, along the Mediterranean Sea. Axens will provide licensing for its proprietary Vegan technology—which hydrotreats a wide range of lipids for production of low-density, high-cetane renewable diesel as well as renewable, sulfur-free jet fuel—to be implemented in a new hydrotreating unit that will use a feedstock of recycled raw materials to produce 250,000 tpy of hydrobiodiesel, biojet fuel, bionaphtha, and biopropane. First announced in late-October 2020, the €188 million Cartagena renewables investment—which also includes commissioning of a new hydrogen plant—comes as part of Repsol's December 2019 commitment to advancing the energy transition and the company's goal of achieving net-zero emissions by 2050 in accordance with the Paris Agreement.
SWEDEN	Preem AB	Gothenburg	Renewable fuels plant	16,000	Engineering	2024	Haldor Topsoe--TL/E/Eq.	As part of the March 2020 contract, Haldor Topsoe will license its proprietary HydroFlex renewable fuel technology as well as supply basic engineering, proprietary equipment, catalysts, and technical services for the unit to enable the refinery's production of clean, renewable diesel and jet fuel. Scheduled for startup in 2024, the new 16,000-b/d unit—which will be completely dedicated to producing renewable fuels from tall oil, tallow, and other renewable feedstocks—will produce about 1 million cu m/year of fuels and enable reduced carbon dioxide (CO2) emissions from cars and planes by 2.5 million tonnes/year. The Gothenburg renewable fuels plant comes as part of Preem's broader plan to become the world's first climate-neutral petroleum and biofuels company with net zero emissions across its entire value chain before 2045. The operator also said it plans to increase its renewable fuel production to 5 million tpy by 2030.
	Preem AB	Lysekil	Carbon Capture Plant		Planning	2025	Aker Solutions--Feasibility	Preem confirmed in 2019 that it intends to build a full-scale carbon capture plant at the Lysekil refinery to reduce CO2 emissions by one-third by 2025 following a demonstration project at the site that began in 2019 and will run to 2021. The Swedish government, which has decided on a more ambitious blending mandate in the country, also has announced a willingness to support investments in domestic production of renewable fuels, thereby improving the investment climate for renewables-based projects.

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	Preem AB	Lysekil	Synsat-to-renewable diesel plant conversion	650,000-950,000 cu m/year	Planning	2024		In late September 2020, Preem and US-based project developer Beowulf Energy LLC announced scrapped a proposed plan to build a residue hydrocracking plant—or residue oil conversion complex (ROCC)—at Preem's 220,000-b/d refinery in Lysekil due to economic impacts caused by COVID-19. Instead, Preem is moving forward with a project to enable large-scale production of renewable fuels at Lysekil. Confirmed in late October 2020, the project's initial phase will involve a redevelopment and rebuild of the refinery's existing Synsat plant that currently produces Swedish Environmental Class 1 diesel with a maximum sulfur content of 10 ppm (wt) to increase Preem's renewable diesel production by 650,000-950,000 cu m/year, which is as much as two to three times higher than present renewable production capacity at the operator's 125,000-b/d refinery in Gothenburg, Sweden. Preem plans to reach final investment decisions on the project in summer 2021 for targeted startup of the new plant by 2024 at the latest. When the Lysekil conversion is completed, the reconfigured plant will have the capacity to process up to 40% renewable raw materials, with a goal of increasing that rate in the future to further phase out processing of fossil-based feedstock by the plant.
TATARSTAN	PJSC Tatneft (JSC Taneco)	Nizhnekamsk	Modernization-expansion	4,000,000 tpy	Under const.	2023		PJSC Tatneft received support from Russia's Ministry of Energy (MoE) in March 2021 to help finance the addition of several new advanced processing units at the more than 10-million tpy refinery of subsidiary JSC Taneco's multiphase integrated refining and petrochemical complex in Nizhnekamsk, 250 km from Tatarstan's capital city of Kazan. As part of the agreement, MoE has granted Tatneft an investment premium to the refundable excise tax on crude oil until Jan. 1, 2031, to support completion of construction on four new refining plants at Nizhnekamsk by yearend 2026. Intended to increase the refinery's advanced conversion of crude for production of high-quality, cleaner products such as Euro 5-quality gasoline and diesel, the project—which will require an investment of more than 50 million rubles—will include the addition of a new units for delayed coking, catalytic cracking, heavy residue hydroconversion, and diesel fuel isodewaxing, or hydroisodewaxing. The operator disclosed no details regarding proposed capacities of the new units or contractors attached to the project. In 2020, Tatneft said unidentified construction and commissioning activities were under way at the Taneco refinery's existing middle distillate and delayed coking units as part of an ongoing program Tatarstan launched in 2005 to strengthen the republic's refining industry, as well as in accordance with basic provisions of a quadripartite agreement on modernization of Russia's processing industry between oil companies; the Federal Antimonopoly Service of the Russian Federation; the Federal Service for Environmental, Technological, and Nuclear Supervision (Rostechnadzor); and the Federal Agency for Technical Regulating and Metrology (Rosstandart) to reequip and upgrade processing capacities at Russian Federation refineries. Tatneft's modernization program—which aims to boost nameplate crude oil processing capacity at Nizhnekamsk to 14 million tpy—previously was scheduled to be fully completed in 2023.
THAILAND	Thai Oil Public Co. Ltd.	Sriracha, Chonburi Province	Hydrogen generation unit		Under const.	2023	Saipem,Petrofac,Samsung--EPCC	Part of Clean Fuels project. With construction started in September 2019 and scheduled to begin commercial operation in 2023, the $4.825-million CFP involves retirement of two crude distillation units (CDU). The addition of a fourth, 220,000-b/d CDU to the existing third unit will raise the refinery's total crude capacity to 400,000 b/d.
	Thai Oil Public Co. Ltd.	Sriracha, Chonburi Province	Electric power plant		Under const.	2023	Saipem,Petrofac,Samsung--EPCC	Part of Clean Fuels project. With construction started in September 2019 and scheduled to begin commercial operation in 2023, the $4.825-million CFP involves retirement of two crude distillation units (CDU). The addition of a fourth, 220,000-b/d CDU to the existing third unit will raise the refinery's total crude capacity to 400,000 b/d.
	Thai Oil Public Co. Ltd.	Sriracha, Chonburi Province	Residue hydrocracker		Under const.	2023	Saipem,Petrofac,Samsung--EPCC	Part of Clean Fuels project. With construction started in September 2019 and scheduled to begin commercial operation in 2023, the $4.825-million CFP involves retirement of two crude distillation units (CDU). The addition of a fourth, 220,000-b/d CDU to the existing third unit will raise the refinery's total crude capacity to 400,000 b/d.
	Thai Oil Public Co. Ltd.	Sriracha, Chonburi Province	Naphtha hydrotreater		Under const.	2023	Saipem,Petrofac,Samsung--EPCC	Part of Clean Fuels project. With construction started in September 2019 and scheduled to begin commercial operation in 2023, the $4.825-million CFP involves retirement of two crude distillation units (CDU). The addition of a fourth, 220,000-b/d CDU to the existing third unit will raise the refinery's total crude capacity to 400,000 b/d.
	Thai Oil Public Co. Ltd.	Sriracha, Chonburi Province	Diesel hydrodesulfurization unit		Under const.	2023	Saipem,Petrofac,Samsung--EPCC	Part of Clean Fuels project. With construction started in September 2019 and scheduled to begin commercial operation in 2023, the $4.825-million CFP involves retirement of two crude distillation units (CDU). The addition of a fourth, 220,000-b/d CDU to the existing third unit will raise the refinery's total crude capacity to 400,000 b/d.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Thai Oil Public Co. Ltd.	Sriracha, Chonburi Province	Clean Fuels Project (CFP)		Under const.	2023	McConnell Dowell Corp. Ltd.--Civil works	Thai Oil PLC let a contract to McConnell Dowell Corp. Ltd. in late-July 2020 to provide civil works for the Clean Fuel Project (CFP) at its 276,000-b/d refinery at Sriracha, in eastern Thailand's Chonburi province. McConnell Dowell's scope of work under the contract—which was awarded by the consortium of Saipem, Petrofac, and Samsung Engineering delivering engineering, procurement, construction, and commissioning services on CFP—includes both earthworks and civil works in both greenfield and brownfield areas to support the overall project of improvement and expansion to the existing refinery, including the addition of new complex processing units, all required utilities, and supporting installations. With construction works already under way at the site and scheduled to be completed in 2021, the overall project is scheduled for startup in 2023. This latest contract follows Thai Oil's previous award to Haldor Topsoe AS for licensing of its SNOX air quality-control technology to help secure compliance with air-emission regulations for a new energy recovery unit to be built as part of the CFP. The $4.825-million CFP involves retirement of two crude distillation units (CDU). The addition of a fourth 220,000-b/d CDU to the existing third unit will raise the refinery's total crude capacity to 400,000 b/d. The project also will add a vacuum gas oil hydrocracker, a residue hydrocracker, a hydrogen manufacturing unit, a naphtha hydrotreater, a diesel hydrodesulfurization unit, a sulfur recovery unit, and an electric power plant fueled by residue pitch. The refinery, now 100% dependent on light crude, will have a crude slate after completion of the project of 40-50% light crude, 5-15% medium crude, and 40-50% heavy crude. The CFP also will improve product yields to 25% light distillate, 62% middle distillate, and 13% others, such as sulfur, long residue, and reformate, with no fuel oil. As the private sector's first megaproject in the Eastern Economic Corridor to position Thailand to become Southeast Asia's energy hub, Thai Oil said the CFP additionally aligns with current global market conditions and changing regulations such as the reduction in fuel oil use by marine transport as well as production of Euro 5-quality gasoline and diesel for improved environmental quality.
	Thai Oil Public Co. Ltd.	Sriracha, Chonburi Province	Crude distillation unit	220,000	Under const.	2023	Saipem,Petrofac,Samsung--EPCC	Part of Clean Fuels project. With construction started in September 2019 and scheduled to begin commercial operation in 2023, the $4.825-million CFP involves retirement of two crude distillation units (CDU). The addition of a fourth, 220,000-b/d CDU to the existing third unit will raise the refinery's total crude capacity to 400,000 b/d.
	Thai Oil Public Co. Ltd.	Sriracha, Chonburi Province	Vacuum gas oil hydrocracker		Under const.	2023	Saipem,Petrofac,Samsung--EPCC	Part of Clean Fuels project. With construction started in September 2019 and scheduled to begin commercial operation in 2023, the $4.825-million CFP involves retirement of two crude distillation units (CDU). The addition of a fourth, 220,000-b/d CDU to the existing third unit will raise the refinery's total crude capacity to 400,000 b/d.
	Thai Oil Public Co. Ltd.	Sriracha, Chonburi Province	Sulfur recovery unit		Under const.	2023	Saipem,Petrofac,Samsung--EPCC	Part of Clean Fuels project. With construction started in September 2019 and scheduled to begin commercial operation in 2023, the $4.825-million CFP involves retirement of two crude distillation units (CDU). The addition of a fourth, 220,000-b/d CDU to the existing third unit will raise the refinery's total crude capacity to 400,000 b/d.
THE NETHERLANDS	Neste Corp.	Port of Rotterdam, Rotterdam	Renewable diesel refinery expansion	500,000 tpy (SAF)	Engineering	2023		Neste Corp. confirmed in May 2021 it will move forward with a project to add production of sustainable aviation fuel (SAF) at its more than 1-million tpy/year existing renewable diesel refinery at the Port of Rotterdam in Rotterdam, the Netherlands. Requiring an estimated investment of about €190 million and slated for completion during second-half 2023, the project will involve modifications to the refinery that will allow the site to optionally produce up to 500,000 tpy of SAF. The operator disclosed no further details regarding specific modifications to be included in Rotterdam SAF addition, which comes as part of Neste's broader program to expand its existing European feedstock and production platform for renewable products. First announced in 2020, the Rotterdam SAF project initially was to add 450,000 tpy of SAF production at the refinery. Once completed, the Rotterdam SAF addition—together with the company's ongoing €1.4-billion, 1-million tpy SAF expansion at its 1.3-million tpy renewable diesel refinery in Singapore—by yearend 2023 will enable Neste to produce 1.5 million tpy of SAF, which reduces greenhouse gas emissions by up to 80% compared to fossil-based jet fuel. Expansion of its renewable diesel and SAF production platform comes as part of Neste's two strategic climate commitments, which include achieving carbon-neutral production by 2035 and reducing customers' greenhouse gas emissions by at least 20 million tpy by 2030.

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	Neste Corp.	Port of Rotterdam, Rotterdam	Grassroots renewable fuels refinery		Planning	2025		In March 2021, Neste Corp. said it selected Rotterdam, the Netherlands, to potentially site a second proposed renewables refinery as part of the operator's plan to expand its existing European feedstock and production platform for renewable products. Neste—which has yet to reveal details regarding capacity or precise location of the proposed Rotterdam expansion—said it expects to reach final investment decision on the project by yearend 2021 or early 2022. Should the planned renewables capacity expansion advance, however, the project would begin production in 2025. The proposed project comes as part of Neste's two strategic climate commitments, which include achieving carbon-neutral production by 2035 and reducing customers' greenhouse gas emissions by at least 20 million tpy by 2030.
	Zeeland Refinery NV	Vlissingen	Cryocap flue gas plant	2,400 tonnes/day	Engineering		Air Liquide Engineering & Construction--TL	In June 2021, Zeeland Refinery NV let a contract to Air Liquide Engineering & Construction to license its proprietary Cryocap Flue Gas (FG) technology for a Cryocap FG plant to be built as part of a decarbonization project at the operator's 148,000-b/d refinery in Vlissingen. Once in operation, the plant will capture more than 90% of emissions on the refinery's existing hydrogen production units and have capacity to liquefy 2,400 tonnes/day of carbon dioxide (CO_2). Pure, liquefied CO_2 captured as part of the decarbonization project—which aims to reduce total CO_2 emissions from the Vlissingen site by more than 800,000 tpy—will be transported for storage in the Dutch North Sea. Application of carbon capture and storage to reduce CO_2 emissions at Vlissingen comes as part of Zeeland Refinery's broader, long-term carbon-reduction and sustainability initiatives at the site.
TURKMENISTAN	Turkmen Petroleum Co.	Turkmenbashi Complex of Oil Refineries (TCOR; includes Turkmenbashi and Seydi refineries)	Expansion		Under const.	2022	Westport Trading Europe Ltd.—EPC	Turkmenistan said in August 2020 it is proceeding with construction of new units at its Turkmenbashi Complex of Oil Refineries (TCOR), which includes it Turkmenbashi and Seydi refineries. Westport Trading Europe Ltd. (WTL) is currently accelerating engineering, procurement, and construction (EPC) activities on a €120-million project to add a 900,000- tpy delayed coking unit (DCU) and 500,000-tpy solvent deasphalting unit (SDA) at the Turkmenbashi refinery. The new DCU and SDA units—for which Bashgiproneftechim LLC served as design engineer and on which construction began in late 2019—are scheduled to be completed in 2022. TCOR also engaged WTL to execute a scoping and technology design study for integration of a needle coke production unit (NCPU) into the Turkmenbashi refinery's new DCU. While WTL confirmed it completed preparation of development documentation on technology for the proposed NCPU integration, details regarding the status of TCOR's plan to move ahead with the project have yet to be revealed by either WTL or the operator. Separately, the government of Turkmenistan said TCOR also has let a turnkey contract to WTL to deliver EPC on a new 1-million tpy atmospheric crude distillation unit (DCU) and accompanying new crude vacuum electric desalination unit (Unit 6) to be added at its Seydi refinery. Confirmation of the proposed new DCU unit at Seydi—for which Bashgiproneftechim also provided design and engineering services—follows WTL's completion in 2019 of a prefeasibility study for the project. Details regarding the proposed scope and timeline of the Seydi project—which initially was to involve reconstruction of existing equipment at the refinery—have yet to be disclosed.
UGANDA	Albertine Graben Refinery Consortium	Kabaale, Hoima District	Refinery	60,000	Engineering	2023	Saipem SPA--FEED, EPC	$3-4 billion grassroots project.
UNITED ARAB EMIRATES	Abu Dhabi National Oil Co.	Ruwais	Refinery	600,000	Engineering	2025	Wood--pre-FEED	New refinery to be built for integration with existing petrochemical infrastructure in Ruwais; part of ADNOC's broader $45-billion program to become a global downstream leader under a new combined model of strategic partnerships and investments.
	Abu Dhabi National Oil Co.	Ruwais	Atmospheric desulfurization units (2)		Engineering	2022	Samsung Engineering,McDermott--EPC	
	Abu Dhabi National Oil Co.	Ruwais	Waste-heat recovery		Engineering	2022	Samsung Engineering--EPC	
	Abu Dhabi National Oil Co.	Ruwais	Crude flexibility		Engineering	2022	Samsung Engineering--EPC	
	Brooge Petroleum & Gas Investment Co. Phase III FZE (BPGIC III; Brooge Energy Ltd. [formerly Brooge Holdings Ltd.])	Fujairah, UAE.	Refinery	180,000	Engineering	2022	MUC Oil & Gas Engineering Consultancy LLC (MUC)--FEED/D/E	As part of an April 2020 contract, MUC will complete basic design for a potential 180,000-b/d refinery as well as FEED studies for the site's Phase 3 oil storage terminals, which could add up to three and a half times more storage capacity—or between 2.1-3.5 million cu m—for crude oil, fuel oil, and clean products than the projected 1.0 million-cu m storage capacity to be added following completion of the Phase 2 expansion currently under way at BPGIC's operations. FEED studies were completed in July 2020. Preconstruction work—including start of the Soil Investigation and the Environmental Impact Assessment (EIA) report—began in October 2020. The facility is due for startup in late 2022.

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UNITED KINGDOM	Esso Petroleum Co. Ltd. (EPCL; ExxonMobil Corp.)	Fawley	Hydrotreating		Engineering	2021	Fluor--FEED; EPC	Following a November 2019 contract award, Fluor's scope of work on the Fawley Strategy (FAST) project includes design and construction of a new diesel hydrotreater and steam methane-reforming hydrogen plant as well as modifications to unidentified existing installations at the Fawley site. The more than $1-billion expansion project, which intends to help reduce the need to import diesel into the UK by adding a hydrotreating unit to remove sulfur from fuel, supported by a hydrogen plant that, combined, will also help improve the refinery's overall energy efficiency and increase ULSD production at the site by 38,000 b/d. While construction on the FAST project was scheduled to begin by yearend 2019 for a targeted commissioning date in 2021, a definitive timeframe for the project remains unclear in the wake of ExxonMobil's announcement to investors in its first-quarter 2020 quarterly earnings report—released on May 1—that it was slashing capital spending in 2020 to $23 billion from a previously proposed investment of $33 billion as a result of market impacts resulting from the COVID-19 health crisis.
UNITED STATES	Continental Refining Co. LLC	Somerset, Ky.	Refinery-to-renewables conversion	5 million gal/year	Engineering	2022		In April 2021, Hemisphere Ltd. LLC subsidiary Continental Refining Co. LLC (CRC) approved a November 2020-announced plan to convert CRC's now idled 5,500-b/d crude oil refinery in Somerset, Ky., into a biodiesel production site. The project will add a soybean-crushing, biodiesel refining, and blending facility equipped to process 3 million bushels/year of locally sourced soybean production into biofuels and other soy-based products. Alongside producing up to 5 million gal/year of renewable-based, ultralow-sulfur diesel—including B6 to B100 biodiesel—the repurposed site also would produce high-protein fiber meal for animal feed, soybean oil for industrial use, and crude glycerin. The converted refinery is scheduled for startup in first-quarter 2022.
	CVR Energy Inc.	Wynnewood, Okla.	Alkylation unit revamp		Engineering	2024	KBR--E/D/TL/Equip	CVR Energy Inc. let a contract to KBR Inc. in February 2021 to provide a suite of additional services for the second phase of a previously proposed project to convert process technology of an existing hydrofluoric acid (HF) alkylation unit at subsidiary Wynnewood Refining Co. LLC's (WRC) 74,500-b/d refinery in Wynnewood, Okla. Following CVR Energy's 2019 contract award to KBR to provide basic engineering and design services for the HF alkylation unit conversion based on the service provider's proprietary Solid Acid Alkylation Technology (K-SAAT), KBR second-phase scope of work on the project will include delivery of detailed engineering of process equipment, as well as proprietary equipment supply and module fabrication. Subject to regulatory and internal approvals, the Wynnewood HF alkylation revamp would reach mechanical completion in late 2024.
	CVR Energy Inc.	Wynnewood, Okla.	Renewable diesel, naphtha	100 million gal/year (renewable diesel); 6 million gal/year (renewable naphtha)	Under constr.	2021		CVR Energy Inc. said in January 2021 it is progressing with a a $110-million project that will allow subsidiary Wynnewood Refining Co. LLC's (WRC) 74,500-b/d refinery in Wynnewood, Okla. to produce about 100 million gal/year of low-carbon renewable diesel and 6 million gal/year of renewable naphtha at the Wynnewood refinery beginning in July 2021.
	Diamond Green Diesel Holdings LLC	Norco, La.	Renewable diesel plant expansion	400 million gal/year	Under constr.	2021	Honeywell UOP--TL	As part of a November 2020 contract, UOP will license and implement its proprietary Ecofining technology for a 30,000-b/d renewable diesel production train at the site. Following startup of the second production unit in 2021, DGD's Norco plant—a 50-50 joint venture of Valero Energy Corp. and Darling Ingredients Inc.—will be equipped to produce 675 million gal/year (about 44,000 b/d) of renewable diesel.
	Diamond Green Diesel Holdings LLC	Port Arthur, Tex.	Grassroots renewable diesel plant	400 million gal/year	Engineering	2023		In January 2021, Diamond Green Diesel Holdings LLC (DGD)—a 50-50 joint venture of Valero Energy Corp. and Darling Ingredients Inc.—confirmed it is building a grassroots 470-million gal/year renewable diesel plant at Valero's 395,000-b/d refinery in Port Arthur, Tex., about 90 miles east of Houston along the Texas Gulf Coast. At a currently estimated construction cost of $1.45 billion to be split equally between the JV partners and funded from internal cash flows provided by DGD, the new Port Arthur plant—once completed and when combined with the partners' previously announced expansion of the operator's 290-million gal/year renewable diesel plant in Norco, La.—will increase DGD's total renewable diesel and renewable naphtha production capacities to 1.2 billion gal/year and 50 million gal/year. Approved by both companies' boards of directors in late-January 2021, the new Port Arthur renewable diesel plant is scheduled to be completed and begin commercial operation in second-half 2023.

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	ExxonMobil Corp.	Baton Rogue, La.	Refinery modernization		Engineering			In June 2021, ExxonMobil reached final investment decision to move forward with a suite of unidentified projects that, among other upgrades, will reduce volatile organic compound emissions by 10% at subsidiary ExxonMobil Fuels & Lubricants Co.'s 520,000-b/d integrated refining and petrochemical complex in Baton Rouge, La. The more than $240 million in modernization projects are aimed at ensuring long-term competitiveness of the site. Construction is scheduled to begin by yearend 2021.
	ExxonMobil Corp.	Baytown, Tex.	NOx reduction		Engineering		ClearSign Technologies Corp.—TL/E	In June 2020, ExxonMobil Corp. let a contract to ClearSign Technologies Corp. to provide its proprietary nitrogen oxide (NOx)-reduction technology at its 561,000-b/d integrated refining and petrochemical complex in Baytown, Tex. ClearSign will fabricate and install a multiburner process heater and burners equipped with its ClearSign Core NOx-reduction technology at the Baytown refinery as part of a final step in validating the technology's effectiveness at improving energy, operational efficiency, and safety while simultaneously reducing NOx emissions. The Baytown refinery installation order follows ExxonMobil's previous order with ClearSign for early engineering and installation planning regarding a trial installation of ClearSign Core process burners at one of ExxonMobil's US Gulf Coast refineries in 2019 following testing of the technology that involved evaluation of its application over a broad range of typical conditions—including variations in fuel heating values, turndown, and excess air—at ClearSign's research and development site in Seattle, Wash. ClearSign disclosed neither a value of the order nor a timeframe for the technology's implementation at the Baytown complex.
	ExxonMobil Corp.	Beaumont, Tex.	Refinery expansion (crude distillation)	250,000	Under constr.	2022	TechnipFMC--EPC; KBR--EPC (offsites and interconnections)	Expansion project to add a third crude unit within the refinery's existing footprint; will also include a new atmospheric pipe still, kerosine hydrotreater, diesel hydrotreater, and benzene recovery unit.
	Freepoint Commodities LLC-Rigby Refining LLC	US Gulf Coast	Refinery	10,000	Planning	2021		Freepoint and Rigby Refining signed definitive contracts to form a joint venture to develop processing plants around the world to help meet the growing demand for International Marine Organization (IMO) 2020-compliant marine fuel. The JV's first project will be the design and construction of a 10,000-b/d fuel oil processing plant in the USGC. The facility would be equipped with Rigby's proprietary process to remove sulfur from fuel oil and produce low-sulfur, IMO 2020-compliant marine fuel.
	Global Clean Energy Holdings Inc.	Bakersfield, Calif.	Refinery-to-renewables plant conversion	15,000	Under const.	2021	Haldor Topsoe AS—TL/E; Primoris Services Corp. (ARB Inc.)—EPC	In June 2020, Global Clean Energy Holdings Inc. (GCEH) let a contract to Haldor Topsoe AS to provide process technology for GCEH's previously announced plan to convert its recently purchased 70,000-b/d Bakersfield, Calif., refinery into a renewable diesel production plant. Haldor Topsoe will license its proprietary HydroFlex renewable fuel technology as well as supply basic engineering, proprietary equipment, and catalysts for the refinery revamp, which—once completed—will enable the plant to produce 15,000 b/d of renewable diesel from proprietary camelina oil and other traditional biofuel feedstocks. Fuel production from the retooled refinery will meet the California Low Carbon Fuel Standard, as well as comply with ASTM D975 diesel specifications, resulting in major reductions of carbon dioxide emissions due to a lower carbon index. Alongside processing GCEH's patented proprietary fallow-land crop varieties of camelina—which, traditionally grown in rotation with wheat, is cultivated as an alternative to fallow so as not to displace or compete with food crops—the HydroFlex unit will process a slate of additional nonpetroleum renewable feedstocks, such as used cooking oil, soybean oil, and distillers' corn oil, among others. The contract award follows GCEH's May 2020 purchase of the idled Bakersfield refinery from Delek US Holdings Inc. subsidiary Alon Bakersfield Property Inc. for $40 million. Scheduled to begin immediately and take 18-20 months to complete, the revamp and conversion project will be executed primarily by local trade unions through Primoris Services Corp. subsidiary ARB Inc., which is serving as engineering, procurement, and construction contractor. With the former oil refinery already equipped with a large portion of necessary equipment in place for production of renewable diesel, the conversion project will involve a full turnaround and refurbishment of existing equipment to enable production from renewable feedstocks. Due for startup in late 2021, the refinery will no longer process petroleum of any kind. Alongside making renewable fuels production from the plant available for blending into California's transportation fuel mix in the Los Angeles metropolitan and San Francisco Bay areas, GCEH previously said it also plans to sell, market, and distribute its production through various partnerships, including one with an unidentified multinational oil major.

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	HollyFrontier Corp.	Woods Cross refinery, West Bountiful, Utah	Clean fuels project		Planning			In April 2020, HollyFrontier said subsidiary HollyFrontier Woods Cross Refining LLC's 45,000-b/sd Woods Cross refinery is making "a major investment" to begin producing low-sulfur fuels that comply with US Environmental Protection Agency (EPA) Tier 3 emissions control requirements for motor fuels and vehicles. The operator disclosed no further details directly regarding the proposed project or the value of its proposed "major" investment.
	HollyFrontier Corp.	Navajo refinery, Artesia, NM	Renewable diesel unit (RDU)	125,000,000 gal/year (9,000 b/d)	Engineering	2022	KP Engineering LP--EPCM; Haldor Topose--TL	As part of the March 2020 contract with HollyFrontier subsidiary Artesia Renewable Diesel Co. LLC (ARDC), KPE will deliver EPCM for the on-site portion of the proposed RDU. ARDC previously awarded a contract to Haldor Topsoe AS to license its proprietary HydroFlex technology, as well as supply basic engineering, proprietary equipment, catalysts, and technical services, for the new RDU, which comes as part of HollyFrontier's expansion into renewable fuels. Implementation of HydroFlex technology for the unit will enable the refinery to process soybean oil and other renewable feedstocks into renewable diesel to help meet demand for low-carbon fuels while covering the cost of the operator's annual EPA-regulated RIN purchase obligation under current market conditions. HollyFrontier said it expects a total capital cost of $350 million for the RDU project, which will include corresponding rail infrastructure and storage tanks. The RDU is scheduled to be completed during first-quarter 2022.
	HollyFrontier Corp. (Cheyenne Renewable Diesel Co. LLC)	Cheyenne, Wyo.	Refinery-to-renewable diesel conversion	6,000	Under const.	2022	Triten Corp. (IAG)--PM	In October 2020, HollyFrontier Corp.'s Cheyenne Renewable Diesel Co. LLC let a contract to Triten Corp. subsidiary IAG, Houston, Tex., to provide project management on the operator's previously announced plan to permanently cease processing of crude oil at its 52,000-b/d refinery in Cheyenne, Wyo., and convert the plant into a renewable diesel refinery by 2022 as part of the operator's increased focus on expanding and integrating its renewables business. Alongside project management, IAG also will deliver project controls and construction management for the proposed refinery conversion. Approved by HollyFrontier's board of directors on May 29, 2020, the proposed Cheyenne conversion project will involve repurposing the refinery's current footprint and a portion of its existing assets to enable production of 90 million gal/year (6,000 b/d) of renewable diesel. HollyFrontier, which began winding down Cheyenne's traditional petroleum refining operations on Aug. 3, 2020, to begin work on converting certain unidentified units and hardware of the refinery for renewable diesel production, plans to complete renewable diesel units (RDU) at the site during first-quarter 2022 at an estimated cost of $125-$175 million. The Cheyenne refinery conversion project also comes as part the operator's broader plan to spend $650-750 million between 2019 and 2022 to make the renewables segment a larger part of its financial and operational future.
	Husky Energy Inc.	Superior, Wis.	Refinery rebuild		Under const.	2022		Husky Energy Inc. has received required permit approvals to begin reconstruction of its 47,500-b/cd refinery in Superior, Wis., after a fire that broke out at the site on Apr. 26, 2018. Key features of the rebuild and modernization project will include: • Implementation of best available control technology (BACT) incorporating advances in technology and efficiencies from across the refining industry. • Increased energy efficiency, in full compliance with federal, state, and local regulations. • Configuration for the refinery to run in a continuous mode averaging 45,000 b/sd, which includes a 5,000-b/d average increase in heavy oil processing to 25,000 b/sd. • Work to equip the refinery to produce a full slate of products, including asphalt, gasoline, and diesel, enhancing Husky's ability to service the US Midwest. In April 2020, Husky said it has suspended the refinery rebuild due to safety and public health risks inherent in mobilizing and maintaining a large construction workforce during the COVID-19 pandemic. The refinery had been scheduled to return to full operations in 2021.
	Marathon Petroleum Corp. (MPC)	Galveston Bay, Tex.	South Texas Asset Repositioning program		Under constr.	2021	Fluor Corp.--EP	Emissions-compliance works.
	Marathon Petroleum Corp. (MPC)	Texas City, Tex.	South Texas Asset Repositioning program		Under constr.	2021	Fluor Corp.--EP	
	Meridian Energy Group Inc.	Belfield, Billings County, ND	Refinery	49,500	Under constr.	2023	Vepica--E/D; McDermott--FEED	In June 2020, Meridian Energy Group Inc. said that with front-end engineering design currently nearing completion by contractor McDermott International Inc. and site-preparation activities already well under way, its long-planned grassroots 49,500-b/sd high-conversion Davis refinery in Belfield, Billings County, ND—which will be equipped with technology from Axens Group—is scheduled to enter commercial operation during fourth-quarter 2023 at a currently estimated overall cost of about $1 billion.
	Meridian Energy Group Inc.	Winkler County, Tex.	Refinery	60,000	Engineering		Winkler Cos. LLC--Site control	Proposed grassroots refinery based on Meridian Energy's Davis refinery under construction in Billings County, ND.

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	MMEX Resources Corp.	Pecos County, Tex.	Renewables refinery		Planning		Blanchard Industrial--EPC; VFuels LLC--E/D	VFuels contract awarded in March 2020.
	Phillips 66	Rodeo, Calif.	Refinery-to-renewable fuels plant conversion	50,000 b/d	Under const.	2024	Worley--FEED	In April 2021, Phillips 66 let a contract to Worley to deliver front-end engineering design (FEED) services for the operator's plan to convert the 120,000-b/d portion of its San Francisco refining complex in Rodeo, Calif. into a renewable fuels refinery as part of an investment strategy in the company's energy transition to ensure long-term viability and competitiveness of its operations. The project will reconfigure the existing conventional refinery to produce up to 2.5 billion l./year (650 million gal/year) of renewable transportation fuels from used cooking oils, fats, greases, and vegetable oils. Known as Rodeo Renewed, the proposed $750-800-million project would involve construction of new pretreatment units as well as repurposing of existing hydrocracking units to enable production of renewable diesel, renewable gasoline, and sustainable jet fuel for the California market. Combined with production of renewable fuels from an unidentified project also in development, the converted Rodeo plant, once fully operational, would produce more than 800 million gal/year (50,000 b/d) of renewable fuels, making it the world's largest plant of its kind. Alongside the Rodeo conversion project, Phillips 66 also plans to shut down the Rodeo carbon plant and 44,500-b/d Santa Maria refining site in Arroyo Grande, Calif.—which converts heavy crude oil into high-quality feedstock for further processing into gasoline, diesel, and jet fuel at the Rodeo refinery—in 2023, with associated crude pipelines also to be taken out of service in phases starting in 2023. Following completion of the reconfiguration project, Phillips 66's San Francisco refining complex—which consists of the Rodeo plant in the San Francisco Bay Area and the Santa Maria refinery in Arroyo Grande, linked by a 200-mile pipeline—would no longer produce fuels from crude oil, resulting in anticipated 50% and 75% reductions in greenhouse gas and sulfur dioxide emissions, respectively, from the site as well as generation of credits under the California Low Carbon Fuel Standard (LCFS).
	Renewable Energy Group Inc.	Geismar, Ascension Parish, La.	Renewable diesel expansion	250,000,000 gal/year	Engineering	2023		In October 2020, Renewable Energy Group Inc. (REG) announced it is undertaking a 250-million gal/year capacity expansion of its existing 90-million gal/year renewable diesel refinery in Geismar, Ascension Parish, La. The proposed expansion, which will require a minimum $825-million capital investment, will more than triple the Geismar biorefinery's capacity to 340 million gal/year. Alongside increasing renewable diesel production capacity at the site, the planned expansion also will include marine and rail infrastructure upgrades that will allow for supplementary shipping methods, reducing the number of trucks on local roadways. With construction on the project scheduled to begin in mid to late 2021, the expansion is targeted for mechanical completion in late 2023. After purchasing the Geismar biorefinery—the first renewable diesel plant built in the US—from Dynamic Fuels LLC in 2014, REG expanded capacity of the then 75-million gal/year plant to its current 90-million gal/year capacity. In June 2017, REG spent $20 million to acquire about 82 acres of land in Geismar—including land the biorefinery previously leased for its operations as well as more than 61 adjacent acres—as part of the operator's plan to support its existing production capacity and future expansion opportunities. REG, which uses an integrated procurement, distribution, and logistics network to operate 13 biorefineries in the US and Europe, produced 495 million gal of cleaner fuel in 2019 to deliver more than 4.2 million tonnes of carbon reduction. REG uses its proprietary BioSynfining technology for production of renewable diesel fuel, with planned feedstocks to include a mix of waste fats, oils, and greases, including regionally sourced vegetable oils, animal fats, and used cooking oil.
	Seaboard Energy LLC	Hugoton, Kan.	Grassroots renewable diesel plant	6,500 b/d	Under constr.	2021	Haldor Topsoe--TL	Seaboard Corp. subsidiary Seaboard Energy LLC in May 2021 let a contract to Haldor Topsoe AS to provide process technology and related services for a renewable diesel unit currently under construction at the operator's existing site in Hugoton, Kan. Topsoe will license its proprietary HydroFlex renewable fuel technology and H2bridge hydrogen technology—based on its modular Haldor Topsoe Convection Reformer (HTCR) technology—for the new plant, which will use a feedstock of tallow and soybean oil to produce 6,500 b/d of renewable diesel. The renewable diesel plant—which Topsoe will deliver as an integrated hydrogen unit and hydroprocessing unit—is scheduled for startup by yearend 2021. The Kansas renewable fuels complex—which will be Seaboard Energy's first expansion into renewable diesel production—follows the operator's purchase of Synata Hugoton LLC's idled Hugoton cellulosic ethanol plant in February 2019, at which the new owner was considering proposed modifications to enable renewable diesel production.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Strategic Biofuels LLC	Port of Columbia, Caldwell Parish, La.	Grassroots renewables fuels plant	32 million gal/year	Planning			In April 2021, Strategic Biofuels LLC said it will build a grassroots renewable fuels plant on a 171-acre site at the Port of Columbia in Caldwell Parish, La., about 25 miles south of Monroe. To be operated by subsidiary Louisiana Green Fuels LLC (LGF), the proposed plant would use established refinery processes to produce up to 32 million gal/year of renewable fuel from a feedstock of wood waste made up of timber byproducts supplied by responsibly managed, sustainable plantation forests within the state. The proposed project also would feature carbon capture and storage (CCS), or sequestration, which—combined with its sustainably sourced feedstock—would enable LGF's plant to produce renewable diesel in a carbon-negative fashion. Strategic Biofuels, which has received a $200-million tax-free bond allocation from the state of Louisiana to help advance the estimated $700-million project, is currently completing feasibility and financing phases. With 85% of its early stage financing presently secured from investors in North Louisiana, Strategic Biofuels said it expects to reach final investment decision (FID) on the project by yearend 2022. Based on a current 30-month construction phase, the proposed renewables refinery could be operational as soon as late 2024 or early 2025. Alongside the LGF's Port of Columbia renewables plant, Strategic Biofuels also is considering developing additional renewables-based refineries in Louisiana that would target production of both renewable diesel and aviation fuels from a feedstock of nearby and readily available forest thinnings, branches, pine needles, and treetops, known as slash.
	Valero Energy Corp.	Port Arthur, Tex.	Coker Unit; Sulfur Recovery Unit	55,000	Under constr.	2022		In April 2020, Valero warned planned projects could be delayed as a result of changing market conditions due to the COVID-19 health crisis.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	World Energy LLC	Paramount, Calif.	Renewable fuels refinery expansion	240 million gal/year	Under constr.	2022	Bechtel--TL, E	In May 2021, World Energy LLC let a contract to Bechtel Corp. to deliver technology to further improve environmental performance of production processes at subsidiary AltAir Paramount LLC's renewable fuels refinery in Paramount, Calif. Bechtel will provide licensing and engineering support for implementation of its proprietary SWSPlus technology to treat sour water volumes generated by the plant's production process. Alongside reducing nitrous oxide (NOx) emissions resulting from production activities by recovering ammonia and hydrogen sulfide (H2S) before incineration, use of SWSPlus technology will allow AltAir Paramount flexibility to convert recovered H2S into elemental sulfur, as well as make recovered ammonia available for the operator to use elsewhere in the refinery or to sell as an additional source of revenue. Further details regarding the proposed SWSPlus technology implementation were not disclosed, but the contract award comes amid AltAir Paramount's proposed Revised Paramount Petroleum AltAir Renewable Fuels Project (RPPARFP) to fully convert the idled Paramount conventional crude oil refinery—which World Energy purchased from Delek US Holdings Inc. in 2018—into a plant exclusively dedicated to production of renewable-based fuels (OGJ Online, Mar. 18, 2018). Based on OGJ's review of official project documents filed with the City of Paramount, the SWSPlus technology presumably will be incorporated as part of AltAir Paramount's proposals under the RPPARFP to modify an existing sour water stripper (SWS) as well as add a second SWS at the site. First announced by World Energy in 2018 and estimated to require an investment of $350 million across a 2-year period, the subsequently named RPPARFP follows the earlier Renewable Fuels Project (RFP) that AltAir Paramount, under its previous owner, completed between 2014-15 to enable part of the former 39,500-b/d Paramount crude refinery to convert up to 3,500 b/d of nonedible vegetable and beef tallow into renewable diesel, jet fuel, naphtha (gasoline), and fuel gas. Designed to help California reduce its dependence on fossil fuels by increasing production of lower-emission, low-carbon intensity transportation fuels that comply with the California Air Resources Board's Low Carbon Fuel Standard (LCFS), the RPPARFP—like its RFP predecessor—proposes a mix of projects involving upgrades of existing units, construction of new units, and repurposing and dismantling of old units to complete the refinery's transformation to 100% renewable fuels output. Project documents made available for public review show the RPPARFP will include the following process-related components: • Installation of a new pretreatment unit that will expand the plant's flexibility to process a wider variety and quality of renewable materials. Addition of the pretreatment unit will allow the plant—which currently is equipped to process only a feedstock of technical-grade nonedible vegetable oils and animal fats (beef tallow)–to condition lower-grade fats, greases and oils (e.g., used cooking oil) for processing. • Upgrading of the existing Renewable Fuels Unit (RFU) A to increase capacity and more efficiently produce renewable diesel, jet fuel, and gasoline. • Installation of a new RFU B for additional production of renewable diesel, jet fuel, and gasoline. The unit also will be equipped to produce gases that would be used to fuel the site's heaters and boilers. • Modification of the existing naphtha stabilizer to add new propane recovery installations for capturing and separating renewable propane and mixed butanes that could be sold or used as fuel elsewhere within the plant, which currently directs propane and butane primarily into the fuel gas system. The modification would allow renewable fuel gas generated after recovery of propane and butane from the units to be supplemented with natural gas, if needed, to meet the refinery's fuel gas demand. • Installation of a new hydrogen generation unit to reduce or eliminate the site's current use of trucks for delivery of hydrogen supplies necessary in the production process. • Installation of a new hydrogen recovery unit to recover hydrogen from produced process gases—which are currently directed to the fuel gas system—for recycling back to the production process. • Installation of a new H2S recovery unit to enable capturing and recycling of H2S for the plant's production process. Use of the new unit's recycled H2S recycling would greatly reduce truck deliveries of H2S to the site, as well as reduce the volume of acidic off gas presently generated by H2S (following its initial treatment in the refinery's existing fuel gas treating system) that currently must be further treated via incineration and scrubbing. • Installation of a second flare and flare vapor recovery system that—balanced with the site's current flare system—will be equipped to service the plant's existing refinery units, as well as the RPPARFP's planned hydrogen generation unit and other proposed grassroots units. • Modification of the existing sour water unit to provide additional installations that will accommodate treatment of increased sour water volumes generated by the expanded production process and enable recovery of aqueous ammonia, which can be used in the refinery's silicon-controlled rectifiers (SCRs) to control NOx emissions. • Installation of additional wastewater treatment facilities to accommodate increased wastewater volumes generated by new processing equipment. According to late-January 2020 documents from the California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA)—which awarded AltAir Paramount a sales-and-use tax exclusion of $10 million to help fund the RPPARFP—the operator started design of the new pretreatment unit in October 2018 and selected an unidentified engineering contractor in February 2019, which immediately began design of RFU B. As of January 2020, AltAir Paramount also was in the process of executing RPPARFP-related works, including tankage cleaning and repairs, pressure upgrading of an unidentified existing unit, and upgrading of unidentified logistics installations at the site. While AltAir Paramount informed CAEAFTA it expected to secure air quality and city construction permits under the California Environmental Quality Act (CEQA) for the RPPARFP by March 2020 for anticipated start of construction in September 2020, final permit approvals for the proposed major processing unit additions and modifications have yet to be publicly announced by state and local regulatory bodies reviewing the permit applications. Despite uncertainty regarding the status of permit approvals for the RPPAREP's processing-related works, California's South Coast Air Quality Management District (South Coast AQMD)—the regulatory agency responsible for air-pollution control for all of Orange County as well as portions of Los Angeles, Riverside, and San Bernardino counties—confirmed in a June 24, 2020 electronic filing its approval of AltAir Paramount's CEQA permit applications for the terminal and logistics portions of the RPPARFP. Slated for phased construction and full commissioning over a 2-3 year period, AltAir Paramount told CAEAFTA in January 2020 the RPPAREP—which will increase the Paramount refinery's renewable fuels output to about 275 million gal/year from its current 35-million gal/year capacity—is scheduled to begin production in early 2022.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
URUGUAY	Administración Nacional de Combustibles Alcohol y Pórtland (ANCAP)	La Teja	Solvent deasphalting	6,000	Engineering		KBR—TL/E/D	In June 2020, Uruguay's state oil company Administración Nacional de Combustibles Alcohol y Pórtland (ANCAP) let a contract to KBR Inc. to provide technology for a new unit to be added as part of a strategic upgrading project at ANCAP's 50,000-b/d Eduardo Acevedo Vázquez refining complex at La Teja, along the Bay of Montevideo. KBR will license its residual oil solvent extraction (ROSE) solvent deasphalting (SDA), as well as deliver basic engineering design, and proprietary equipment for the 6,000-b/d ROSE unit. In addition to helping reduce the site's environmental footprint, the ROSE unit will enable the refinery—Uruguay's only—to produce a lighter, higher-grade product mix, as well as allow it greater flexibility in adjusting production slates to respond to changing market conditions. While further details regarding the La Teja upgrading project were not disclosed, ANCAP confirmed in its 2019 annual report to investors that it will carry out modifications and equipment upgrades designed to improve economics, efficiency, and environmental performance to main processing units at the refinery during the complex's next planned maintenance shutdown, which is scheduled for 2023. Already in the planning stages, the 2023 turnaround also will implement a project involving coprocessing cheaper, low-cost renewable feedstocks into fuel.
UZBEKISTAN	Fergana Oil Refinery LLC	Fergana City, Fergana Region	Refinery modernization		Under const.	2023	Axens—TL/D (hydrocracking, isomerization units); Wood—FEED; UzLITI Engineering JV LLC—Feasibility; UzGASHKLITI—E	Fergana Oil Refinery LLC (FNPZ)—now under the trust management of Jizzakh Petroleum JV LLC, a joint venture of JSC Uzbekneftegaz and Gazprom International SA subsidiary Gas Project Development Central Asia AG—in July 2020 undertook a $300-million modernization project at its 5.5-million tpy refinery in Fergana City, Fergana Region, Uzbekistan. Scheduled to run from 2020-23, the modernization and reconstruction project includes a series of works that will include replacing 30% of the refinery's existing but obsolete units and equipment with new and modernized installations, Uzbekistan's Ministry of Energy (MOE) said. To date, MOE said FNPZ has let a series of contracts for work on the project to the following service providers: • Axens Group, which is delivering licensing and design of new hydrocracking and isomerization units. • John Wood Group PLC, which is providing front-end engineering design (FEED) on the project. • UzLITI Engineering JV LLC, which is developing a feasibility study for the project. • UzGASHKLITI, which is conducting engineering surveys at the project construction sites. As of July 2020, the future configuration of the Fergana refinery, the required capacity of new units for processing 2 million tpy of hydrocarbon feedstock, and the type of feedstock to be processed have been approved, according to MOE and FNPZ. Work also has started on development of a package of design documentation for new process units and FEED, as well as design solutions for reconstruction of existing installations and energy installations, MOE said. FNPZ also is working to implement measures aimed at introducing software at the refinery that will automate accounting, document management, and digitalization of production processes. While much of the project remains in the works, MOE said an upcoming replacement of catalyst—which will be manufactured and supplied by Axens—in an existing diesel hydrotreater will enable the Fergana refinery to adjust its production of diesel fuel during fourth-quarter 2020 to comply with current European fuel-quality standards. The work on modernization and reconstruction of the Fergana refinery comes as part of a resolution of Uzbekistan's Cabinet of Ministers dated Feb. 7, 2020, that—though yet to be released to the public—identified priority tasks regarding efficient use of the Fergana refinery's capacities, as well as the plant's overall modernization, MOE said in June 2020. Alongside a new light naphtha isomerization unit to equip the refinery's production of AI 92-95 gasoline and diesel that meets Euro 5-quality standards by July 1, 2023, the project also intends to modernize production blocks to improve overall plant production quality and operating performance. The project additionally includes installation of new units for hydrocracking of vacuum distillates. The overhaul of FNPZ's refinery follows the government of Uzbekistan's March 2019 cancellation of Jizzakh Petroleum JV's previously announced project to build a 5-million tpy grassroots refinery under construction in the Jizzakh region of eastern Uzbekistan. Jizzakh Petroleum JV LLC officially took over trust management of FNPZ to execute the Fergana refinery modernization project on Mar. 7, 2020, MOE said.
	Jizzakh Petroleum JV LLC	Jizzakh	Refinery	100,411	Under constr.	2021	Amec Foster Wheeler,Hyundai Engineering,Enter Engineering--EPC	
	Jizzakh Petroleum JV LLC	Jizzakh	Merox unit		Engineering	2021	Honeywell UOP--E/D/TL	
	Jizzakh Petroleum JV LLC	Jizzakh	CCR Platforming unit		Engineering	2021	Honeywell UOP--E/D/TL	
	Jizzakh Petroleum JV LLC	Jizzakh	Distillate Unionfining unit		Engineering	2021	Honeywell UOP--E/D/TL	

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Jizzakh Petroleum JV LLC	Jizzakh	Par-Isom unit		Engineering	2021	Honeywell UOP--E/D/TL	
	Jizzakh Petroleum JV LLC	Jizzakh	Unicracking unit		Engineering	2021	Honeywell UOP--E/D/TL	
	JSC Uzbekneftegaz (Bukhara Oil Refinery LLC)	Karaoul Bazar, Bukhara	Refinery modernization		Under const.	2022	SK Engineering & Construction Co. Ltd.—E/D; Honeywell UOP—TL	JSC Uzbekneftegaz subsidiary Bukhara Oil Refinery LLC (BOR) in September 2020 let a contract to Honeywell UOP LLC to provide a suite of process technologies for the modernization and reconstruction project at BOR's 50,000-b/d condensate refinery at Karaoul Bazar, located 55 km from Bukhara, in southwestern Uzbekistan, 437 km southwest of Tashkent. Alongside delivering technology licensing and basic engineering design services for a series of new units to be added during the overhaul, Honeywell UOP also will participate in revamping the refinery's existing diesel hydrotreating and amine regeneration units. In addition to a new hydrotreating unit, Honeywell UOP's scope of licensing and engineering design delivery on the project will include the following units equipped with UOP proprietary technologies: • A Par-Isom unit for upgrading light naphtha into high-value isomerate for gasoline blending. • An RFCC unit for converting heavy feedstocks into cleaner-burning gasoline and diesel products that meet the latest global emissions regulations. • A SelectFining unit, which uses selective hydrodesulfurization of naphtha to meet low-sulfur gasoline specifications while minimizing octane loss. • A Merox unit for treating naphtha feedstock to meet requisite product specifications. UOP disclosed no details regarding either the value of the contract or capacities of the new units. This latest contract follows BOR's July 2020 award to SK Engineering & Construction Co. Ltd. (SK E&C) to deliver front-end engineering design services for the modernization project, which—alongside aiming to increase existing processing capacities to 95% from 79% and production of light oil products to 91% from 77%—intends to expand the refinery's capabilities to convert and upgrade heavy oil and fuels into more environmentally friendly Euro 5-quality gasoline and diesel in compliance with the government of Uzbekistan's stricter specifications for fuel products taking effect in 2023. In addition to upgrades at the refinery's existing atmospheric distillation unit, gas oil hydrotreater, and amine purification units, the modernization project will include the addition of a new naphtha hydrotreating unit, light naphtha isomerization unit, fuel oil catalytic cracking unit, and a short-cycle adsorption unit to help increase hydrogen purity. Previously planned at a total investment of $600 million, the three-phased Bukhara refinery modernization and reconstruction project—already under way and to be executed in three phases—now will cost an estimated $678.5 million. The first stage, completed in early 2020, involved replacement of the catalyst system in the refinery's existing gas oil hydrotreater to increase production of Euro 4 and Euro 5-quality fuel. Scheduled to be completed by yearend 2022, the second-stage modernization work will include upgrading and reconstructing existing processing units at the site to enable 100% production of Euro 5-quality diesel, as well increase output of high-octane gasoline grades AI-91, AI-93, and AI-95. Slated for completion in 2025, the modernization program's final stage will involve construction of new units focused on improving the refinery's overall crude processing to 95% of its nameplate capacity, as well as boosting its production of higher-value, light oil products to 91%. While Bukhara's modernization and reconstruction program will not increase the refinery's current 50,000-b/d crude processing capacity, the project, once completed, will enable the plant to produce 1.2 million tpy of gasoline, 750,000 tpy of diesel, and 200,000 tpy of jet fuel, all of which meet Euro 5-quality standards.
VIETNAM	PetroVietnam	Dung Quat	Refinery expansion	40,164	Engineering	2021	Amec Foster Wheeler--FEED	Expansion
	PetroVietnam	Dung Quat	Hydrogen unit		Engineering	2021		New unit as part of expansion.
	PetroVietnam	Dung Quat	Alkylation unit		Engineering	2021		New unit as part of expansion.
	PetroVietnam	Dung Quat	Diesel hydrotreater		Engineering	2021		New unit as part of expansion.
	PetroVietnam	Dung Quat	Sulfur removal unit		Engineering	2021		New unit as part of expansion.
	PetroVietnam	Dung Quat	Gasoline hydrotreater		Engineering	2021		New unit as part of expansion.
	PetroVietnam	Dung Quat	Naphtha hydrotreater		Engineering	2021		New unit as part of expansion.
	PetroVietnam	Dung Quat	Solvent deasphalting unit		Engineering	2021		New unit as part of expansion.

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Added capacity listed in tons per year (tpy) unless otherwise specified.

Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
AUSTRALIA	Coogee Chemicals Pty. Ltd.	Darwin, Northern Territory	Methanol	350,000	Planning	2024		The methanol project would be built close to Inpex's Ichthys LNG plant at Middle Arm on Darwin Harbor. A final investment decision for the Darwin project is expected in early 2021 which would enable the plant to be brought on stream in 2024.
AZERBAIJAN	SOCAR GPC	Garadagh	Polyethylene	600,000	Engineering	2022	Univation Technologies--D/TL	
	SOCAR GPC	Garadagh	Propylene	120,000	Engineering	2022	Technip--D/TL	
	SOCAR GPC	Garadagh	Ethylene	610,000	Engineering	2022	Technip--D/TL	
BELGIUM	BASF Antwerpen NV	Verbund, Antwerp	Ethylene oxide	400,000	Engineering	2022		At a total investment amounting to more than €500 million, the expansion will add a second large EO plant at the site to increase production capacity by about 400,000 tonnes/year, as well as involve additional investments in various installations for EO derivatives, including non-ionic surfactants, glycol ethers for automotive applications, and other alkoxylates.
	Borealis AG	Kallo	Propylene	740,000	Engineering	2021	Honeywell UOP--E/TL	
	Ineos AG	Antwerp	Propylene	750,000	Engineering	2023	McDermott--TL/D	CATOFIN dehydrogenation process technology.
	Ineos AG	Antwerp	Ethylene		Planning	2023		
CANADA	Canada Kuwait Petrochemical Corp.	Sturgeon County, Alta.	Propane Dehydrogenation (PDH)-Polypropylene (PP)	550,000	Engineering	2023	Honeywell UOP LLC--TL/Eq.; Heartland Canada Partners (HCP; Fluor Canada-Kiewit Construction Services JV)--EPC	As part of the January 2020 contract award, HCP will deliver EPC services for construction of the complex's PDH unit for the estimated overall $4.5-billion PDH-PP complex. Pembina said CKPC now expects the PDH-PP complex to enter commercial service during second-half 2023. Once completed, the proposed complex will consume 23,000 b/d of Alberta-produced propane sourced from Pembina's Redwater fractionation complex as well as other regional facilities.
	Inter Pipeline Ltd.	Strathcona County, Alta.	Polypropylene	525,000	Under construction	2022	W.R. Grace & Co.--TL/Catalyst	The government of Alberta in April 2021 approved a $408-million (Can.) grant under its Alberta Petrochemicals Incentive Program (APIP) to support Calgary-based Inter Pipeline Ltd.'s Heartland Petrochemical Complex (HPC)—Canada's first integrated propane dehydrogenation (PDH) and polypropylene (PP) complex—now under construction in Strathcona County, Alta. Inter Pipeline will receive the cash grant in equal installments over 3 years once the HPC reaches startup and becomes operational, which currently is scheduled for 2022. Formally started in December 2017, the HPC is under construction near Inter Pipeline's Redwater Olefinic Fractionator (ROF)—which has a capacity to fractionate about 40,000 b/d of ethane-plus mixture—and will include an integrated PDH and PP plant designed to convert 22,000 b/d of locally sourced propane feedstock from ROF and several other third-party fractionators in the region into 525,000 tpy of polymer-grade PP mostly for sale to the US. The now $4-billion HPC is scheduled to be mechanically completed in 2021, with the PDH plant to be completed in May 2021 and the PP plant to follow by yearend. Anticipated in-service of the entire HPC project remains early 2022.
	West Coast Olefins Ltd.	Prince George, BC	Ethylene	1,000,000	Planning	2023		WCOL has now secured a 300-acre site in the BCR Industrial Area of Prince George in preparation for construction of the proposed petrochemical project, which would include both an ethylene and polyethylene (PE) plant for manufacturing of PE product for export to growing markets in Asia Pacific. The overall project also would include an NGL recovery plant to recover ethane, propane, butane, and natural gas condensate from Enbridge Inc.'s Westcoast Pipeline; a polyethylene plant to consume most of the ethylene produced; associated off-site facilities and infrastructure; and a possible monoethylene glycol plant on site to utilize the balance of produced ethylene.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
CHINA	Datong Coal Mine Group Co. Ltd. Dayuewan (Zhuhai) Petrochemical Co. Ltd. (China Grain Petrochemical Group)	Datong Gaolan Port Economic Zone, Guangdong Province	Polypropylene Uniflex MC slurry hydrocracking	430,000 1,400,000	Engineering Engineering	2022	W.R. Grace & Co.--TL Honeywell UOP--TL/E	The Uniflex MC slurry hydrocracking unit to upgrade bottom-of-the-barrel fuel oil into light oil products that will be fed to a Unicracking unit to produce naphtha for a CCR Platforming unit. The project also includes three Polybed pressure-swing adsorption (PSA) units to supply high-quality hydrogen for the Uniflex process. The PSA units are designed to generate 320,000 cu m/hr of hydrogen. When the project is completed, Dayuewan will be converting nearly all its vacuum residue to light oil products, representing one of the highest conversion rates in the world. The project also will adopt a range of unidentified advanced process technologies to recycle hydrogen and LPG. Contract awarded in November 2019.
	Formosa Chemicals Industries (Ningbo) Co. Ltd. (Formosa Chemicals & Fibre Corp.)	Ningbo, Zhejiang Province	Alpha-methyl-styrene (AMS) recovery	10,000	Engineering		McDermott--TL/E	The AMS recovery unit to be equipped with AMS technology jointly licensed by McDermott's Lummus Technology and Eni SPA subsidiary Versalis SPA. Contract awarded in November 2019.
	Hainan Huasheng New Material Technology Co. Ltd.	Dongfang City, Hainan Province	Bisphenol A (BPA)	240,000	Engineering		KBR--TL/E/D	Under the December 2019 contract, KBR will license Mitsubishi Chemical Corp.'s (MCC) proprietary BPA technology, as well as deliver commissioning, start-up support, and training services for the new 240,000 tonnes/year BPA plant
	LyondellBasell Industries NV-China Petroleum & Chemical Corp. (Sinopec)	Zhenhai, Ningbo Province	Styrene monomer (SM)	600,000	Planning	2022	LyondellBasell--TL	LyondellBasell signed a memorandum of understanding (MOU) in late-December 2019 to form a 50-50 joint venture with Sinopec to build a new PO-SM unit it Zhenhai, Ningbo, China, to satisfy rising demand in China's domestic market. If approved, construction of the new unit—which will be equipped with LyondellBasell's proprietary PO-SM production technology—would begin in early 2020 for scheduled start-up some time in 2022. This latest MOU for a proposed JV between the operators would be the second LyondellBasell-Sinopec partnership for PO-SM production in Zhenhai, where LyondellBasell 26.65% and Sinopec Zhenhai Refining & Chemical Co. Ltd. 73.35% already jointly own the existing Ningbo ZRCC Lyondell Chemical Co. Ltd. (NZLC), which produces 285,000 tpy of PO and 620,000 tpy of SM alongside SZRC's refinery. LyondellBasell has not disclosed a definitive timeframe for when the companies would take final investment decision on the project.
	LyondellBasell Industries NV-China Petroleum & Chemical Corp. (Sinopec)	Zhenhai, Ningbo Province	Propylene oxide (PO)	300,000	Planning	2022	LyondellBasell--TL	LyondellBasell signed a memorandum of understanding (MOU) in late-December 2019 to form a 50-50 joint venture with Sinopec to build a new PO-SM unit it Zhenhai, Ningbo, China, to satisfy rising demand in China's domestic market. If approved, construction of the new unit—which will be equipped with LyondellBasell's proprietary PO-SM production technology—would begin in early 2020 for scheduled start-up some time in 2022. This latest MOU for a proposed JV between the operators would be the second LyondellBasell-Sinopec partnership for PO-SM production in Zhenhai, where LyondellBasell 26.65% and Sinopec Zhenhai Refining & Chemical Co. Ltd. 73.35% already jointly own the existing Ningbo ZRCC Lyondell Chemical Co. Ltd. (NZLC), which produces 285,000 tpy of PO and 620,000 tpy of SM alongside SZRC's refinery. LyondellBasell has not disclosed a definitive timeframe for when the companies would take final investment decision on the project.

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	LyondellBasell; Liaoning Bora Enterprise Group (Bora)	Panjin	Ethylene	1,100,000	Under construction	2020	LyondellBasell--TL	LyondellBasell signed a memorandum of understanding to form a 50-50 joint venture with Liaoning Bora Enterprise Group (Bora) to operate the ethylene cracker. The facility will produce olefins and polyolefins that will be marketed by LyondellBasell.In a Nov. 13, 2019, presentation to investors, LyondellBasell said construction on the petrochemical complex—which will include the flexible naphtha-LPG cracker and units equipped to produce 800,000 tpy of PE-HDPE and 600,000 tpy of PP from flexible feedstock provided by Liaoning Bora Petrochemical Co. Ltd. subsidiary Panjin North Asphalt Fuel Co. Ltd.'s adjacent 10 million-tpy refinery—was about 50% completed. Alongside cracking, HDPE, and PP units, the Bora LyondellBasell Petrochemical complex is also to include a butadiene unit, a 120,000-tpy methyl tertiary butyl ether (MTBE) unit, a 35,000-tpy butene-1 plant, a cracked gasoline hydrogenation plant, an aromatics extraction plant, and a styrene plant, according to a series of August 2019 releases from Management Commission of New District of Liaodong Gulf of Panjin.
	Ningbo Kingfa Advanced Materials Co. Ltd.	Qingzhi Industrial Park of Ningbo Economic and Technological Development Zone, Ningbo City, Zhejiang Province	Propane dehydrogenation (PDH) expansion	1,200,000	Engineering		Lummus--TL	In November 2020, Kingfa Sci. & Tech. Co. Ltd. subsidiary Ningbo Kingfa Advanced Materials Co. Ltd. let a contract to Lummus Technology LLC to license technology for two new propane dehydrogenation (PDH) units to be built at its complex in the Qingzhi Industrial Park of Ningbo Economic and Technological Development Zone, Ningbo City, Zhejiang Province, adjacent to China's second largest port of Beilun. Lummus—alongside catalyst partner Clariant International Ltd.—will license its proprietary CATOFIN PDH technology process as well as provide the basic engineering package, technical services, and catalyst supply for the two PDH units, each of which will have a production capacity of 600,000 tpy to boost the site's propylene production capacity by 1.2 million tpy. While it disclosed neither a value nor timeframe for its work under the agreement, the service provider confirmed this latest contract follows Ningbo Kingfa's previous award to Lummus for licensing of CATOFIN PDH technology for the Ningbo plant's first PDH unit. The new PDH units come as part of the operator's Phase 2 and Phase 3 expansion projects at the complex. Established in 2011, Ningbo Kingfa's 16-billion yuan complex, in addition to propylene, produces isooctane, methyl ethyl ketone, 2-butanone, isooctane, n-butane, sulfuric acid, LPG, hydrogen, and mixed pentanes.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Ningxia Baofeng Energy Group Co. Ltd.	Yinchuan City, Ningxia Province	Methanol	7,200 tonnes/day	Engineering		Johnson Matthey—TL	In August 2020, Ningxia Baofeng Energy Group Co. Ltd. let a contract to Johnson Matthey to provide technology licensing for a third methanol synthesis plant at its 600,000-tpy coal-to-olefins (CTO) complex at Ningdong Energy Chemical Base in Yinchuan City, Ningxia Province, China. Johnson Matthey will deliver associated engineering, technical review, commissioning assistance, equipment, and catalyst for the proposed 7,200-tonnes/day plant, which will be equipped with Johnson Matthey's proprietary Advanced Series Loop technology and radial steam-raising converters to produce stabilized methanol from a feedstock of coal-derived synthesis gas (syngas). Baofeng Energy will use methanol production from the new plant—which, upon startup, will become the world's largest single-train methanol plant—to produce olefins in one of the Ningdong complex's downstream units. This latest contract follows Baofeng Energy's previous awards to Johnson Matthey for licensing of the Ningdong complex's original 4,450-tonnes/day methanol synthesis unit started up in 2014 as well as its second unit commissioned in May 2020. Johnson Matthey disclosed neither a value of the contract nor a timeframe for startup of the newly proposed third plant. Baofeng Energy's Ningdong CTO complex currently produces 4 million tpy of methanol, 1.2 million tpy of olefins, 4 million tpy of coke, and 780,000 tpy of specialty chemicals from coal-derived feedstock.
	PetroChina Guangdong Petrochemical Co. Ltd. (China National Petroleum Corp.'s PetroChina Co. Ltd.)	Jieyang Nandahai Petrochemical Industrial Zone, Guangdong Province	Paraxylene	52,200 b/d	Under construction	2023	Honeywell UOP--TL	Part of a refining-chemical integration project under way at PetroChina Guangdong Petrochemical's 400,000-b/d heavy crude oil processing and petrochemical site in the Jieyang Nandahai Petrochemical Industrial Zone of China's Guangdong province.
	PetroChina Guangdong Petrochemical Co. Ltd. (China National Petroleum Corp.'s PetroChina Co. Ltd.)	Jieyang Nandahai Petrochemical Industrial Zone, Guangdong Province	Polypropylene	500,000	Under construction	2023	W.R. Grace & Co.--TL	Part of a refining-chemical integration project under way at PetroChina Guangdong Petrochemical's 400,000-b/d heavy crude oil processing and petrochemical site in the Jieyang Nandahai Petrochemical Industrial Zone of China's Guangdong province.
	Shanghai Huayi (Group) Co. (Guangxi Huayi New Material Co. Ltd.)	Qinzhou, Guangxi	Propylene	750,000	Engineering		Honeywell UOP—TL	Shanghai Huayi (Group) Co. subsidiary Guangxi Huayi New Material Co. Ltd. in September 2020 let a contract to Honeywell UOP LLC to provide its proprietary C3 Oleflex technology for a propane dehydrogenation (PDH) plant at its integrated petrochemical complex in Qinzhou, Guangxi, China. Honeywell UOP will deliver licensing for the Oleflex technology, in addition to catalysts, adsorbents, and other unidentified services for the plant, which will produce 750,000 tpy of polymer-grade propylene to help meet China's growing demand for propylene derivatives. Huayi will use on-purpose propylene production from the plant as feedstock for the complex's downstream acrylic acid unit, as well as cumene and phenol units, to support creation of industrial and consumer products.
	Shanghai Huayi (Group) Co. (Guangxi Huayi New Material Co. Ltd.)	Qinzhou, Guangxi	Butanol	300,000	Engineering		Johnson Matthey, Dow—TL/D	Shanghai Huayi (Group) Co. subsidiary Guangxi Huayi New Material Co. Ltd. in February 2020 let a contract to Johnson Matthey and Dow to license their LP Oxo SELECTOR 10 technology for a new 300,000-tonnes/year butanol plant to be built at its integrated petrochemical complex in Qinzhou, Guangxi, China. Alongside technology licensing, the service providers will deliver customized plant design, performance warranties, technical support pre- and post-plant startup, as well as ongoing technology updates. A timeline for commissioning of the butanol plant project, however, was not revealed.

PETROCHEMICALS CONT.

Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Shanghai Huayi (Group) Co. (Guangxi Huayi New Material Co. Ltd.)	Qinzhou, Guangxi Province	Propylene; butanol	750,000; 300,000	Engineering		Honeywell UOP--TL; Johnson Matthey, Dow--TL/D	Shanghai Huayi (Group) Co. subsidiary Guangxi Huayi New Material Co. Ltd. in September 2020 let a contract to Honeywell UOP LLC to provide its proprietary C3 Oleflex technology for a propane dehydrogenation (PDH) plant at its integrated petrochemical complex in Qinzhou, Guangxi, China. Honeywell UOP will deliver licensing for the Oleflex technology, in addition to catalysts, adsorbents, and other unidentified services for the plant, which will produce 750,000 tpy of polymer-grade propylene to help meet China's growing demand for propylene derivatives. Huayi will use on-purpose propylene production from the plant as feedstock for the complex's downstream acrylic acid unit, as well as cumene and phenol units, to support creation of industrial and consumer products. The operator has disclosed neither a value of the contract nor a timeframe for the project's targeted completion. In February 2020, Huayi let a contract to Johnson Matthey and Dow to license their LP Oxo SELECTOR 10 technology for a new 300,000-tpy butanol plant to be built at the Qinzhou complex. Alongside technology licensing, the service providers will deliver customized plant design, performance warranties, technical support pre- and post-plant startup, as well as ongoing technology updates. A timeline for commissioning of the butanol plant project was not revealed.
	Zibo Qixiang Tengda Chemical Co. Ltd. (Zibo Qixiang Petrochemical Industry Group Co. Ltd.)	Zibo, Shandong Province	Propylene		Engineering		Honeywell UOP--TL	Honeywell UOP will provide its proprietary C3 Oleflex technology for the grassroots polymer-grade propylene to expand production of propylene in response to growing demand for propylene derivatives. The new unit will join QXTD's existing C3-C4 Oleflex unit that converts propane and isobutane into propylene into propylene and isobutylene. Contract awarded in late-October 2019.
EGYPT	Anchorage Investments Ltd.	Suez	Grassroots polypropylene plant	590,000	Engineering		Honeywell UOP--TL; Lummus--TL	In May 2021, Anchorage Investments Ltd. let a contract to a division of Lummus Technology LLC to provide technology licensing and additional services for a polypropylene (PP) unit to be built at subsidiary Anchor Benitoite's proposed grassroots petrochemical complex in Suez, Egypt, near the southern boundary of the Suez Canal. Lummus Novolen Technology GMBH will license its proprietary Novolen gas-phase polypropylene (PP) technology for a new 590,000-tpy PP unit at the complex, as well as deliver basic design engineering, training, catalyst supply, and operator-training simulator services for the project. The Novolen PP plant will produce PP using propylene produced from another unit within the complex The service provider disclosed no further details regarding a value of the contract or the duration of the project. The contract award follows Anchorage Investments' late-April 2021award to Honeywell UOP to license its proprietary C3 Oleflex technology for a propane dehydrogenation (PDH) plant at the complex that will produce 750,000 tpy of on-purpose, polymer-grade propylene. Requiring an overall investment of nearly $2 billion, Anchor Benitoite's proposed petrochemical complex at Suez will house five major installations with various production units equipped to produce a total of 1.75 million tpy of petrochemical products, including propylene, polypropylene, crude acrylic acid, n-butanol, and butyl acrylate. Intended to help Egypt increase its competitiveness and position as a petrochemical hub, as well as attract new investments into the country, the grassroots complex will have deep-sea access to the port and connection to multiple nearby pipelines, enabling product distribution to both domestic and global markets. A timeline for construction and commissioning of the proposed petrochemicals development has yet to be revealed.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Egyptian Ethylene & Derivatives Co.'s (Ethydco)	Alexandria	Polybutadiene	36,000	Engineering	2021		The $180-million project will produce 36,000 tpy of polybutadiene based on a feedstock of 20,000 tpy of butadiene sourced from Ethydco's own and Sidpec's operations. The project is scheduled for startup in fourth-quarter 2021.
	Egyptian Petrochemicals Holding Co.		Polyoxymethylene (POM)		Planning			The US Trade and Development Agency (USTDA) awarded a feasibility study grant in December 2019 to ECHEM for what will be Egypt's first POM plant. USTDA's study will provide expert analysis as ECHEM identifies the design, capital requirements, and technical specifications necessary to develop the POM plant, which will produce a recyclable thermoplastic for industrial and consumer products. The project will also drive local economic growth and provide a domestic supply of an important engineering plastic. ECHEM will select an American firm to conduct the study for the proposed POM plant. A timeframe for the project has yet to be disclosed.
	Ministry of Petroleum & Mineral Resources (MOPMR)	New Al-Alamein City	Grassroots integrated complex		Planning	2024		Egypt's MOMPR said in January 2020 it is evaluating a project to construct a new integrated refining and petrochemical complex at New Al-Alamein City on Egypt's northwestern coast, near Marsa Matrouh governorate. The complex would have crude and condensate processing capacity of 2.5 million tpy for production of a variety of high-quality fuels and petrochemical products to meet local demand, with any surplus exported via the Al Hamra terminal near the Mediterranean Sea. The $8.5-billion project, if realized, would be completed by yearend 2024 and supplied by Western Desert crude.
	Sidi Kerir Petrochemicals Co. (Egyptian Petrochemicals Holding Co.)	El-Amerya—El-Nahda Territory, Alexandria	Polypropylene	450,000	Under constr.	2022	W.R. Grace & Co.--TL/Catalyst	In February 2021, Egyptian Petrochemicals Holding Co. (ECHEM) subsidiary Sidi Kerir Petrochemicals Co. (Sidpec) implemented process automation improvements from Honeywell International Co.'s Honeywell Process Solutions (HPS) to upgrade production capabilities as part of the previously announced expansion of Sidpec's petrochemical complex in the El-Amerya—El-Nahda Territory of Alexandria. The automation improvements are specifically intended to support collective production at the site following startup of Sidpec's proposed expansion, which will add 450,000 tpy of polypropylene production from propane feedstock. Based on the latest information available from ECHEM and Sidpec, the new polypropylene plant is scheduled for commissioning in first-quarter 2022. Sidpec's Alexandria complex currently produces 300,000 tpy of ethylene, 225,000 tpy of polyethylene, 50,000 tpy of LPG, and 10,000 tpy of butene-1. Sidpec also plans to expand ethylene and polyethylene production capacities at the site to 470,000 tpy and 350,000 tpy, respectively, according to ECHEM's website.
INDIA	Abu Dhabi National Oil Co.- Adani Group-BASF SE-Borealis AG	Mundra, Gujarat	Propylene-polypropylene		Planning	2024		The partners said they plan to finalize the joint feasibility study by the end of first-quarter 2020. The collaboration includes evaluating a joint world-scale propane dehydrogenation (PDH) plant to produce propylene based on propane feedstock to be supplied by ADNOC that will be partially used as feedstock for a polypropylene (PP) complex, owned by ADNOC and Borealis, based on proprietary Borealis Borstar technology.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Bharat Petroleum Corp. Ltd.	Kochi, at Ambalamugal, Ernakulam district, Kerala State	Polyols	300,000 (propylene)	Engineering	2024	Fluor--PMC/FEED	Fluor contract awarded in January 2020. Six new process units will be built and integrated into BPCL's integrated Kochi refinery and petrochemical complex as part of this project: a propylene oxide unit, propylene glycol unit, polyols unit, ethylene oxide-monoethylene glycol unit, ethylene recovery unit, and cumene unit. Once completed, the Kochi complex will produce propylene glycol, ethylene glycol, and various grades of polyols based on a feedstock of 250,000 tonnes/year of polymer-grade propylene from the refinery. BPCL is investing 111.3 billion rupees to set up the Kochi specialty polyols petrochemical plant, which is scheduled to be completed sometime during 2023-24. The project comes as part of BPCL's program to help meet growing domestic demand for polyols and reduce India's dependence on petrochemical imports.
	HPCL Rajasthan Refinery Ltd.	Barmer, Rajasthan	Polypropylene	840,000	Engineering	2022	McDermott--TL, Eng.	McDermott will deliver licensing and basic engineering design of two 420,000-tpy polypropylene units that will use Lummus' proprietary Novolen process reactors and proprietary NHP catalyst to produce a full range of polypropylene products at the new integrated refinery.
KUWAIT	Kuwait Petroleum Corp.	Al-Zour	Propylene	330,000	Under constr.		McDermott--TL, Eng.	
	Petrochemical Industries Co. KSC	Al-Zour	Polypropylene	940,000	Under constr.	2022	Amec Foster Wheeler--FEED/PMC	Integration project with Al-Zour refinery.
	Petrochemical Industries Co. KSC	Al-Zour	Paraxylene	1,400,000	Under const.	2022		
MALAYSIA	Sarawak Petchem Sdn. Bhd.	Bintulu, Sarawak	Grassroots methanol plant	1,700,000	Under construction	0	Samsung Engineering--LEPCC; Air Liquide--TL	In June 2021, Sarawak Petchem Sdn. Bhd.—an oil and gas firm established and owned by Malaysia's Sarawak state government—let a contract to a division of Air Liquide SA to license process technology for a grassroots methanol plant now under development at Bintulu, Sarawak, eastern Malaysia. Air Liquide Engineering & Construction will deliver licensing of its proprietary Lurgi MegaMethanol technology for the planned 5,000-tonne/day (1.7-million tonne/year) methanol plant. Alongside technology licensing, engineering services, and related equipment for the methanol unit, Air Liquide's scope of delivery under the contract includes an air separation unit that will have capacity to produce 2,200 tonnes/day of oxygen. Sarawak Petchem's previously awarded a $1.07-billion contract to Samsung Engineering Co. Ltd. to provide licensing, engineering, procurement, construction, and commissioning (LEPCC) services for the proposed Sarawak methanol project. Partners in codeveloping the project from its prefeasibility study stage, Air Liquide and Samsung Engineering said they expect Sarawak Petchem's methanol plant to enter operation by late 2023.
NETHERLANDS	Royal Dutch Shell PLC (Shell Nederland Chemie BV)	Moerdijk	Ethylene furnace revamp		Engineering	2025	TechnipFMC—EPF	Royal Dutch Shell PLC in September 2020 let a contract to TechnipFMC PLC to provide engineering, procurement, and module fabrication (EPF) for proprietary equipment and related services for eight ethylene furnaces at Shell Nederland Chemie BV's 971,000-tpy Moerdijk petrochemicals complex in the Netherlands. Based on TechnipFMC's multi-lane radiant coil design, the new steam cracker furnaces will replace 16 older units to increase energy efficiency and reduce greenhouse gas (GHG) emissions at the complex without reducing capacity at the complex. The furnaces will be shipped to the site in modules, enabling the cracker to maintain continuous operation throughout the upgrading project. The new steam cracker furnaces are anticipated to reduce the Moerdijk complex's carbon dioxide (CO_2) emissions by about 10%. A timeframe for the project was not disclosed. Shell's investment in the furnace revamp at Moerdijk comes as part of the operator's ambition to become a net-zero emissions energy business by 2050 or sooner. Shell said it expects work on the Moerdijk upgrading project to be completed in 2025.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
NIGERIA	Dangote Group	Lekki Free Trade Zone, Lagos	Polypropylene		Under constr.	2022	Engineers India Ltd.--EPC	
OMAN	Duqm Refinery & Petrochemical Industries Co. LLC	Duqm Special Economic Zone, Duqm, Al Wusta Governate	Ethylene; NGL; butadiene; MTBE; 1-butene	1,600,000; 48 million cu m/day; 161,000; 145,000; 51,000	Engineering		Lummus Technology—TL/D/Eq.	In late-September 2020, Duqm Refinery & Petrochemical Industries Co. LLC (DRPIC), Muscat—a joint venture of state-owned OQ SAOC (OQ) and Kuwait Petroleum Corp. subsidiary Kuwait Petroleum International Ltd. (Q8)— let a contract to Lummus Technology LLC to license technology for a series of new units at the petrochemical portion of DRPIC's long-planned 230,000-b/d integrated refining complex under construction in the Duqm Special Economic Zone (SEZAD) in Duqm, Al Wusta Governate, on Oman's southeastern coast along the Arabian Sea, about 600 km south of Muscat. Lummus will provide the second-stage development of DRPIC's complex with its proprietary technology licensing and the process design package for what will become one of the world's largest ethylene units, NGL extraction units, a butadiene extraction unit, and a combined methyl tertiary butyl ether (MTBE)-1-Butene separation unit, the service provider said. Alongside technology licensing and design, Lummus's scope of delivery under the contract also includes supply of its proprietary Short Residence Time (SRT) pyrolysis cracking heaters, proprietary catalysts, equipment, as well as training and advisory services, to cover the following: • A 1.6-million tpy ethylene unit that will use SRT cracking heaters and be equipped with a low-pressure chilling train operating at less than half the operating pressure of a conventional flow scheme, as well as a patented, multicomponent tertiary refrigeration system that produces refrigeration from 40° C. to -140° C. in a single refrigeration system vs. the three systems used in a conventional design. • NGL extraction units with a combined 48-million cu m/day capacity equipped with Lummus's high-ethane recovery NGL-MAX process technology, which uses semi-lean and lean reflux to achieve high ethane recovery of 99+% from natural gas streams. Lummus will license technology for these units to OQ subsidiary Oman Oil Facilities Development Co. LLC. • A 161,000-tpy butadiene extraction unit equipped with Lummus-licensed N-methylpyrrolidone (NMP)-based butadiene extraction technology from BASF SE, which produces high-purity 1,3-butadiene of 99.7 wt % purity while recovering more than 99% of 1,3-butadiene from crude C4 cuts. • A combined MTBE-1-butene separation unit equipped with Lummus's CDMtbe technology to process various hydrocarbon feedstocks from the steam cracker for production of 145,000 tpy of MTBE and 51,000 tpy of high-purity 1-butene. Lummus disclosed neither a value of the contract nor a timeframe for its work on the project. Primarily designed to produce and recover naphtha, jet fuel, diesel, and LPG, the Duqm refinery will include units for hydrocracking, hydrotreating, delayed coking, sulfur recovery, hydrogen generation, and Merox treating. As of September 2020, the nearly $6-billion refinery project was 68.4% completed, with launch of preliminary test runs at the refinery site slated for yearend 2021. Specific details regarding commissioning of the project's second-stage petrochemical development have yet to be revealed.
POLAND	PKN Orlen SA	Plock	Paraxylene	400,000	Engineering	2023	Technip--EPC; Honeywell UOP--TL	$221.9 million.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	PKN Orlen SA	Plock	Ethylene		Engineering	2023	Honeywell UOP--TL; Fluor--PMC+	Project will increase production of ethylene and aromatics, as well as improve flexibility of gasoline production, at its 327,300-b/d Plock integrated refining and petrochemical complex. Honeywell UOP will license its proprietary MaxEne process, which separates full-range naphtha into a stream of normal paraffins ideal for steam crackers because they produce high yields of light olefins, and a second stream of isoparaffins, naphthenes, and aromatics ideal for catalytic reforming units because they produce high yields of aromatics. The project comes as part of PKN Orlen's Petrochemicals Development Programme (PDP), which aims to position the company to take full advantage of its potential in petrochemicals. The company expects investments under the PDP to add some 30% to PKN Orlen's existing capacity, while ensuring a marked improvement in Poland's overall trade balance in petrochemicals. Launched in 2018 and requiring an estimated investment of about 8.3 billion zloty, the PDP will be implemented through yearend 2023. Alongside launching a new research and development center in 2020 to generate a range of proprietary technologies, PKN Orlen also said another ongoing PDP project to build an aromatic derivatives plant is also at an advanced stage.
	PKN Orlen SA	Plock	Phenol	200,000	Engineering	2023	Honeywell UOP--TL	UOP will deliver licensing for its proprietary Q-Max and Phenol 3G technologies to enable phenol production. Alongside technology licensing, UOP said it also will provide both a cumene unit and phenol unit with alpha methyl styrene hydrogenation, as well as basic engineering design services, key equipment, catalysts, adsorbents, and technical services for the new units. Specifically, UOP's Q-Max process will convert benzene and propylene into high-quality cumene—the primary building block for production of phenol and its derivatives—at low benzene-to-propylene ratios using regenerable catalysts that reduce byproduct transalkylation catalyst requirements, lowering utility consumption and capital requirements for the complex's downstream fractionation equipment. The UOP 3G Phenol unit will convert cumene into high-yield, high-quality phenol, which will then be converted into plastics and other related materials, including bisphenol-A—a building block for polycarbonate plastics—and phenolic resins used to make durable laminated boards and industrial adhesives. The integrated units and technologies also will increase operating flexibility, on-stream time, reliability, and safety at the proposed Plock phenol complex. Once completed, the new units will enable PKN Orlen to extend its benzene production into phenol and acetone derivatives, positioning the operator to meet growing demand for phenol and other petrochemicals in Poland and even become a net exporter of those products. The project comes as part of PKN Orlen's Petrochemicals Development Programme (PDP), which aims to position the company to take full advantage of its potential in petrochemicals. The company expects investments under the PDP to add some 30% to PKN Orlen's existing capacity, while ensuring a marked improvement in Poland's overall trade balance in petrochemicals. Launched in 2018 and requiring an estimated investment of about 8.3 billion zloty, the PDP will be implemented through yearend 2023.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
QATAR	Chevron Phillips Chemical Co. LLC-Qatar Petroleum	Ras Laffan Industrial City	Polyethylene	1,680,000	Planning	2025		The proposed complex will include a 1.9 million-tpy ethane cracker as well as two HDPE derivative units with a combined capacity of 1.68 million tpy. In addition to exclusive licensing of its proprietary MarTECH loop slurry process for manufacturing HDPE, CPCC will provide project management, engineering, and construction services to develop the project. As part of the development phase, the companies also will study potential efficiencies that could be realized by harnessing existing capabilities of Qatar Chemical Co. joint ventures to provide overall operational management of the completed complex. In June 2019, CPCC said it expects the project's engineering design phase to begin shortly, with planned start-up of the complex targeted for late 2025. QP will own a 70% majority share of the joint venture, while CPCC will hold the remaining 30%.
	Chevron Phillips Chemical Co. LLC-Qatar Petroleum	Ras Laffan Industrial City	Ethylene	1,900,000	Engineering	2025	CPCC--PM, Eng., Constr., TL	The proposed complex will include a 1.9 million-tpy ethane cracker as well as two HDPE derivative units with a combined capacity of 1.68 million tpy. In addition to exclusive licensing of its proprietary MarTECH loop slurry process for manufacturing HDPE, CPCC will provide project management, engineering, and construction services to develop the project. As part of the development phase, the companies also will study potential efficiencies that could be realized by harnessing existing capabilities of Qatar Chemical Co. joint ventures to provide overall operational management of the completed complex. In June 2019, CPCC said it expects the project's engineering design phase to begin shortly, with planned start-up of the complex targeted for late 2025. QP will own a 70% majority share of the joint venture, while CPCC will hold the remaining 30%.

PETROCHEMICALS CONT.

Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
RUSSIA	Baltic Chemical Complex LLC (JSC RusGazDobycha)	Gulf of Finland, near Ust-Luga	Ethylene; polyethylene	2,800,000; 480,000	Under constr.	2024	Lummus Technology—TL/E/Eq.; China National Chemical Engineering & Construction Corp. Seven Ltd.—EPC; Axens--TL; PESCO Switzerland AG—PM; McDermott--E/P	In October 2020, JSC RusGazDobycha subsidiary Baltic Chemical Complex LLC, through a subcontractor, let a contract to PESCO Switzerland AG to provide project management (PM) for its $13-billion ethane cracking project under construction on the Gulf of Finland near Ust-Luga, Russia. As part of the contract awarded by China National Chemical Engineering & Construction Corp. Seven Ltd. (CC7), PESCO Switzerland will deliver PM services for early works, long-lead item (LLI) procurement, and supply for the project. PESCO Switzerland said this latest award follows a previous contract to PESCO Switzerland in November 2019 to provide PM services for the project's extended basic engineering stage as part of jointly integrated PM team with CC7. In September 2020, BCC let a contract to Axens Group to license its AlphaButol technology for production of high-purity 1-butene by ethylene dimerization as well as its AlphaHexol technology for production of high-purity 1-hexene through ethylene trimerization at the complex. The project includes two 60,000-tpy for production of 1-butene and one 50,000-tpy unit for production of 1-hexene. The complex will use 1-butene and 1-hexene as comonomers for production of various types of polyethylene (PE), including linear low-density PE (LLDPE) and high-density PE (HDPE). First announced in 2019 and slated to become the largest ethylene integration project in the world once completed, the natural gas processing chemical plant will include two ethylene cracking sites—each with a capacity of 1.4 million tpy—six polyethylene trains with a combined processing capacity of 480,000 tpy, and two linear alpha olefin plants with a combined capacity of 137,000 tpy. Construction work on the integrated complex—which will process ethane-containing gas from PJSC Gazprom's production fields—currently is proceeding according to schedule. The complex is due to be completed in two phases, with Phase 1 commissioning planned for fourth-quarter 2023 and Phase 2 startup to follow in fourth-quarter 2024.
	Gaz Sintez LLC	Vlysotsk, Leningrad Region	Methanol	1,600,000	Engineering	2023	Hadlor Topsoe--TL; Hyundai Engineering--FEED; JSC NIIK--D	As part of its January 2020 contract award, Haldor Topsoe is licensing its proprietary SynCOR methanol technology for the proposed methanol plant. In April 2019, Hyundai Engineering said FEED activities would take 13 months to complete.
	Irkutsk Oil Co. Ltd. (Irkustsk Polymer Plant)	Irkutsk Region of East Siberia	Ethylene; Polyethylene	650,000; 650,000	Planning	2022	Toyo Engineering Corp - Eng., Proc., TL; McDermott--TL, Eng.	

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	JSC Sayanskkhimplast	Sayano-Irkutsk development support area, Irkutsk Region, East Siberia	Gas chemical complex		Planning		Gazprom Proyektirovaniye--Prefeasibility	In January 2020, Gazprom Proyektirovaniye (Gazprom Design) said it completed a prefeasibility study on developing the gas chemical complex. The study evaluated the economic and technological parameters of developing the Sayano-Irkutsk gas chemical complex. Results indicated implementation of the project was in close connection with gasification of districts in the region, gas supply to industrial enterprises, conversion of coal from combined heat and power (CHP) to gas in large settlements and boiler houses in the Lake Baikal region, and increased use of natural gas in quality of motor fuel to improve the environmental situation as well as social conditions of the population in the Irkutsk region. In February 2018, Sayanskkhimplast said it had always emphasized its interest in creating a gas chemical complex on its Sayansk industrial site and was actively involved in the development of the project, noting it was ready to accept any profitable investment offers, regardless of the nationality of the investor. In October 2018, the government of Irkutsk region, upon visiting Sayanskkhimplast's industrial site, said it was continuing to cooperate with producer Gazprom in hopes of approaching the first stage of gasification of the region. Gas feedstock for the project would be sourced via pipeline to the Sayansk site from Kovykta gas condensate field. Sayanskkhimplast has yet to officially confirm specific details of the proposed gas chemical complex project.
	Nakhodka Mineral Fertilizer Plant CJSC	Vladivostok	Methanol	1,800,000	Under construction	2023	Haldor Topsoe--TL; China Chengda Engineering Co. Ltd.--EPC	Due for start-up in 2023 with a planned total capacity of as much as 1.8 million tonnes/year of methanol and up to 1.8 million tpy of ammonia, the plant—which will be located near the major Russian seaport Nakhodka in the Primorsky region—aims to export products to destinations in Southeast Asia.
	PJSC Nizhnekamskneftekhim	Nizhnekamsk, Tatarstan	Ethylene	616,000	Engineering	2022	Linde AG--TL/D/P/E consulting; Lummus Technology--TL/E	In April 2021, TAIF Group subsidiary PJSC Nizhnekamskneftekhim (NKNK) let a contract to Lummus Technology LLC to deliver technology licensing and engineering services for a series of new units to be built as part of an expansion of NKNK's existing petrochemical complex at Nizhnekamsk, Tatarstan. Lummus Technology will license its proprietary technologies and provide basic engineering for four new plants—including what will be Russia's first ethylene dimerization and olefins conversion units—aimed at enabling NKNK to expand both the range and volume of raw materials used to produce rubber and plastic products. Lummus Technology's scope of delivery will include the following: • A unit equipped with EBOne technology that will produce 250,000 tpy of ethylbenzene. • A unit equipped with Classic SM technology designed to produce 250,000 tpy of styrene monomer. • Two units—one outfitted with ethylene dimerization (DIMER) technology and the other with olefins conversion (OCT) technology—based on olefins metathesis chemistry that, combined, will produce 150,000 tpy of polymer-grade propylene. Lummus Technology disclosed neither a value of the contract nor a timeframe for its work on the project. The latest contract award for expansion of the Nizhnekamsk complex follows NKNK's more than 45-billion rubles investment during 2019 to upgrade, rehabilitate, modernize, rebuild, and improve environmental performance at the site. NKNK's existing petrochemical complex produces 616,000 tpy of ethylene and 300,000 tpy of propylene, which the operator uses to manufacture a host of products, including synthetic rubbers, plastics, ethylbenzene, styrene, ethylene oxide, propylene oxide, alphaolefins, among others.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	PJSC Nizhnekamskneftekhim	Nizhnekamsk, Tatarstan	Grassroots olefins complex	600,000 tpy ethylene; 272,800 tpy propylene	Under construction	2023	Linde--TL; Gemont--EPC	In November 2020, TAIF Group subsidiary PJSC Nizhnekamskneftekhim (NKNK) confirmed it is progressing with its previously announced grassroots olefins and derivatives complex currently under construction at Nizhnekamsk. Following NKNK's February 2020 contract award to OOO Gemont for delivery of EPC on the project, construction activities immediately began and have remained ongoing at the site without a single day of stoppages despite the coronavirus (COVID-19) pandemic. Designed to reduce Tatarstan's export of petrochemical and gas feedstocks as well as increase its production of target high-value products such as rubber and plastics, the new olefins complex—known as EP-600—will include six cracking furnaces, based on technology licensed by Linde Group, designed to crack 1.8 million tpy of naphtha into 600,000 tpy of ethylene and 272,800 tpy of propylene. The EP-600 complex also will produce 88,000 tpy of butadiene and 245,600 tpy of benzene. Alongside other units, the complex also will feature a unit dedicated to producing 89,000 tpy of divinyl, the primary raw material used to produce a range of synthetic rubbers. With installation of major equipment well under way and laying of pipelines to interconnect units most recently scheduled to begin by end-April 2021, the new EP-600 complex remains on schedule for commissioning in 2023.
	PJSC Sibur Holding	Svobodny, Amur	Polyethylene-polypropylene	1,500,000; 400,000	Engineering	2025	Linde--TL/E/P; NIPIgazpererabotka (Nipigaz)--Contractor; Maire Tecnimont (Tecnimont); MT Russia LLC; Sinopec Engineering Inc., and Sinopec Engineering Group Co. Ltd.—EPSS	In May 2020, PJSC Sibur Holding let a contract to a consortium led by Maire Tecnimont SPA subsidiary Tecnimont SPA to provide services for Sibur subsidiary Amur GCC LLC's long-planned Amur gas chemical complex (AGCC), an integrated 1.5 million-tpy polyethylene and polypropylene production complex to be built near Svobodny in Russia's far-east Amur region. As part of the €1.2-billion contract, Tecnimont and consortium partners MT Russia LLC, Sinopec Engineering Inc., and Sinopec Engineering Group Co. Ltd. will deliver engineering, procurement, and site services (EPSS) for the AGCC. Scheduled for mechanical completion in 2024, AGCC is the downstream expansion of the Amur gas development initiative that began with PJSC Gazprom subsidiary OOO Gazprom Pererabotka Blagoveshchensk's (GPB) nearby 42 billion-cu m/year grassroots Amur natural gas processing plant (AGPP) now under construction in Svobodny, near the border with China. The EPSS contract award to Tecnimont for AGCC follows GPB's earlier €3.9-billion contract award to the service provider and consortium partner Sinopec Engineering subsidiary Sinopec Ningbo Engineering Corp. to provide all engineering, procurement, construction, commissioning, and performance testing services for utilities, infrastructure, and off-site installations of the AGPP. In February 2020, Sibur let a contract to Linde PLC deliver EPSS based on its proprietary technology for AGCC's cracker, which will receive LPG and ethane fraction feedstock under a long-term contract from GPB's AGPP. Sibur previously said it expects a proposed increase in the overall amount of ethane fraction and LPG feedstock supplies of up to 3.5 million tpy over time from AGPP will allow AGCC to expand design capacities at the site from an initial 1.5 million tpy of polyethylene to about 2.3 million tpy of polyethylene and 400,000 tpy of polypropylene. While Sibur has completed preliminary design development and approved configuration as well as capacities for AGCC's proposed units, the operator has yet to confirm completion of front-end engineering design or final approval for implementation of the petrochemical project. AGPP is scheduled to reach full operational capacity by 2025.

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SAUDI ARABIA	Advanced Petrochemical Co. (Advanced Global Investment Co.; Advanced Polyolefins Co.)	Jubail Industrial City	Propane Dehydrogenation (PDH)-Polypropylene (PP)	800,000; 843,000	Engineering	2024	Lummus Technology-Clariant—TL/E; Fluor—PMC; LyondellBasell—TL; Tecnimont--EPC	In May 2020, Advanced Petrochemical Co. (APC) let a contract to Lummus Technology LLC to license technology for APC subsidiary Advanced Global Investment Co.'s (AGIC) proposed propane dehydrogenation (PDH) and polypropylene (PP) complex at APC's existing operations in Jubail Industrial City, on Saudi Arabia's eastern coast. Lummus Technology—alongside catalyst partner Clariant International Ltd.—will license its proprietary CATOFIN PDH technology process as well as provide the basic engineering package for a C3 CATOFIN unit to be installed at the new complex. Once in operation, the new unit will have a propylene production capacity of 843,000 tpy. AGIC also let a contract earlier in May 2020 to Fluor Corp. for delivery of project management consultancy (PMC) on the complex, which alongside propylene, also will produce 800,000 tpy of PP that will be used for production of specialty polymers by manufacturers in the face mask, automotive, pipes, food packaging, and textiles industries. APC also previously confirmed AGIC has let a contract to LyondellBasell Industries NV subsidiary Basell Poliolefine Italia SRL to license its proprietary Spherizone and Spheripol technologies for the complex's two PP plants, each of which will have a capacity of 400,000 tpy. Award of the technology and PMC contracts follow AGIC's March 2020 signing of a shareholders agreement with SK Gas Co. Ltd. subsidiary SK Gas Petrochemical Pte. Ltd. (SKGP) to establish a joint venture named Advanced Polyolefins Co. (APC JV) for construction and operation of the proposed PDH-PP complex. At a total estimated cost of about $1.8 billion, the planned PDH-PP project will be financed 25% by equity of shareholders, while APC JV will finance the remaining 75% via borrowing from lenders, APC said. AGIC will hold 85% interest in APC JV, with SKGP to hold the remaining 15% stake. APC said APC JV expects to begin construction in 2021 on the new PDH-PP complex—which will receive its main feedstock of propane from Saudi Aramco under a long-term contract—for a targeted start-up of operations by second-half 2024. APC currently produces 455,000 tpy of propylene and 450,000 tpy of PP at its existing Jubail Industrial City plants.
	Huajin Aramco Petrochemical Co. Ltd.	Panjin, Liaoning Province	Ethylene; Paraxylene	1,500,000; 1,300,000	Planning	2024		JV of Saudi Aramco and China North Industries Group Corp. as part of the proposed integrated 300,000-b/d refinery and petrochemicals complex.
	Saudi Aramco Total Refinery & Petrochemicals Co.	Jubail	Ethylene	1,500,000	Engineering	2024	Lummus Technology--TL, E	FEED under way; Amiral petrochemical complex.
	Saudi Aramco-SABIC	Yanbu	COTC complex	9,000,000	Engineering	2025	KBR--FEED; John Wood Group--pre-FEED,PM	Proposed crude oil-to-chemicals complex; FID due upon completion of FEED.
SOUTH KOREA	Hyundai Chemical Co. Ltd.	Daesan, Chungcheongnam-do Province	Polyethylene	300,000	Under constr.	2021	Univation Technologies LLC--TL	Univation will provide its UNIPOL PE technology for the 300,000-tpy high-density polyethylene (HDPE) plant
	Hyundai Chemical Co. Ltd.	Daesan, Chungcheongnam-do Province	Polypropylene	250,000	Under constr.	2021	W.R. Grace & Co.--TL	The UNIPOL PP unit, which will be used to produce high-end, specialty-grade random copolymer resins, comes as part of a larger cracker complex that is scheduled to begin operations in 2021.
	S-Oil Corp.	Ulsan	Ethylene	1,500,000	Planning	2023		Feasibility study under way.
	S-Oil Corp.	Ulsan	Polyethylene		Planning	2023		Feasibility study under way.
	S-Oil Corp.	Ulsan	Polypropylene		Planning	2023		Feasibility study under way.
	S-Oil Corp. Saudi Aramco	Ulsan	Ethylene	1,500,000	Planning	2024		In June 2019, S-Oil and Saudi Aramco signed a memorandum of understanding between the two companies to collaborate on Phase 2 of the Ulsan complex, which will involve construction of a $6-billion, 1.5 million-tpy mixed-feed steam cracker and olefins downstream project scheduled to be completed by 2024

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
THAILAND	IRPC PLC	Rayong Province	Benzene	495,000	Engineering	2022	Honeywell UOP--TL/D/Equip./Catalyst	
	IRPC PLC	Rayong Province	Paraxylene	1,200,000	Engineering	2022	Honeywell UOP--TL/D/Equip./Catalyst	
	Map Ta Phut Olefins Co. Ltd.	Rayong Province	Ethylene	350,000	Engineering	2021	McDermott--E/D/TL	Debottlenecking project to increase ethylene production.
	PTT Global Chemical PCL	Map Ta Phut Industrial Estate, Rayong Province	Olefins complex expansion		Under construction	2023	Samsung Engineering--EPC	In January 2021, PTT Global Chemical PCL (PTT GC) let a contract to a subsidiary of Samsung Engineering Co. Ltd., Seoul, for a recently approved project to expand use of propane as a feedstock at PTT GC's existing olefins operations at Map Ta Phut Industrial Estate in Thailand's Rayong Province, about 150 km southeast of Bangkok. As part of the $120-million contract, Samsung Engineering (Thailand) Co. Ltd. will provide EPC services for PTTGC's proposed Olefins 2 modification project at the Map Ta Phut complex. The EPC contract award follows PTT GC's final investment decision to move forward with the project taken at an October 2020 meeting of the operator's board of directors. Alongside increasing propane usage as a feedstock, the Olefins 2 modification project also aligns with the operator's broader strategy of enhancing overall feedstock flexibility to ensure long-term competitiveness of the complex. With Thailand's Office of Natural Resources and Environmental Policy and Planning (ONEP) approval of the project's environmental impact assessment report now granted, the Olefins 2 modification project is scheduled to enter commercial operation during first-quarter 2023 at a total investment of about $165 million.
TURKEY	Ceyhan Polipropilen Uretim AS (Ronesans Holding—Sonatrach SPA)	Ceyhan Mega Petrochemistry Industry Zone, Ceyhan	Propylene	457,000	Engineering	2023	Honeywell UOP--TL, E, D, Eq.	Part of Ceyhan Polipropilen Uretim's grassroots petrochemical complex to be built in Ceyhan. The new PDH unit will enable Ceyhan Polipropilen Uretim to manufacture polypropylene domestically, reducing Turkey's dependence on imports from manufacturers in the Middle East and Western Europe.
	Ceyhan Polipropilen Uretim AS (Ronesans Holding—Sonatrach SPA)	Ceyhan Mega Petrochemistry Industry Zone, Ceyhan	Polypropylene	450,000	Engineering	2023		Formed in early 2019, Ceyhan Polipropilen Uretim plans to begin production at its new $1.2-billion, 450,000-tpy polypropylene plant in 2023. The complex also will include a PDH unit that will produce 457,000 tpy of polymer-grade propylene.
TURKMENISTAN	Turkmengaz	Ovadan-Depe, Akhal region	Gas-to-gasoline complex		Planning		Kawasaki Heavy Industries Ltd.--EPC	In August 2020, state-owned Turkmengaz and Japan's Kawasaki Heavy Industries Ltd. discussed plans for a proposed expansion of Turkmengaz's recently commissioned natural gas-to-gasoline (GTG) complex at Ovadan-Depe near Ashgabat, in Turkmenistan's Akhal region. Heads of the companies reviewed implementation plans for construction of a second GTG plant at the Ovadan-Depe GTG complex as part of an ongoing bilateral collaboration partnership between Turkmenistan and Japan in the petrochemicals sector. Turkmengaz, however, disclosed no details regarding either production capacities or the construction timeframe of the proposed second GTG plant. Built by a consortium of Kawasaki Heavy Industries and Rönesans Endüstri Tesisleri Inşaat Sanayi ve Ticaret Aş and officially entered into operation in June 2019, Turkmengaz's $1.7-billion GTG complex is designed to process 1.785 billion cu m/year of natural gas to produce 600,000 tpy of Euro 5-compliant A-93 gasoline as well as 115,000 tpy of liquefied gas and 12,000 tpy of diesel using Haldor Topsoe AS's proprietary Topsoe Improved Gasoline Synthesis (Tigas), which involves a combination of SynCOR Methanol technology with a gasoline synthesis loop. Late in 2019, Turkmengaz signed a memorandum of understanding with Kawasaki Heavy Industries and Sojitz Corp. for design and construction of the second GTG complex, also presumably to be based on Topsoe's Tigas technology.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
UNITED ARAB EMIRATES	Abu Dhabi National Oil Co.-Reliance Industries Ltd.	Ruwais, Abu Dhabi	Ethylene dichloride (EDC)		Planning			As part of the December 2019 development agreement, ADNOC and RIL will evaluate the potential creation of a plant that manufactures EDC adjacent to ADNOC's integrated refining and petrochemical site in Ruwais and strengthen the companies' existing relationship supporting future collaboration in petrochemicals. ADNOC would supply ethylene to the potential joint venture and provide access to infrastructure at Ruwais, while RIL will deliver operational expertise and entry to the large and growing Indian vinyls market, in which it is a key participant.
	Abu Dhabi Polymers Co. Ltd.	Ruwais	Polypropylene	480,000	Engineering	2021	Tecnimont SPA--EPC	Proposed PP5 plant to be equipped with Borstar proprietary polyolefin multimodal process technology; tender planned to lauch after July 2017; FID due by yearend 2018.
	Abu Dhabi Polymers Co. Ltd. (Borouge; Abu Dhabi National Oil Co.-Borealis AG)	Ruwais	Ethylene	1,800,000	Under constr.	2023	WorleyParsons--PMC; Tecnimont--FEED	Proposed Borouge 4 expansion; now under construction at the same location of the operator's three existing plants, the Borouge 4 complex will host what will become world's largest mixed-feed cracker with an estimated ethylene output of 1.8 million tpy as well as a total olefins and aromatics production capacity of 3.3 million tpy using a variety of feedstocks such as ethane, butane, and naphtha from ADNOC's refining and gas processing operations. Alongside ethylene, the cracker and its derivative units will produce propylene, butadiene, MTBE, 1-butene, pygas,1-hexene, and benzene, with ethylene and propylene to be converted into PE and polypropylene (PP) products. Borouge plans to more than double the current 4.5 million-tpy capacity of its production site by 2030.
	Abu Dhabi Polymers Co. Ltd. (Borouge; Abu Dhabi National Oil Co.-Borealis AG)	Ruwais	MTBE	124,000	Engineering	2023	Axens--TL	Part of proposed Borouge 4 expansion; additionally, Axens will provide a methyl acetylene and propadiene (MAPD) unit, a C4 hydrogenation unit, and a second-stage pygas hydrogenation unit for downstream of the project's new steam cracker.
	Abu Dhabi Polymers Co. Ltd. (Borouge; Abu Dhabi National Oil Co.-Borealis AG)	Ruwais	1-butene	50,000	Engineering	2023	Axens--TL	Part of proposed Borouge 4 expansion; additionally, Axens will provide a methyl acetylene and propadiene (MAPD) unit, a C4 hydrogenation unit, and a second-stage pygas hydrogenation unit for downstream of the project's new steam cracker.
	Abu Dhabi Polymers Co. Ltd. (Borouge; Abu Dhabi National Oil Co.-Borealis AG)	Ruwais	1-hexene	75,000	Engineering	2023	Axens--TL	Part of proposed Borouge 4 expansion; additionally, Axens will provide a methyl acetylene and propadiene (MAPD) unit, a C4 hydrogenation unit, and a second-stage pygas hydrogenation unit for downstream of the project's new steam cracker.
UNITED STATES	Chevron Phillips Chemical Co. LLC-Qatar Petroleum	US Gulf Coast	Polyethylene	1,000,000	Planning	2024	CPCC--PM, Eng., Constr., TL	To be known as the USGC II, the complex will include a 2 million-tpy ethylene cracker and two 1 million-tpy high-density polyethylene (HDPE) units. CPCC would own 51% interest in the project, with QP holding the remaining 49% interest. Alongside providing project management and oversight, CPCC also would be responsible for operation and management of the complex, which the companies estimate will cost about $8 billion. CPCC and QP said they expect to take a final investment decision on the project no later than 2021, followed by full funding and award of engineering, procurement, and construction contracts, for a targeted start-up of the new complex in 2024.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Chevron Phillips Chemical Co. LLC-Qatar Petroleum	US Gulf Coast	Ethylene	2,000,000	Planning	2024		To be known as the USGC II, the complex will include a 2 million-tpy ethylene cracker and two 1 million-tpy high-density polyethylene (HDPE) units. CPCC would own 51% interest in the project, with QP holding the remaining 49% interest. Alongside providing project management and oversight, CPCC also would be responsible for operation and management of the complex, which the companies estimate will cost about $8 billion. CPCC and QP said they expect to take a final investment decision on the project no later than 2021, followed by full funding and award of engineering, procurement, and construction contracts, for a targeted start-up of the new complex in 2024.
	Chevron Phillips Chemical Co. LP	Old Ocean, Tex.	Grassroots 1-hexene plant	260,000	Under construction	2023		Chevron Phillips Chemical Co. LP (CPChem), a joint venture of Chevron Corp. and Phillips 66, in May 2021 undertook work to expand production of alpha olefins with addition of a grassroots on-purpose 1-hexene plant near its Sweeny petrochemical complex in Old Ocean, Tex. The project includes construction of a new 1-hexene unit equipped with CPChem's proprietary technology that, once in operation, will use a feedstock of ethylene to produce 266,000 tpy of high-purity, comonomer-grade 1-hexene, a critical component used in producing polyethylene (PE). Scheduled for targeted startup in 2023, the planned Old Ocean 1-hexene project comes as part of CPChem's program to help meet customers' needs as global PE demand continues to grow. To be equipped with the latest advances in process design for maximum production, optimized resource efficiency, and reduced emissions in line with the company's long-term sustainability strategy, the Old Ocean unit will join CPChem's current operation of the world's largest on-purpose 1-hexene plant at its Cedar Bayou chemical complex in Baytown, Tex. Following commissioning of the Old Ocean plant, CPChem said it will have a total US 1-hexene capacity of 650,000 tpy.
	Enterprise Products Partners LP	Mont Belvieu, Tex.	Propylene	1.65 billion lb/year	Under constr.	2023	S&B Engineers & Constructors Ltd.--EPC; Honeywell UOP--TL	Part of a long-term contract with LyondellBasell Industries NV under which Enterprise will process LyondellBasell-provided propane to the unit for a fixed fee. The new PDH plant, which will have the capacity to process up to 35,000 b/d of propane to produce up to 1.65 billion lb/year of polymer-grade propylene, remains on schedule for completion in first-half 2023, EPP said in January 2020.
	Enterprise Products Partners LP	Mont Belvieu, Tex.	Propylene	750,000	Engineering	2023	Honeywell UOP--TL	Adds a second PDH plant at Mont Belvieu. As part of a November 2019 contract, Honeywell UOP will deliver licensing for its Oleflex technology, in addition to engineering, catalysts, adsorbents, services, and equipment for the PDH2 plant, will produce 750,000 tpy of polymer-grade propylene as part of Enterprise's expansion of propylene manufacturing capacity. The PDH2 unit is scheduled to begin service in first-half 2023.
	ExxonMobil Corp.	Baytown, Tex.	Polymers	400,000	Engineering	2022	Tecnimont SPA-Performance Contractors Inc.--FEED	A consortium of Maire Tecnimont SPA subsidiary Tecnimont SPA and Performance Contractors Inc. will provide FEED, early execution studies, and early procurement activities for new process units and associated offsites and utilities at the operator's $2-billion project to expand its Baytown, Tex., chemical plant. The Tecnimont USA Inc.-led consortium's scope of work includes implementation of new innovative process units, including a 400,000-tonne/year Vistamaxx performance polymer unit as well as a 350,000-tpy linear alpha olefins unit.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	ExxonMobil Corp.	Baytown, Tex.	Linear alpha olefins (LAO)	350,000	Engineering	2022	Tecnimont SPA-Performance Contractors Inc.--FEED	A consortium of Maire Tecnimont SPA subsidiary Tecnimont SPA and Performance Contractors Inc. will provide FEED, early execution studies, and early procurement activities for new process units and associated offsites and utilities at the operator's $2-billion project to expand its Baytown, Tex., chemical plant. The Tecnimont USA Inc.-led consortium's scope of work includes implementation of new innovative process units, including a 400,000-tonne/year Vistamaxx performance polymer unit as well as a 350,000-tpy linear alpha olefins unit.
	Formosa Plastics Corp.	St. James Parish, La.	Ethylene		Under constr.			Delayed.
	IGP Methanol LLC	Plaquemines Parish, La.	Methanol	1,800,000	Engineering		McDermott--FEED,EPC; Haldor Topsoe--TL	Plant 2.
	IGP Methanol LLC	Plaquemines Parish, La.	Methanol	1,800,000	Engineering		McDermott--FEED,EPC; Haldor Topsoe--TL	Plant 4.
	IGP Methanol LLC	Plaquemines Parish, La.	Methanol	1,800,000	Engineering		McDermott--FEED,EPC; Haldor Topsoe--TL	Plant 3.
	Ineos AG	Alvin, Tex.	Ethylene Oxide (EO) and Ethylene Oxide Derivatives (EOD) plant	520,000	Planning	2023		The new 1.2 billion-lb (520,000-tpy) EO unit and associated downstream EOD plant will be built at Ineos's Chocolate Bayou petrochemicals manufacturing site in Alvin, Tex., south of Houston on the Gulf of Mexico coast
	LyondellBasell Industries NV	Channelview, Tex.	Propylene oxide	1 billion	Under constr.	2021		In late-March 2020, LyondellBasell warned of possible construction delays as a result of the COVID-19 health crisis.
	LyondellBasell Industries NV	La Porte, Tex.	Tertiary butyl alcohol	2.2 billion lb/year	Under constr.	2021		In late-March 2020, LyondellBasell warned of possible construction delays as a result of the COVID-19 health crisis.
	Methanex Corp.	Geismar, La.	Methanol	5,000 tonne/day	Planning	2022	KBR--FEED; Johnson Matthey--TL	Methanex will make a $1.3-1.4-billion capital investment in the G3 project, which will involve construction of the company's third methanol plant at Geismar. Construction on the plant—which will be equipped with Johnson Matthey PLC's proprietary autothermal reforming and methanol technology to produce about 1.8 million tpy of methanol—will begin during second-half 2019.
	Next Wave Energy Partners LP	Houston Ship Channel, Pasadena, Tex.	Alkylate	28,000 b/d	Under constr.	2022	McDermott (Lummus)--TL/process design package; DuPont Clean Technologies--TL/E/Eq	Known as Project Traveler, the facility will be able to convert over 1.2 billion lb/year of ethylene feedstock from North America's growing ethylene supply delivered to the site by multiple pipelines. Alkylate production will be delivered via direct-connection pipelines to major gasoline blending terminals in Pasadena, which have dock access to marine movements through the Houston Ship Channel as well as connections to major refined product distribution pipelines. If warranted, the facility is designed to accommodate receipt of feedstock and delivery of product by rail. Alkylate, a gasoline blending component, typically comprises 11-13% of the overall gasoline pool in the US. Next Wave's alkylate product, Optimate, can be produced with 96.0 road octane (98.0 Research Octane Number), a low 3.5 Reid vapor pressure, and 5 ppm or less of sulfur. McDermott's Lummus Technology is licensing its proprietary Dimer ethylene dimerization process, which converts ethylene to an unmatched high-purity butene-2 feed stream ideal for producing a higher-octane alkylate used for blending cleaner-burning gasoline. Next Wave reached FID on the project in November 2019.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	PTT Global Chemical (PTTGC America LLC)	Mead Township, Shadyside, Belmont County, Ohio	Ethylene	1,500,000	Under constr.			In September 2020, PTTGC America LLC (PTTGCA), the US subsidiary of Thailand's PTT Global Chemical (PTTGC), signed a long-term agreement with Range Resources Corp. subsidiary Range Resources-Appalachia LLC for supply of ethane feedstock to PTTGCA's proposed 1.5 million-tpy ethane cracker and petrochemical complex planned for Mead Township along the Ohio River in Shadyside, Belmont County, Ohio. As part of the agreement—which is contingent upon PTTGCA reaching final investment decision (FID) on the project—Range will 15,000 b/d of ethane as feedstock to the complex's planned ethylene cracker with an ethane feed capacity of 100,000 b/d for production of polyethylene. Ethane supplied to PTTGCA will be sourced from existing natural gas production and NGL processing plants in the region with the benefit of no additional transportation required, according to Jeff Ventura, chief executive officer and president of Range, a leading producer of natural gas and NGLs based in western Pennsylvania. Slated for FID in early 2021, PTTGCA's Ohio petrochemical complex, if approved, will be capable of producing 1.6 million tpy of polyethylene plastic resin used to make a variety of plastic products, the operator said. This latest agreement for the proposed complex follows the withdrawal of Daelim Industrial Co. Ltd. subsidiary Daelim Chemical USA LLC as a project equity partner in mid-July 2020 as a result of deteriorating market conditions caused by the coronavirus (COVID-19) pandemic and its impact on oil price volatility. While PTTGCA said in July 2020 that it expected the COVID-19 health crisis would lead to another 6-9-month delay in development of the complex, the operator reconfirmed that—despite Daelim's withdrawal—it would continue advancing the project and was already in the process of seeking new potential partners. According to a final air pollution permit-to-install issued on Dec. 21, 2018, by the Ohio Environmental Protection Agency, PTTGCA's proposed complex—which will be equipped with six ethane-cracking furnaces—will produce ethylene, high-density polyethylene (HDPE), and linear low-density polyethylene (LLDPE) using the following units and capacities: • Ethylene plant, 1. 5 million tpy. • HDPE Unit 1, 350,000 tpy. • HDPE Unit 2, 350,000 tpy. • LLDPE-HDPE Unit 1, 450,000 tpy. • LLDPE-HDPE Unit 2, 450,000 tpy. The proposed multi-billion-dollar complex will also include on-site railcar and truck loading, supporting utilities, infrastructure, storage tanks, logistics facilities, and installations for either production or provision of required natural gas, water, air, nitrogen, steam, and electricity to support operation of process units.
	Royal Dutch Shell PLC (Shell Chemical Appalachia LLC)	Potter Township, Beaver County, Pa.	Ethylene	1,500,000	Under constr.		McDermott--FEED/TL	
	Saudi Arabian Basic Industries Corp.-ExxonMobil Chemical Co.	San Patricio County, Tex.	Ethylene	1,800,000	Under construction	2022	Amec Foster Wheeler--EPC; Bay Ltd.--Civil, site maintenance; John Wood Group PLC, McDermott, Turner Industries, Chiyoda Corp., Kiewit Corp., Mitsubishi Heavy Industries Ltd., Zachry Group--EPC	
	Saudi Arabian Basic Industries Corp.-ExxonMobil Chemical Co.	San Patricio County, Tex.	Monoethylene glycol	1,100,000	Under construction	2022	CTCI McDermott Integrated--Constr.	
	Saudi Arabian Basic Industries Corp.-ExxonMobil Chemical Co.	San Patricio County, Tex.	Polyethylene		Under construction	2022		Two units.

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Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	YCI Methanol One LLC (Koch Methanol Investments LLC-Shandong Yuhuang Chemical Co.)	St. James Parish, La.	Methanol	1,700,000	Under constr.	2020	WorleyParsons--Commissioning; Air Liquide--TL	The first phase of the greenfield complex, which will produce 1.7 million tonnes/year of methanol using Air Liquide SA's proprietary MegaMethanol technology, is scheduled to be fully operational and ready for production in late 2020. Koch Methanol acquired a majority ownership stake in the YCI Methanol One JV in August 2019, at which time it said the JV was evaluating an expansion that would more than double production of methanol at the site. YCI previously let a series of contracts for the methanol complex, on which construction began in January 2017.
UZBEKISTAN	Jizzakh Petroleum JV LLC	Karakul, Bukhara	Grassroots gas-to-chemicals complex	500,000	Planning		Versalis--TL;	Jizzakh Petroleum JV LLC, a joint venture of JSC Uzbekneftegaz and Gazprom International SA subsidiary Gas Project Development Central Asia AG, entered a June 2021 memorandum of understanding (MOU) with Russia's Gazprombank (Joint Stock Company), State Development Corp. VEB.RF, and the Russian Agency for Export Credit and Investment Insurance (EXIAR) for financial backing of the operator's proposed grassroots gas-to-chemicals complex based on methanol-to-olefins (MTO) technology in the Karakul area of southwestern Uzbekistan's Bukhara region. The four-sided MOU establishes a framework for potential future cooperation between the parties that covers an initial $800-million financing of the planned $2.8-billion MTO complex, including insurance of risk related to the project. Support from Gazprombank, VEB.RF, and EXIAR comes amid the operator's plan to source a considerable volume of equipment, materials, and services for the project from Russia, according to Nigora Ibadova, Jizzakh Petroleum's director for strategic development. The MOU follows the early-2021 contract award to Versalis SPA—the chemical subsidiary of Italy's Eni SPA—to provide licensing of its proprietary low-density polyethylene (LDPE)-ethylene vinyl acetate (EVA) technology for the MTO complex's LDPE-EVA swing unit, which will be designed for a maximum EVA-equivalent production capacity of up to 180,000 tpy. Selected for siting in Bukhara due to its proximity to competitive feedstock, energy supplies, suitable infrastructure, and key export markets across Europe and the Asia Pacific, the proposed complex will process 1.5 billion cu m/year of domestic Uzbek natural gas to produce 500,000 tpy of high-quality polymers, including LDPE, EVA, polyethylene terephthalate (PET), and polypropylene (PP). To become the core of Uzbekistan's future gas chemical cluster—which will be Central Asia's first special economic zone—the MTO complex forms part of Uzbekistan's plan to diversify its economy, develop domestic industries, reduce product imports, and enable the country to monetize its natural gas resources via production of export-oriented, high-value products, according to Jizzakh Petroleum.

PETROCHEMICALS CONT.

Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	JSC Uzbekneftegaz (Shurtan Gas Chemical Complex LLC)	Guzar District, Kash-kadarya Region	Polyethylene	325,000	Under constr.	2021	Enter Engineering Pte. Ltd.—EPC; Lummus Technology—TL/Eq.	JSC Uzbekneftegaz subsidiary Shurtan Gas Chemical Complex LLC (Shurtan GCC), through a subcontractor, has let a contract to Lummus Technology LLC to deliver technology licensing and equipment for a project that will more than double ethylene production at Shurtan GCC's petrochemical complex in the Guzar district of southern Uzbekistan's Kashkadarya region. As part of the contract awarded by subcontractor Enter Engineering Pte. Ltd., Lummus will design and supply four proprietary Short Residence Time (SRT) VI and SRT VII cracking furnaces. Previously scheduled to be completed during second-half 2020, Shurtan GCC's proposed expansion was to increase the complex's current 125,00-tonnes/year polyethylene production capacity to 450,000 tpy. Financed by a mix of funds from Uzbekneftegaz, Shurtan GCC, and loans from Chinese and Russian financial institutions and banks, the expansion comes as part of a May 11, 2017, decree of the President of the Republic of Uzbekistan designed to ensure Shurtan GCC's complex further diversify its polymer production, improve its technical and economic indexes, increase export potential, and reduce imports of raw materials by increasing production of high-quality products in demand in foreign and local markets. As of 2019, construction on the project—for which Shurtan GCC previously awarded a turnkey $1.3-billion contract to Enter Engineering to provide engineering, procurement, and construction—was under way. Detailed design and project development were carried out by specialists from Uzbekneftegaz, Uzbekistan GTL LLC, Hyundai Engineering & Construction Co. Ltd., McDermott International Inc., and Enter Engineering.

GAS PROCESSING

Added capacity listed in tons per year (tpy) unless otherwise specified.

Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
AUSTRALIA	Cooper Energy Ltd.-Mitsui Group	Port Campbell, Victoria	Gas plant	150 tera-joules/day	Under constr.	2021		In July 2020, Cooper Energy Ltd. and its Japanese JV partner Mitsui Group made a $37-million (Aus.) final investment decision to upgrade and restart the Minerva gas plant near Port Campbell in western Victoria. The JV has already spent $17.8 million (Aus.) purchasing the plant last December and performing a front-end engineering and design program aimed at upgrading the facility and connecting it to process gas produced from the JV's existing offshore Otway basin gas fields at Casino, Henry, and Netherby in licences L24 and L30. Cooper is operator with 50% interest. Mitsui has the remaining 50% interest in the plant and the gas fields. The new infrastructure work at the plant will enable it to receive 16 petajoules of gas that has yet to be developed. Cooper and Mitsui will upgrade the idle plant to be a processing hub for local production and new discoveries in the offshore Otway basin. The investment follows the successful exploration by the JV that resulted in the recent Annie-1 gas discovery – the first offshore discovery in southeast Australia in 7 years. The project will initially connect gas from four offshore wells (Casino-4, Casino-5, Henry-2, and Netherby-1) to the plant via a pipeline tie-in and minor modifications. First gas is expected in late 2021, but will ultimately be dependent on any further supply chain disruption arising from the COVID-19 pandemic. The Minerva plant has the capacity to process up to 150 terajoules/day of gas. The plant will be renamed the Athena gas plant in recognition of the expansion to its original role as a dedicated plant supplied by BHP Petroleum's (now depleted) Minerva offshore gas field to a hub for gas supply from current Otway fields and future discoveries.
	Emperor Energy Ltd.	Gippsland basin, Victoria	Gas plant	80	Engineering		APA Group--Pre-FEED	Emperor Energy Ltd. said in September 2020 that preliminary front-end engineering design (pre-FEED) was under way for development of its 100%-owned Judith gas-condensate field in offshore Gippsland basin permit Vic/P47 in Victoria, which includes early design concepts for a gas processing plant to operate adjacent to and in parallel with the existing Orbost plant that is currently processing gas from Cooper Energy's Sole gas. There will also be initial design for a 40-km long subsea pipeline from the field to a shoreline crossing along with an export pipeline from the shore plant to the Eastern Gas Pipeline that carries gas up the east coast to Sydney. Carried out by the APA Group and scheduled to be completed in 4 months, the pre-FEED study will refine indicative project cost estimates and project scheduling. The design basis is for production and processing of 80 million cu ft/day of gas (90 terajoules/day) across a projected 25-year project life. The pre-FEED stage follows a memorandum of understanding between Emperor and APA for Judith field signed in October 2019.

GAS PROCESSING CONT.

Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Australian Gas Infrastructure Group (AGIG)	Perth basin, Western Australia	Gas plant	50 tera-joules/day	Planning	2022		In May 2020, Strike Energy Ltd. partnered with Australian gas infrastructure company AGIG as its preferred company to design, build, own, and operate a 50 terajoules/day gas plant to process gas from the proposed Phase 1 West Erregulla field development in permit EP 469 in the onshore north Perth basin of Western Australia. The plant—which will process the raw gas to sales specification before delivering it into the Western Australian domestic gas transmission network—will be built adjacent to the field with a raw gas trunkline connecting it to the upstream development. Strike expects the $200 million (Aus.) investment in infrastructure and services under a long-term tariff to enable the company to focus on upstream wells and infrastructure, as it avoids substantial up-front capital. Strike expects the $200 million (Aus.) investment in infrastructure and services under a long-term tariff to enable the company to focus on upstream wells and infrastructure, as it avoids substantial up-front capital. While the deal is subject to final investment decision slated for yearend 2020, to facilitate the timetable and produce first gas in first-half 2022, AGIG will now begin front-end engineering and design, long lead procurement, and other early works needed to secure requisite tenure and project approvals before beginning construction. In the meantime, Strike is moving forward with a three-well appraisal plan that includes the drilling of West Erregulla-3 and West Erregulla-4 and possibly West Erregulla-5 wells. There is also a planned 3D seismic program to be run over a substantial portion of the remaining part of the permit. West Erregulla-3 is planned for drilling during the second half of this year. A decision on the need for West Erregulla-5 will be made before the end of November 2020. All the wells will be drilled for use as future producers to support the proposed Phase 1 development. Strike is operator of West Erregulla with 50%. Warrego Energy Ltd. holds the other 50%.
AZERBAIJAN	SOCAR GPC	Garadagh	Gas plant	10	Engineering	2022	Technip--E/D/TL	
BAHRAIN	National Oil & Gas Authority	Bahrain field	Gas dehydration plant	500	Engineering		Petrofac--EPC	
CANADA	Keyera Corp.	Grand Prairie, Alta.	Gas plant	150	Engineering	2020	Jacobs Engineering Group Inc.--EPC	Phase 2 of the Wapiti development project to add another 150 MMcfd of sour gas processing capacity.
EGYPT	Egyptian Natural Gas Co. (GASCO)	Western Desert Gas Complex (WDGC), Amreya, Alexandria	Expansion	600	Engineering		ENPPI-Petrojet JV--EPC	The project includes construction of WDGC's proposed Train D, the complex's fourth production train, lifting WDGC's overall throughput to 1.5 bcfd from 950 MMcfd. Alongside increasing output of ethane-propane mixture as feedstock to supply Egyptian petrochemical producers, the expansion also will increase WDGC's production of LPG and condensates for local consumption, as well as increase WDGC's production of commercial propane to be used as feedstock for the first phase of Sidpec's 450,000-tpy polypropylene plant scheduled to be completed by second-quarter 2022.
	ENI SPA	Port Said	Gas plant	350	Under constr.		Frames Group--Equipment	
	ENI SPA	Port Said	Gas plant	350	Under constr.		Frames Group--Equipment	
	ENI SPA	Port Said	Gas plant	350	Under constr.		Frames Group--Equipment	
	ENI SPA	Port Said	Gas plant	350	Under constr.		Frames Group--Equipment	

GAS PROCESSING CONT.

Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
IRAQ	South Gas Co.	Dhi Qar Province	Gas plant	200	Engineering		Baker Hughes--EPC	In January 2021, South Gas Co. (SGC)—a subsidiary of Iraq's Ministry of Oil—let a contract to a division of Baker Hughes Co. to provide a series of services and equipment for a new 200-MMcfd natural gas processing plant to be built in Dhi Qar Province. Baker Hughes Turbomachinery & Process Solutions' (TPS) team will deliver design, manufacturing, delivery, construction, and commissioning of the integrated plant that will process previously flared natural gas from Iraq's Nassiriya and Gharraf oil fields. Alongside overseeing construction and startup of the plant, Baker Hughes said it also will supply compression equipment, digital monitoring systems, and other unidentified services for the project. Once in operation, the gas plant will reduce estimated carbon dioxide (CO2) emissions from Nassiriya and Gharraf oil fields by more than 6 million tpy. Further details regarding the project were not disclosed.
KAZAKHSTAN	GPC Investment LLP	Makat, Atyrau	Grassroots gas plant	815 million cu m/year (commercial gas); 119,000 tpy (liquified gas); 212,000 tpy (sulfur); 35,000 tpy (gas condensate)	Under construction	2023		In June 2021, Kazakhstan began construction of a new gas processing plant in the Makat district of the country's Atyrau region, 12 km northeast of the existing onshore Bolashak oil and gas treatment complex, to accommodate associated gas production from giant offshore Kashagan oil field. Backed by GPC Investment LLP, the $860-million gas plant will have a design capacity to process 1 billion cu m/year of sulfur dioxide from Kashagan field to produce 815 million cu m/year of commercial gas, 119,000 tpy of liquified gas, 212,000 tpy of sulfur, and 35,000 tpy of gas condensate. Scheduled for commissioning in fourth-quarter 2023, the gas processing plant will allow oil production from Kashagan field to increase by 450,000 b/d, as associated gas production at the site to date has inhibited higher crude production rates. Alleviating the current gas processing overload on the Bolashak treatment complex, will allow the Bolashak plant to treat Kashagan field's increased oil production.

GAS PROCESSING CONT.

Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Kazakhstan Petrochemical Industries Inc. LLP	National Industrial Petrochemical Technopark, Atyrau	Gas-to-chemicals complex	629,000 tpy	Under construction	2022	Lummus Novolen--TL	In June 2021, Kazakhstan Petrochemical Industries Inc. (KPI) LLP reached nearly 90% completion of its long-planned integrated gas-to-chemicals complex (IGCC) under construction at the National Industrial Petrochemical Technopark in Kazakhstan's western Atyrau region. Construction activities on the first $2.6-billion phase of the IGCC were 87.19% completed. While construction works on main processing plants and offsite installations—including metal structures, mechanical equipment, process pipelines, and tanks—remains in progress, laying of concrete foundations and installation of underground pipelines is now complete, as is construction of the site's related transportation infrastructure, which included 11.6 km of railway and 4 km of roads. Scheduled official commissioning and startup during first-quarter 2022, KPI confirmed Phase 1 of the IGCC will include a propane dehydrogenation (PDH) unit equipped with Lummus Technology LLC's proprietary CATOFIN process to convert 629,000 tpy of propane from Tengiz oil field into propylene feedstock for the complex's associated polypropylene (PP) plant that will use Lummus Novolen Technology GMBH process technology to produce 500,000 tpy of PP for supply to domestic and export markets. A second phase planned for the IGCC—which will be Kazakhstan's first integrated petrochemical complex—will involve building a gas separation plant that will supply ethane to a proposed 1.25-million tpy polyethylene plant to be built at the site, JSC National Co. KazMunayGas (KMG)—trust manager of KPI since June 2018. While KMG and KPI let a contract to JGC Holding Corp. in February 2021 to deliver front-end engineering design (FEED) on the IGCC's proposed 957-MMcfd gas separation plant that would be located adjacent to a similar plant operated by Tengizchevroil as part of its development of Tengiz field, neither trustee nor operator has revealed a specific timeframe for when they will take final investment decision on the project's Phase 2 plan. On June 4, however, KMG did inform investors it entered trilateral agreement with JSC National Welfare Fund Samruk-Kaznya—holder of 90.42 interest in KMG—and PJSC Sibur Holding, under which the parties are considering the possibility of Sibur's participation as a partner in the Atyrau IGCC. With FEED for IGCC's Phase 2 now completed, advancement of the project's second-phase polyethylene development program is awaiting a Sibur study on its economic efficiency, which is due by yearend 2021. Separately, Mamin's office confirmed that Kazakh-French joint venture Air Liquide Karabatan Tech Gases LLP in April completed construction of its plant for production of nitrogen and compressed dry air. The plant will produce 8,000 cu m/hr of nitrogen and 8,100 cu m/hr of compressed dry air, both of which are necessary for the IGCC's production of PP.

GAS PROCESSING CONT.

Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
NIGERIA	ANOH Gas Processing Co. Ltd.	Niger Delta, Imo State, Nigeria	Gas plant	300	Under construction	2021		In February 2021, ANOH Gas Processing Co. Ltd. (AGPC)—a 50-50 incorporated joint venture of independent Seplat Petroleum Development Co. PLC (Seplat) and state-owned Nigerian National Petroleum Corp. (NNPC) subsidiary Nigerian Gas Co. (NGC)— secured necessary financing to complete construction of its previously proposed 300-MMcfd gas plant to process future wet gas production from unitized Assa North-Ohaji South (ANOH) onshore gas and condensate field, which straddles Seplat-operated oil mining lease (OML) 53 and Shell Petroleum Development Co. (SPDC)-operated OML 21 in the northeastern Niger Delta of Imo State, Nigeria. Following a combined equity investment of $420 million previously injected by shareholders Seplat and NGC between 2019-20, AGPC raised $260 million in debt funding in early February 2021 from a consortium of seven banks to fully fund completion of the ANOH gas plant. AGPC received excess funding commitments of more than $450 million for the ANOH plant, which became unnecessary following execution of an optimization program that recently lowered total project cost to $650 million—including financing costs and taxes—from the originally estimated $700-million price tag, according to Seplat. Identified as one of the federal government's Seven Critical Gas Development Projects—intended to improve and expand Nigeria's gas production and related infrastructure—AGPC's ANOH gas processing plant will be built on an 87-hectare plot on OML 53, which hosts currently producing Jisike and Ohaji South fields, as well as still undeveloped Owu field. The gas plant will process 300 MMcfd of about 600 MMcfd of gas that ANOH upstream development operator SPDC will produce from four wells in OML 21's H1000 reservoir and two wells in OML 53's H4000 reservoir. SPDC will treat the remaining 300 MMcfd of production at its own gas processing plant. According to the latest information available from Seplat, Phase 1 of the ANOH gas plant—which has been designed and accommodated space for future expansions—will include the following: • Two 150-MMcfd Joule-Thompson trains with 50% turndown capacity, automated operations. • A 22,500-b/d two-train condensate handling plant. • A 1,200-b/d LPG recovery unit. • Two 100,000-bbl condensate storage tanks. • A 50,000-bbl produced water tank. • A 200-bbl diesel tank. • Eight 1,500-bbl LPG storage bullets. Phase 1 of the ANOH gas plant and upstream development is currently scheduled to be completed during fourth-quarter 2021.

GAS PROCESSING CONT.

Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
NORWAY	Gassco AS	Kollsnes, Øygarden	Monoethylene glycol upgrade		Under constr.	2023	Wood—EPCI; Kværner ASA—Fabrication	Plant technical services providerEquinor ASA in September 2020 let a $42-million contract to John Wood Group PLC to provide EPCI services for a monoethylene glycol (MEG) upgrading project at the Gassco AS-operated Kollsnes natural gas processing plant in Øygarden, Norway, west of Bergen. Wood will upgrade the MEG regeneration handling capacity at the Kollsnes gas processing plant via installation of three new modules, including an MEG train, a chiller package, and an MEG export pump. Work on the Kollsnes MEG upgrade (KMU) project—which includes an extension of the plant's fourth MEG train—was to begin immediately. As part of its scope of work on the KMU, Wood let a subcontract to Kværner ASA to deliver fabrication and installation services for the project's new fourth MEG processing train. Fabrication and module-assembly of the new MEG processing train will take place at Kvaerner's yard at Stord, Norway, from late-summer 2021, where upon completion, Kvaerner also will test the module before shipping it off to Kollsnes for installation during second-half 2022. Scheduled to be completed in 2023, the KMU comes as part of Gassco's strategy to ensure longevity of the Kollsnes gas plant, which has the capacity to treat as much as 144.5 million cu m/day of gas that arrives from North Sea fields Troll, Kvitebjørn, Visund, and Fram. Kollsnes also plays a vital role in exports of Norwegian Continental Shelf-produced gas into Europe, with about 40% of all Norwegian gas exports moving through the plant. Alongside further strengthening safety in MEG handling and helping maintain maximum plant capacity at Kollsnes in the long term, the KMU also will strengthen security of gas supplies to Europe.

GAS PROCESSING CONT.

Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
RUSSIA	PJSC Gazprom (OOO Gazprom Pererabotka Blagoveshchensk)	Far East Amur region	Gas processing	42 billion cu m/year	Under constr.	2025	NIPIgazpererabotka--Contr.; China Petroleum Engineering & Construction Corp.--EPC; China Gezhouba Group Corp.--Constr.; Linde AG--TL; Tecnimont SPA,Sinopec Ningbo Engineering Corp.--EPCC (utilities,infrastructure,off sites)	In June 2021, PJSC Gazprom subsidiary OOO Gazprom Pererabotka Blagoveshchensk (GPB) completed construction and started commissioning activities at the second train of its 42-billion cu m/year (bcmy) grassroots Amur natural gas processing plant (AGPP) near Svobodny in Russia's Far East Amur region. With assembly of auxiliary and core equipment completed, startup and commissioning of the AGPP's second of six production trains were under way as of June 17, just more than a week after the June 9 entrance of the complex's first train into operation processing multicomponent gas it receives via the Power of Siberia gas pipeline from the Gazprom Eastern Gas Program's (EGP) Yakutia gas production center at eastern Russia's Chayandinskoye field. Overall construction work on the AGPP has now reached 76.5%, with construction and commissioning of the complex's four remaining trains still on schedule to be synchronized with increased gas volumes delivered by Power of Siberia from the Irkutsk gas production center at EGP's Kovyktinskoye field, where work currently is under way to prepare for full-scale production. At AGPP's third and fourth production trains, Gazprom confirmed gas separation equipment is now fully installed. Ongoing works at the two trains include laying of pipes and cables, application of insulation materials, and assembly as well as fire-proofing of metal structures. On the fifth train, foundation works are completed, with preparations now under way for installation of the ethane and methane separation columns, as well as gas compressor units. On the sixth train, Gazprom said pouring of foundations and assembly of metal structures also were in progress. During the remainder of 2021, Gazprom said it plans to bring 51 pieces of heavy cargo weighing a total of 5,500 tonnes via river and sea vessels to the AGPP site as part of the remaining construction process. Scheduled to reach full-design capacity in 2025 and equipped with cryogenic gas separation technology licensed by Linde AG, the €11.4-billion AGPP forms part of Gazprom's implementation of its EGP to integrate field developments, pipeline, and natural gas production centers in East Siberia and Russia's Far East to support the company's commitment to supply 38 billion cu m/year of Russian natural gas into China over 30 years. Once fully operational, the AGPP—which receives process steam and electricity generated by Gazprom's Svobodny thermal power plant commissioned in April 2021—will produce about 2.4 million tpy of ethane, 1 million tpy of propane, 500,000 tpy of butane, 200,000 tpy of pentane-hexane fraction, and as much as 60 million-cu m/year of helium. Ethane production at the complex mostly will be delivered as feedstock to the PJSC Sibur Holding (60%)-China Petroleum & Chemical Corp. (Sinopec, 40%) joint venture Amur GCC LLC's nearby 2.7-million tpy integrated Amur gas chemical complex (AGCC) currently under construction near Svobodny. Scheduled for startup in 2024, AGCC will produce 2.3 million tpy of polyethylene and 400,000 tpy of polypropylene.

GAS PROCESSING CONT.

Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	PJSC Gazprom, RusGazDobycha	Gulf of Finland, Ust-Luga, Leningrad Oblast, Russia	Integrated gas processing-ethane cracking complex	13,000,000 tpy (liquefaction); 4,000,000 tpy (ethane); 2,200,000 tpy (LPG)	Under construction			In May 2021, PJSC Gazprom and its affiliates started construction on a previously announced combined gas processing, liquefaction, and chemical complex at the Gulf of Finland near the seaport of Ust-Luga, Leningrad Oblast, Russia. Construction activities on the proposed complex for processing ethane-containing gas (CPECG) began on May 21 and will cover works on the CPECG's two major enterprises, including RusKhimAlyans'—a 50-50 special-purpose venture of Gazprom and RusGazDobycha—integrated natural gas processing and liquefaction complex (GPC of the CPECG), as well as RusGazDobycha subsidiary Baltic Chemical Complex LLC's (BCC) planned ethane-cracking complex, or gas chemical complex (GCC of the CPECG). RusKhimAlyans GPC, which will have 13 million-tpy liquefaction capacity, initially will receive 45 billion cu m/year (bcmy) of wet natural gas feedstock from Gazprom's Achimov and Valanginian deposits in the Nadym-Pur-Taz region of the Yamal Peninsula, and later, from specially allocated ethane gas pipelines delivering production from the region's yet-to-be-developed Tambeyskoye field. The GPC will produce as much as 4 million tpy of ethane, and more than 2.2 million tpy of LPG, with ethane from the complex to feed nearby BCC's proposed $13-billion ethane cracking project that—once in operation—will produce more than 3 million tpy of polymers. About 18 bcmy of gas remaining after processing at GPC—including ethane extraction, LPG, and 13 million tpy of LNG—will be exported from the site via Gazprom's gas transmission lines.
TATARSTAN	PJSC Tatneft (Tatneftegazpererabotka)	Minnibayevo, Almetyevsk region	Gas processing	50,000 tpy	Engineering	2023		In October 2020, PJSC Tatneft's Tatneftegazpererabotka (UTNGP) announced it was adding a new unit as part of an ongoing modernization program at its Minnibayevo gas processing plant (MGPP) in Tatarstan's Almetyevsk region. Recently approved for its permit to build, the project includes construction of a normal butane (n-butane) processing unit and associated off-site installations within the boundaries of the existing MGPP complex. The new n-butane unit will be equipped with the capacity to process 50,000 tonnes/year of n-butane into solid maleic anhydride. Scheduled for commissioning in 2023, the n-butane unit comes as part of a broader upgrading program at the MGPP complex, which also includes the proposed reconstruction of a cryogenic unit for deep processing of dry stripped gas (DSG). Alongside enabling deep processing of DSG, the cryogenic unit revamp—due to be completed in December 2023—also will increase the site's depth of ethane fraction recovery the calorific value of carbon dioxide, as well as reduce the volume of hydrocarbons in nitrogen-containing gas, allowing the complex to reduce the amount of hydrocarbon emissions into the atmosphere by about 42%. The MGPP modernization program is part of Tatneft's renewed focus on its gas processing and petrochemical operations given the current situation in the petroleum market.

GAS PROCESSING CONT.

Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
UNITED ARAB EMIRATES	Abu Dhabi National Oil Co. (ADNOC) Sour Gas	Shah sour gas-condensate onshore field	Gas plant expansion	170	Engineering	2030	Saipem--EPCC	Abu Dhabi National Oil Co. (ADNOC) Sour Gas—a joint venture of ADNOC (60%) and Occidental Petroleum Corp. (40%)—in June 2021 let a contract to Saipem SPA to deliver EPCC services for the upgrading and expansion of its Shah gas processing complex at Shah sour gas-condensate onshore field, southwest of Abu Dhabi City, UAE. As part of the $510-million contract, Saipem will provide engineering, supply of materials, construction, and commissioning of new but yet-to-be-identified components designed to increase the plant's daily gas treatment capacity by 13%. The expanded daily gas treatment capability will lift gas production capacity to 1.45 bcfd from a current output of 1.28 bcfd, representing a cumulative increase to 145% of the plant's original design capacity. While it did not disclose further details regarding specific technologies selected for the project, Saipem did confirm technologies to be implemented would improve the plant's safety and environmental performance when processing its ultra-sour gas feedstock, minimize its overall downtime, and ensure continuous production even during execution of maintenance works. First announced in 2018, the proposed expansion—now officially known as the Optimum Shah Gas Expansion (OSGE) & gas gathering project—comes as part of the ADNOC 2030 strategy, which envisions higher oil production capacity and innovation in enhanced oil recovery, expansion of petrochemical production, and further development of natural gas resources. The operator has yet to confirm a definitive timeframe for OSGE's completion.
UNITED STATES	Brazos Midstream Holdings LLC	Reeves County, Tex.	Gas plant upgrades				Honeywell UOP--TL	In December 2020, Brazos Midstream Holdings LLC let a contract to Honeywell International Inc. subsidiary UOP LLC to deliver technology licensing for the upgrade of two cryogenic natural gas processing plants at the company's operations in Reeves County, Tex., in the Permian basin. UOP will upgrade two existing 200-MMcfd gas processing plants from gas subcooled process (GSP) to UOP-owned Ortloff recycle split vapor (RSV) technology, a newly developed technology that can increase recovery of more ethane and propane. Neither UOP nor Brazos Midstream provided additional details on the proposed upgrade or a timeline for its commissioning.
	Enterprise Products Partners LP	Mont Belvieu, Tex.	Fractionation	150,000 b/d	Under constr.	2020		Tenth fractionator.
	Enterprise Products Partners LP	Mont Belvieu, Tex.	Fractionation	150,000 b/d	Under constr.	2020		Eleventh fractionator.
	Epic Midstream Holdings LP (Epic Y-Grade LP)	Robstown, Tex.	Fractionation	110,000 b/d	Planning	2021		Announced in December 2019, the new 110,000-b/d greenfield fractionator will be the second at the Robstown complex, near Corpus Christi, which currently consists of 70,000 b/d of operational fractionation capacity, as well as the operator's first greenfield fractionator, which is still under construction. With the first 100,000-b/d greenfield fractionator due for mechanical completion in late first-quarter 2020, Epic will have a total fractionation capacity of 270,000 b/d at Robstown once the second fractionator is completed. A timeframe for start-up of the second fractionator was not disclosed, but the project is due for mechanical completion in third-quarter 2021, Epic said in a December 2020 presentation.
	Hess Midstream Partners LP	North Dakota	Gas plant expansion	150	Under constr.	2021		Expanding capacity of 250-MMcfd Tioga gas plant to 400 MMcfd. The expansion will add residue and y-grade liquids processing capacity to the existing full-fractionation and ethane-extraction capability of the current plant. In July 2020, Hess Midstream said incremental gas processing capacity is expected to be available in 2021 upon completion of a deferred turnaround—originally planned for third-quarter 2020 but rescheduled to 2021—during which both the expansion and residue and NGL takeaway pipelines will be tied in.

GAS PROCESSING CONT.

Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Keyera Corp.	Wapiti, Grand Prairie, Alta.	Gas plant	150	Under constr.	2020		Keyera Corp. has approved a second-phase expansion of its Wapiti natural sour gas processing and liquid stabilization plant about 60 km south of Grand Prairie, Alta. Scheduled for commissioning in fourth-quarter 2020, the expansion will add another 150 MMcfd of gas processing capacity at the site. Keyera commissioned Phase 1 of the Wapiti gas plant in May 2019 with gas processing capacity of 150 MMcfd and condensate handling capacity of 25,000 b/sd.
	Nacero Inc.	Casa Grande, Ariz.	Gas-to-gasoline plant	35,000 b/d			Haldor Topsoe—TL/E	As part of the March 2020 contracts, Haldor Topsoe will deliver basic engineering and licensing of its proprietary Topsoe Improved Gasoline Synthesis (Tigas) GTG technology for the Casa Grande plant that, once in operation, will have the capacity to produce 35,000 b/d of finished gasoline from low-cost natural gas. Pending final investment decision (FID) on the project, Haldor Topsoe said it also will supply proprietary hardware, catalysts, and services for the plant. To be located on the operator's existing 1,000-acre site in Casa Grande's industrial and advanced-technology corridor, Nacero's proposed $3-billion GTG plant—which will supply 80% of its own water needs, with the remaining 20% to come from municipal treatment plant effluents—aims to provide the US Southwest with a cleaner, cost-competitive source of gasoline. Construction is to begin in 2021.
	Nacero Inc.	Penwell, Ector County, Tex.	Grassroots gas-to-gasoline plant	70,000 b/d	Engineering		Bechtel--FEED; Haldor Topsoe--TL	In May 2021, Nacero Inc. let a contract to Bechtel Corp. to provide engineering and construction for a newly proposed natural gas-to-gasoline (GTG) plant to be built in Penwell, Ector County, Tex., in the heart of the Permian basin. Bechtel will deliver FEED for the Penwell plant that, once in operation, will be the world's first gasoline manufacturing plant to incorporate carbon capture, sequestration, and 100% renewable power. Upon completing the FEED, Bechtel said it will deliver a lump-sum turnkey price proposal for engineering, procurement, and construction (EPC) of the project based on sustainable design and execution to bring about carbon reduction in the supply chain and reduce the carbon footprint of the project during construction, in line with the companies' shared commitment to best-in-class environmental, social, and governance (ESG) practices. First announced in April 2021, the proposed $6.5-7.5-billion Penwell GTG plant will use a feedstock of low-cost natural gasoline, biomethane captured from farms and landfills, and mitigated flared gas from the Permian basin to produce 70,000 b/d of finished gasoline component ready for blending to US commercial grades. The second phase of construction, which will take an additional 2 years, will bring plant capacity to 115,000 b/d. The Penwell GTG plant also will produce blue hydrogen (see accompanying box) and will receive all of its electricity from renewable sources, much of which will be produced on-site from solar panels colocated with the processing and production installations on the 2,600-acre site. Nacero said construction on the Penwell GTG project is slated to begin by yearend but has yet to disclose a definitive timeframe for startup of either Phase 1 or Phase 2.

GAS PROCESSING CONT.

Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Navitas Midstream Partners LLC	West Texas Permian basin	Gas processing	200	Engineering		Honeywell UOP--TL/equipment	In May 2021, Navitas Midstream Partners LLC let a contract to Honeywell UOP LLC to deliver a 200-MMcfd cryogenic natural gas processing plant the operator will use to extract NGLs from gas produced in several counties across the Permian basin. Honeywell UOP's scope of work under the contract will include design and supply of proprietary equipment for a UOP modular cryogenic plant, including refrigeration and dehydration units, that will be customized for high-rate recovery of NGLs from the Permian's NGL-rich feed gas composition. The new plant will use UOP-owned Ortloff recycle split vapor (RSV) technology to increase recovery of more ethane and propane, but further details regarding the project, including a timeframe for startup, were not disclosed. Navitas currently owns and operates nearly 1,500 miles of gas-gathering pipelines, 660 MMcfd of gas processing capacity, and about 210,000 hp of field compression in the Midland basin of the West Texas Permian basin to serve producers in Midland, Martin, Howard, Glasscock, Upton, and Reagan Counties. Located about 18 miles southeast of Midland, Tex., near the Midland-Glasscock county line, the 660-MMcfd Midland basin processing complex is made up of four processing trains at three separate plant sites: • The Newberry plant, which includes Newberry Train 1, a 60-MMcfd RSV cryogenic plant commissioned in March 2017, as well as Newberry Train 2, a 200-MMcfd gas subcooled process (GSP) cryogenic processing plant commissioned in April 2018. Both trains include inlet carbon dioxide (CO2) and hydrogen sulfide (H2S) treating capabilities, with the combined Newberry plant also equipped with nitrogen rejection unit. • The Taylor plant—commissioned in June 2019—houses a 200-MMcfd GSP cryogenic processing train. This plant also includes inlet CO2 and H2S treating capabilities, as well as a nitrogen rejection unit. • The Trident plant, which features a 200-MMcfd RSV cryogenic processing plant commissioned in June 2020. Also equipped with inlet CO2 and H2S treating capabilities, this plant is scheduled to receive a nitrogen rejection unit sometime in 2021.
	Oneok Inc.	McKenzie County, ND	Gas plant	200		2020		Demicks Lake II plant.
	Oneok Inc.	Mont Belvieu, Tex.	Fractionation		Planning	2021		MB-6 fractionator.
	Oneok Inc.	Mont Belvieu, Tex.	Fractionation	125,000 b/d		2021		MB-5 fractionator.
	Oneok Inc.	Permian basin	Fractionation	65,000 b/d		2021		Expansions to Oneok's Midcontinent NGL fractionation facilities; to cost $150 million, with 15,000 b/d expected to be completed in third-quarter 2020 and 50,000 b/d expected to be completed in first-quarter 2021.
	Oneok Inc.	Williston basin	Gas processing	200	Planning	2021		Expansion of the Bear Creek gas processing facility and related systems.
	Piñon Midstream LLC	Lea County, NM	Gas plant	85	Under construction	2021		In May 2021, Piñon Midstream LLC said it was building the greenfield Dark Horse sour gas treating and carbon capture site and associated pipeline infrastructure in northeastern Delaware basin, Lea County, NM. The project includes a centralized amine treating plant, an 18,000-ft deep acid-gas sequestration well (Independence AGI #1), and 30,000 hp of field compression. Piñon expects Dark Horse to begin operations in July 2021, treating 85 MMcfd of sour gas. The company purchased a second amine treating plant that is scheduled to be installed and operational in fourth-quarter 2021, increasing capacity to 170 MMcfd. The site is expandable up to 400 MMcfd. Treated gas will be delivered to multiple third-party gas processing plants.

GAS PROCESSING CONT.

Country	Company	Location	Project	Added capacity	Status	Expected completion	Contractor/ contract type	Project notes
	Primus Green Energy Inc.	Texas	Gas-to-gasoline (GTG)	28; 2,800 b/d (gasoline)			IHI E&C International Corp.--FEED	Announced in December 2019, the proposed Texas GTG plant—which would consume 28 MMcfd of natural gas to produce 2,800 b/d of gasoline—will be a scaled-up version of Primus's demonstration plant in New Jersey, which has safely and successfully produced methanol and gasoline. Underpinning the project is Primus's patented STG+ technology, which has been validated through more than 10,000 hr of operation. Over the past several years, Primus has collaborated with Koch Modular Process Systems LLC—who will also be participating in the project—to optimize the technology. The plant will produce RBOB-specification gasoline using low-cost natural gas from the nearby Permian basin. FEED is to be completed in mid-2020. A second train at the Texas plant also is under consideration, which would bring total gasoline production at the site to 5,600 b/d.
	Raven Petroleum LLC	Duval County, Tex.	Fractionator	30,000	Development			Approved by Texas Commission on Environmental Quality
VIETNAM	ExxonMobil Exploration & Production Vietnam Ltd.		Ca Voi Xanh (Blue Whale)			2020		

LNG

Added capacity listed in millions of tons per year (million tpy) unless otherwise specified.

Country	Company	Project	Location	Project type	Added capacity	Status	Completion	Contractor/ contract type	Project notes
AUSTRALIA	Venice Energy	Outer Harbor LNG	Port Adelaide	LNG terminal		Planning	2022		
	Australian Industrial Energy	Port Kembla LNG terminal	Port Kembla, NSW	LNG terminal		Planning	2022	Hoegh LNG, FSRU; SCSB joint venture, wharf facility and pipeline construction	Port lease signed November 2020, pipeline connection December.
	Woodside, Shell, BP	Browse LNG	Offshore Western Australia	LNG		Planning	2027		Begin FEED Q4 2019. FID first-half 2021.
	Woodside	Pluto Train 2	Burrup Peninsula, Western Australia	LNG	5	Engineering		Bechtel-FEED	FID delayed to 2021
	Viva Energy	Oz LNG	Geelong refinery, Victoria	LNG terminal		Planning	2024		Would extend refinery pier to host FSRU. Build 6.5-km pipeline. Seeking expressions of interest March 2021.
	Vopak		Avalon, Victoria	LNG terminal		Planning	2024		FSRU. Hopes to file with state Q3 2021
BRAZIL	Prumo Logistica, BP, Siemens	Acu Port	Sao Joao da Barra, Rio de Janeiro	LNG terminal	3	Engineering	2021	BW	FSRU BW Magna. Supply new-build power plants UTE GNA 1 (1.3 Gw, 2021) and UTE GNA 2 (1.6 Gw, 2023)
	Cosan	Santos	Santos, Sao Paulo	LNG terminal	2	Planning			FSRU. Supply local distributor Comgas, replacing pipeline imports from Bolivia.
	TPK Logistica, Port of Rotterdam	Presidente Kennedy	Espirito Santo state	LNG terminal	3	Planning			FSRU. Supply two regional new-build power plants
	New Fortress Energy	Sao Marcos Bay	Maranhao state	LNG terminal	3	Engineering			Supply regional power plants.
	Celse, New Fortress	Barcarena	Vila do Conde port, Para state	LNG terminal	2	Planning	2022		FSRU. MoU with Norsk Hydro signed July 2020.
	New Fortress Energy	Terminal Gas Sul	Babitonga Bay, Santa Catarina	LNG terminal	2	Planning			160,000-cu m FSRU near coast. Connection to Gasbol pipeline and Engie power plant. FID expected mid-2021.
	Copel, Shell	Pontal do Parana	Pontal do Parana or Paranagua	LNG terminal	2	Planning			Copel got authorization to import gas June 2020
CANADA	Liquefied Natural Gas Ltd.	Bear Head LNG	Strait of Canso, Nova Scotia	LNG	12	Planning	2024		Financing problems undermining project. FID date uncertain as of Jan. 2021.
	Haisla Nation	Cedar LNG	Kitimat, BC	LNG	3.5	Planning	2025		FLNG. Construction start planned 2022. 250,000-cu m FSU. Receive gas from Coastal GasLink.
	Shell, Petronas, PetroChina, Mitsubishi, Kogas	LNG Canada	Kitimat	LNG	14	Under constr.	2025	JGC-Fluor EPC	Phase 1 pile driving complete, three newbuild carriers chartered April 2021
	Pieridae Energy Ltd.	Goldboro LNG	Nova Scotia	LNG	10	Planning	2026	KBR	Seeking expressions of interest March 2021. Expect FID by end-June 2021. 5-mtpy supply agreement with Uniper
	Chevron, Woodside	Kitimat LNG	Bish Cove	LNG	11	Engineering	2027	KBR-FEED, Fluor-EPC	Chevron ended funding Mar. 2021, Woodside plans to continue development
	Pacific Oil and Gas Ltd.	Woodfibre LNG	Sqaumish	LNG	2.1	Engineering		McDermott-EPC	Construction start pushed back to 2021
CHILE		GNL Talca-huano	Bay of Concepcion	LNG terminal		Engineering			300 MMcfd send out. Construction delayed by anti-trust examination. 100,000-cu m storage. 4 km offshore connected by pipeline.
CHINA	Zhejiang Jun'an Energy	Damaiyu LNG	Taizhou	LNG terminal	4	Under constr.	2021		Phase 1 (2 million tpy) under construction. Phase II planning.
	GCL, Hangzhou Gas, Jiaxing Gas	Pinghu LNG	Pinghu	LNG terminal	0.4	Under constr.	2021		Peak-shaving. 200,000-cu m storage.
	Sinopec, Zhejiang Energy Group Co. Ltd.	Wenzhou LNG	Wenzhou, Zhejiang	LNG terminal	3	Under constr.	2021		4 x 200,000 cu m storage, 16 mile pipeline
	CNOOC	Rudong LNG Phase 3	Binhai, Jiangsu	LNG terminal	0	Under constr.	2021		2 x 200,000 cu m storage, pipe most gas 156 km to Anhui
	CNOOC	Zhejiang Ningbo LNG	Ningbo	LNG terminal	3	Under constr.	2021		Phase II. 480,000-cu m storage.
	ENN	ENN Zhoushan LNG	Zhoushan	LNG terminal	2	Under constr.	2021		320,000-cu m storage
	CNOOC, Fujian Investment and Development Co.	Zhangzhou LNG	Zhangzhou, Fujian	LNG terminal	3	Under constr.	2022		Phase II could double capacity to 6 mtpy
		Jiangsu LNG	Jiangsu province	LNG terminal	3	Under constr.	2022		Phase 1 to include 4 x 220,000-cu m storage tanks, complete by 2022. Phase 2 will include 6 x 270,000-cu m tanks.
	Zhejiang Energy, Shenzhen Energy	Zhoushan Liuheng LNG	Zhoushan	LNG	10	Planning	2023		Phase 1 (5 million tpy) to be complete 2023. Phase II planning. 600,000-cu m storage for each stage.
	PipeChina, Nanshan Group	Yantai LNG	Yantai, Shandong province	LNG terminal	10	Under constr.	2023		Phase 1 (5 mtpy) available 2023, incl. 5 x 200,000 cu m storage. Phase 2 startup 2025, plus 5 x 200,000 cu m more
	Sinopec	Sinopec Zhoushan LNG	Zhoushan	LNG terminal	7	Engineering	2024		880,000-cu m storage. Will include 2 wharfs, 4 storage tanks, Construction to begin first-half 2021.
CONGO-BRAZZAVILLE	NewAge LNG		Block Marine XII	LNG	1.2	Planning	2021	SBM Offshore-JGC	FSRU
CYPRUS	ETYFA		Vasilikos Bay	LNG terminal		Engineering	2022	ETYFA, construction	FSRU
EL SALVADOR	Invenergy	Energia del Pacifico	Port of Acajutla	LNG		Engineering	2021		137,000-cu m FSRU, converted Gallina Moss. Scheduled to arrive mid-2021. Will send out 280 MMcfd
GERMANY	Gasunie, Vopak, OilTanking	German LNG	Brunsbuttel, Kiel Canal mouth	LNG terminal	8	Planning	2022		EPC contract tendered June 2020
	Uniper	Wilhelm-shaven LNG	Wilhelmshaven	LNG terminal	7	Planning	2023	Mistui OSK, FSRU	263,000-cu m FSRU
INDIA	Swan Energy	Swan LNG	Jafrabad, Gujarat	LNG terminal	5	Under con-struction	2021	NMIIPL	180,000-cu m FSRU Vasant delivered September 2020. Expandable to 10 mtpy.

LNG CONT.

Country	Company	Project	Location	Project type	Added capacity	Status	Completion	Contractor/ contract type	Project notes
	AG&P	Karaikal LNG	Karaikal port	LNG terminal	2.5	Under constr.	2021	Stolt-Nielsen	Al Khaznah LNG carrier to be converted to FSU
	HPCL	Chhara LNG	Chhara, Gujarat	LNG terminal	5	Under constr.	2022		Expandable to 10 mtpy
	H-Energy	West Bengal LNG	Hooghly River, East Medinipur	LNG terminal	4	Planning	2021		Initial capacity of 1.5-3.0 mtpy
	Adani Group/IOC/GAIL	Dhamra LNG	Dhamra, Odisha	LNG terminal	5	Under constr.	2021		IOC booked 3 mtpy capacity
	Petronet LNG Ltd	East Coast	Gopalpur	LNG terminal	5	Planning			FSRU. Still under consideration May 2021.
	H-Energy	Kolkata LNG	Digha port, Midnapur	LNG terminal	5	Planning	2024		125-km pipeline to Bangladesh, 225-km pipeline to Shrirampur
INDONESIA	Inpex Holdings, Shell	Abadi LNG	Abadi field	LNG	10.5	Engineering	2028	KBR, pre-FEED	Supply MOU signed Dec. 2020 with PGN
	BP	Tangguh LNG	Papua Barat province	LNG terminal	3.8	Under con-struction	2022	GE Oil & Gas/Tripatra/ Chiyoda/Saipem/Suluh Ardhi/ABB	Third train. Will raise total capacity to 11.4 million tpy. Delayed by COVID-19 labor restrictions.
	Inpex/Shell	Masela LNG	South Tanimbar, Maluku	LNG terminal	9	Engineering	2027	GE Oil & Gas	Onshore terminal will deliver gas by pipeline
IRELAND	Predator Oil & Gas	Predator LNG	Kinsale gas field	LNG terminal		Planning	2024		FSRU
LATVIA	Skulte LNG Terminal Co.	Skulte LNG	Skulte Port, Gulf of Riga	LNG terminal	3	Planning			Able to receive carriers up to 174,000 cu m.
MAURITANIA-SENEGAL	BP/Kosmos	Tortue LNG	Offshore both countries LNG	LNG	3	Engineering	2023	Black & Veatch, Keppel	Gimi FLNG will develop. Connection delayed to 2023 (Oct. 2020)
MEXICO	Sempra LNG	Energia Costa Azul	Baja, Mexico	LNG	2.5	Planning	2024		FID taken May 2021. SPAs with Mitsui (0.8 mtpy) and Total (1.7 mtpy)
	Mexico Pacific Ltd.	Mexico Pacific LNG	Puerto Libertad, Sonora	LNG	12.9	Planning	2025		FID on first two trains expected Q4 2021-Q1 2022. Three trains. Phase 1: 1 train, 1 tank, 1 berth. Phase 2: 1 train, 1 tank. Phase 3: 1 train.
MOZAMBIQUE	Eni	Coral South LNG	Area 4, Rovuma basin	LNG	3.4	Under constr.	2022	Samsung, Technip-FMC, JGC	Topsides installation complete May 2021 (13 modules). Sailaway from Samsung yard expected 2021.
	Total, ENH, Mitsui, ONGC Videsh, PTT, Bharat Petroleum	Mozambique LNG (Area 1)	Onshore plant on the Afungi peninsula, Cabo Delgado	LNG	12.9	Under constr.	2025	TechnipFMC, VanOord -Subsea; CCS JV - EPC	Financing finalized July 2020. Construction 21% complete end-2020. Insurgent violence has slowed progress.
	ExxonMobil, Eni, CNPC, ENH, Kogas, Galp	Rovuma LNG	Area 4	LNG	15	Engineering	2025	Mitsubishi, Hitachi	Late-2020 FID delayed indefinitely March 2020. Talks underway about possible shared approach to extraction with Total project.
NIGERIA	Nigeria LNG	Bonny Island Train 7	Bonny Island	LNG	8	Engineering	2022	Chiyoda-FEED; Saipem, Chiyoda, Daewoo-EPC	Construction delayed April 2020. Siemens to deliver Train 7 BOG compression by Q4 2021.
PAKISTAN	Younus Bros., Sapphire, Halmore Power Generation	Energas LNG	Port Qasim, Karachi	LNG terminal	6	Planning	2022		Awaiting site allocation at Port Qasim.
	Elengy	Elengy Terminal Pakistan	Port Qasim	LNG terminal		Planning	2023		Pakistan's first onshore terminal. Expressions of interest invited June 2020. 480,000-cu m storage. 1.2-bcfd regas capacity.
	Gwadar GasPort Ltd.	Gwadar LNG	Gwadar	LNG terminal	9.2	Planning	2022		Two-vessel jetty. Initially would use 20,000 cu m FSU and transfer still-liquefied gas to trucks for shipment inland.
PAPUA NEW GUINEA	Total SA, Oil Search, ExxonMobil	Papua LNG	Caution Bay, Port Moresby	LNG	5.4	Planning	2026	`--	Expansion. 2 additional trains. Delayed by gov't/ExxonMobil disagreement re: P'nyang field development
	ExxonMobil	PNG LNG	Port Morseby	LNG	2.7	Planning	2029		Expansion. Delayed by gov't/ExxonMobil dispute re: P'nyang field development
PHILIPPINES	First Gen, Tokyo Gas Co. Ltd.		Batangas City, Southern Luzon Island	LNG terminal	5	Under constr.	2022		Moved forward from 2023 by switch to FSRU. Issued permit to construct March 2021.
	CNOOC, Phoenix Petroleum, Philip-pine National Oil Co.	Batangas Energy Hub	Batangas Bay	LNG terminal	0	Planning	2023		Notice to proceed cancelled. Phoenix backing away from project March 2021
	AG&P	Philippines LNG	Batangas City, Southern Luzon Island	LNG terminal	3	Under constr.	2022		Received notice to proceed Mar. 2021. Will include 200,000-cu m storage.
POLAND	Gaz-System	Polskie LNG	Swinoujscie	LNG terminal	2.5	Planning	2021	Selas-Linde, SCV vaporizer supply	Expansion from 5 mtpy to 7.5.
			Gdansk Harbor	LNG terminal	2.8	Planning	2025		FSRU
QATAR	Qatar Petroleum	Expansion	Ras Laffan	LNG	33	Planning	2025	McDermott, Con-solidated Contractors, Chiyoda	Four-train expansion to existing plant
RUSSIA	Novatek		Kamchatka	LNG terminal	0	Planning	2022		Transshipment point for Russian exports to Asia from ice breaker vessels to conventional. 2 x 380,000-cu m FSU barges.
	Gazprom	Baltic LNG	Ust-Luga port	LNG	13	Planning	2023		State development bank VEB invested $741 million Aug. 2020
	Gazprom	Portovaya LNG	Vyborgsky, Leningrad	LNG	1.5	Under constr.	2021	SRDI Oil & Gas Peton	Feedgas sourced from Gryazovets-Vyborg pipeline
	Gazprom/Shell/Mitsui/Mitsubishi	Sakhalin II Train 3		LNG	0	Planning	2024		Discussions between Gazprom, Mitsubishi ongoing
	Total SA/Novatek	Arctic LNG 2	Gydan Peninsula	LNG	19.8	Under constr.	2024	TechnipFMC, EPC; QMW, module supply	"Slightly ahead of schedule" April 2020. $9.5-billion financing secured Sept. 2020.

LNG CONT.

Country	Company	Project	Location	Project type	Added capacity	Status	Completion	Contractor/ contract type	Project notes
	ExxonMobil/Rosneft/SODECO, ONGC Videsh	Far East LNG	Di Kastri port, Khabarovsk	LNG	6.2	Planning		TechnipFMC, JGC; FEED	Engineering, design underway May 2021.
TAIWAN	CPC Corp.	Taoyuan LNG	Kuantan Industrial Zone, Taoyuan	LNG terminal	3	Under constr.	2025		Third terminal. Supply industrial and commercial demand in northern Taiwan
TANZANIA	Equinor/Shell/ExxonMobil/Ophir	Lindi LNG	Lindi region	LNG	10	Planning	2028		Onshore plant. Shell, Equinor igned MoU Jan. 2021. Tanzania says construction could start 2022, but has yet to restart talks suspended in 2019.
THAILAND	SGP	Rayong LNG	Nong Fab, Rayong	LNG terminal	7.5	Engineering	2022	Saipem/CTCI Corp., EPC	Economic impact assessment underway March 2021
UNITED KINGDOM	InfraStrata	Cumbria LNG	Offshore Barrow-in-Furness	LNG terminal	5	Planning			InfraStrata acquired project June 2020
UNITED STATES	Freeport LNG	Freeport LNG	Quintana Island, Tex.	LNG	5	Under construction	2021	McDermott, Zachry Industrial, Chiyoda International Corp. KBR, Train 4	Production from Train 1 started August 2019, Train 2 Jan. 2020. Train 3 feedgas introduced March 2020. Fourth train in 2021 will bring production to 20 mtpy.
	Tellurian	Driftwood LNG	Carlyss, La.	LNG	27.6	Planning	2024		Plans to produce own feedgas (March 2021). Will not sanction until 16 mtpy of supply secured.
	Venture Global	Calcasieu Pass LNG	Cameron Parish, La.	LNG	10	Under constr.	2022	Baker Hughes, liquefaction trains	6 of 18 trains installed as of early March 2021. First commissioning cargoes by end-2021
	Venture Global	CP2 LNG	Cameron Parish, La.	LNG	20	Planning	2025		Adjacent to Calcasieu Pass LNG. FERC pre-filing paperwork submitted Feb. 2021. Construction could start Q2 2023
	Sempra	Port Arthur LNG	Port Arthur, Tex.	LNG	13.5	Planning	2023	Bechtel	Signed participation agreement with Aramco Jan. 2020, incl. 5 mtpy and 25% equity. FID expected Dec. 2021.
	Fairwood	Delfin LNG	Cameron Parish, La.	LNG	13	Planning	2023	Samsung, Black & Veatch	FEED completed for 3.5-mtpy FSRUs Oct. 2020
	Cheniere	Sabine Pass Train 6	Cameron Parish, La	LNG	4.9	Under constr.	2021	Bechtel Oil, Gas & Chemicals Inc, Construction	Start-up planned by end-2021.
	Venture Global	Plaquemines LNG	Plaquemines Parish	LNG	20	Planning	2023		Feedgas pipeline (CGT East Lateral Xpress) EIS issued March 2021. As many as 36 0.626-mtpy trains, 3 berths up to 185,000-cu m vessels, 4 200,000-cu m tanks.
	NextDecade	Rio Grande LNG	Brownsville	LNG	27	Planning	2023	Bechtel, EPC	FID expected 2021
	Glenfarne Group LLC	Magnolia LNG	Lake Charles, La.	LNG	8.8	Engineering	2024	KBR-SKE&C	FERC granted 5-year extension Oct. 2020
	Commonwealth Projects LLC	Commonwealth LNG	Cameron Parish, La.	LNG	8.4	Planning	2025	TechnipFMC	Offtake tender launched Jan. 2021 (tolling, FOB, or DAP), awards expected June 2021. FID planned Q1 2022
	Glenfarne Group LLC, Alder Midstream	Texas LNG	Brownsville, Tex.	LNG	4	Planning	2025	Samsung	Environmental groups sought reversa of FERC approval Dec. 2019. Signed long-term lease with Port of Brownsville Dec. 2020. FID expected in 2021.
	Venture Global	Delta LNG	Plaquemines Parish, La.	LNG	24	Planning	2024		Plan to begin construction 2H 2021
	Energy Transfer	Lake Charles LNG	Lake Charles, La.	LNG	11	Planning	2025	--	Shell left project March 2020. FID targeted in 2021.
	Pembina Pipeline Corp.	Jordan Cove LNG	Coos Bay	LNG	7.8	Planning	2025	KBJ	Received final FERC authorization March 2020. DC Circuit Court of Appeals declined summary vacatur of FERC authorization October 2020. But Pembina paused development April 2021
	Alaska Gasline Development Corp.	Alaska LNG	Kenai Peninsula	LNG	20	Planning	2025		FERC authorized August 2020. Includes1-mile 60-in. OD Prudhoe Bay Unit Gas Transmission Line; 62.5-mile, 32-in. Point Thomson Unit Gas Transmission Line, 806.9-mile, 42-in. transmission pipeline, 8 compressor stations,
	Qatar Petroleum, ExxonMobil	Golden Pass LNG	Sabine Pass, Tex.	LNG	15.6	Under constr.	2026		Construction started May 2019. FERC granted 7-year extension to 2026 for completion.
	Kinder Morgan	Gulf LNG	Pascagoula, Miss.	LNG	11.7	Planning			FERC approved construction, DOE exports, July 2019. Placed on back burner Jan. 2020
VIETNAM	Korea Gas Corp. (Kogas), Energy Capital Vietnam (ECV)	Mui Ke Ga LNG terminal	Mui Ke Ga, Binh Thuan Province	LNG terminal		Planning	2025	KBR, feasibility and cost estimates	LNG regasification terminal, storage, gas supply system, and a 3,200-Mw gas-fired electric power project . Gunvor agreed to supply LNG Dec. 2020. Phase 1 FID targeted late-2021.
	ExxonMobil	Hai Phong LNG-to-Power	Hai Phong	LNG terminal		Planning	2027		Estimated $5-billion cost

PIPELINES

Diameter of pipe is listed in inches.

C Crude
G Gas
P Products

Country	Company	Project	From Where	To Where	Pipeline Type	Project Miles	Diameter	Status	Expected Completion	Contractor	Project notes
AUSTRALIA	Woodside	Julimar-Brunello Phase 2			G	14	18	Under Constr.	2021		Will supply Wheatstone LNG
	ConocoPhillips	Barossa export	Barossa FLNG	Bayu-Darwin pipeline	G	162	26	Engineering	2022	Allseas	Project FID taken March 2021. Extend life of Darwin LNG
	Woodside Petroleum Ltd.	Scarborough export	Scarborough field	Pluto LNG, Karratha gas plant	G	233	Large	Engineering	2023	Subsea Engineering Associates; Boskalis, seabed intervention and shore crossing sectors	Deliver gas to Pluto LNG and Karratha gas plant. 2021 FID targeted.
CANADA	NGTL	West Path Delivery 2023			G	25	48	Engineering	2023		Looping of Western Alberta System along three segments
	Gazoduq		NE Ontario	Saguenay, Que.	G	465	42	Planning	2025		Part of system delivering from Alberta to Energie Saguenay
	Keyera, SemCAMS	KAPS	Grand Prairie	Fort Saskatchewan	C/P	300		Engineering	2023		Construction to start second-half 2021
	FortisBC	Eagle Mountain-Woodfibre	Eagle Mountain	Woodfibre LNG	G	29	24	Planning	2022		Start construction mid-2022 (pending Woodfibre LNG progress)
	Government of Canada	Trans Mountain expansion	Edmonton	Westridge, BC	C	612	36	Under Constr.	2022		21% complete Jan. 2021. Construction near Burnaby suspended Apr. -Aug. 2021 due to nesting season of endangered birds.
	TC Energy	Coastal GasLink	Dawson Creek, BC	LNG Canada near Kitimat, BC	G	415	48	Under Constr.	2024	JGC, Fluor	27% complete, Sept. 2020. Expandable to 5 bcfd if LNG Canada expanded. TC sold 65% stake to AIMCo and South Korea's public pension fund (May 2020).
CHINA		Caofeidian LNG	Tangshan	Tianjin	G	109	56	Planning	2022		Supply Beijing-Tianjin-Hebei
	PipeChina	Changling-Yongqing	Hebei province	Shanghai	G	936	56	Under Constr.	2025		Expandable to 2.9-bcfd
GERMANY	E.ON, OMV, Royal Dutch Shell, Gazprom	Nord Stream 2	Ust-Luga, Russia	Greifswald, Germany	G	759	48	Under constr.	2021		95% laid. Center section near Denmark missing. Denmark approved Oct. 2019. Nearing completion despite US sanctions. Two Russian lay-vessels positioned in region summer 2020. Work expected to be complete Sept. 2021.
INDIA	GAIL (India) Ltd.		Barauni, Bihar	Guwahati, Assam	G	453	24	Engineering	2021		Part of spurs for the 2,111-mile Jagdisphur-Haldia-Bokaro-Dhamra system under construction in northeastern India.
	Indian Oil Corp.		Ennore	Thoothukudi	G	729	28	Under constr.	2021		89-mile Ramanathapuram-Thoothukudi segment dedicated Feb. 2021
	Numaligarh Refinery Ltd. (NRL)	Paradip to Numaligarh	Paradip	Numaligarh	C	868	28	Planning	2023		Contract for associated refinery expansion let Feb. 2021
	Numaligarh Refinery Ltd. (NRL)		Numaligarh	Siliguri	P	406	16	Planning	2023		Contract for associated refinery expansion let Feb. 2021
	Gujurat State Petronet Ltd.	Mallvaram to Bhilwara	Mallavaram	Bhilwara	G	992	24	Under constr.	2021		From India's east coast to central and northern parts of the country. Partially completed August 2020.
	Gujurat State Petronet Ltd., Indian Oil Corp.,HPCL, Bharat Petroleum Corp.	Mehsana-Srinagar	Mehsana	Srinagar	G	1525	42	Under constr.	2021		Phase 1 (Mehsana-Bhatinda) commissioning planned for March 2021. Construction of Phase 2 to Srinagar to follow.
	H-Energy	Jaigarh-Mangalore	Jaigarh	Mangalore	G	464	Large	Under constr.	2023	H-Energy Pvt. Ltd.	Building from both ends towards the middle
	Gas Authority of India	Jagdishpur to Dhamra spurs	Jagdishpur	Dhamra	G	699	12, 30	Under constr.	2021		Spur and feeder lines for above.
	Indian Oil Corp., Bharat Petroleum Corp., Hindustan Petroleum Corp.	Kandla to Uttar Pradesh LPG pipeline	Kandla	Gorakhpur	P	1713	20	Under Constr.	2022		Shipping LPG. Pipe contract awarded to MAN Industries Q2 2020. Work began March 2021.
	Gas Authority of India	Jagdishpur to Dhamra	Jagdishpur	Dhamra	G	2111	24, 36	Under constr.	2021	MECON	Phase 1 complete Feb. 2019. Phase 2 delayed by COVID-19 but construction back underway end-2020. Complete beyond Durgapur
INDONESIA	Pertamina	Cirebon-Semarang	West Java	Central Java	G	158		Under Constr.	2023	PT Bakrie & Brothers	Bakrie took over as contractor Jan. 2021
	PGN, Rukun Raharja	Rokan pipeline	Rokan block	Dumai refinery	C	228		Under Constr.	2021		12 segments and three pump stations: Duri, Dumai, Manifold Batang. Pertamina-Rukun Raharja partnership Mar. 2021
IRAN	National Iranian Gas Co.	IGAT IX	Asalouyeh	West Azerbaijan province	G	1147	56	Under constr.	2022	Kogas	Export gas to Europe.
		Goureh-Jask	Goureh	Jask	C	620	42	Under Constr.	2021		Export point on Gulf of Oman, outside Straits of Hormuz. Phase 1 70% complete Jan. 2021.
IRAQ-JORDAN	NIOC	Basra-Aqaba pipeline	Basra, Iraq	Aqaba, Jordan	C	1043	56	Planning	2023		Discussions continuing, but project delayed as of July 2020 as Iraq considers option of exporting crude through Turkey instead.

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Israel-Greece	IGI Poseidon SA	EastMed	Eastern Mediterranean	Greece	G	1178	24	Planning	2025		Connect with Poseidon pipeline for continued shipment to Italy. Israel approved July 2020. FID targeted for 2022.
MALAYSIA	Petronas	Kasawari export line	Field	CPP and existing export line	G	54		Planning	2023		Supply MLNG 2
MEXICO	TC Energy	Tula-Villa de Reyes	Tula	Villa de Reyes	G	261	36	Under Constr.	2021		Delayed by COVID-19 contingency measures. TC says will complete 2021 (Feb. 2021)
MOZAMBIQUE	Mozambique National Hydrocarbon Co., Profin Consulting Sociedade Anónima, SacOil Holding Ltd., China Petroleum Pipeline Bureau	African Renaissance Pipeline Project	Cabo Delgado, Mozambique	Richard's Bay, South Africa	G	1519		Planning	2026		Supply gas from Rovuma basin to South African power plants. Application for concession to build under consideration by Mozambique gov't Jan. 2021
NIGER	China National Petroleum Corp.	Niger-Benin crude line	Agadem block Niger	Benin's Port of Seme	C	1181	20	Under Constr.	2022		Construction began Sept. 2019 but stopped during 2020 due to COVID-19
NIGERIA	NNPC	OB3	Obiafu	Obrikom-Oben	G	79	48	Under constr.	2021		Boost domestic supply, reduce flaring.
	NNPC	AKK	Ajaokuta-Abuja	Kaduna-Kano	G	403	40	Under Constr.	2022		Will be built in three phases: Ajaokuta-Abuja (124 miles), Abuja-Kaduna (120 miles), Kaduna-Kano (137 miles). Whole project is Phase 1 of Trans-Nigeria Gas Pipeline.
PAKISTAN	Pakistan Government	North-South Gas Pipeline Project	Karachi	Lahore	G	682	42	Planning	2023	Rostec	TMK-led consortium denied participation Jan. 2020. New Russian consortium put forward. Work to start July 2021.
POLAND	PGNiG, Energinet	Baltic Pipe	Norway	Poland	G	171	40	Engineering	2022		Corinth Pipeworks awarded second pipe contract July 2020, with deliveries to start early 2021. All construction contracts signed as of Dec. 2020
QATAR	Qatargas	NFPS	North field	Shore	G	175	32, 38	Engineering	2024		Three lines: 38-in. x 2 (103 km and 98 km), 32-in. 81 km. Part of North Field Production Sustainability project. Saipem awarded EPCL contract March 2021
ROMANIA	Black Sea Oil & Gas	Midia	Black Sea wells	National gas grid	G	26	16, 8	Under Constr.	2021		24 km export line (16-in.), 18 km between offshore wells (8-in.). Construction began Sept. 2020.
RUSSIA	Gazprom	Power of Siberia 2 (former Altai)	Western Siberia	Xinjiang, China	G	1612	56	Under Constr.	2022		Under construction in Russia. Route study underway with Mongolia.
SAUDI ARABIA	Saudi Aramco	Marjan field development	Offshore Saudi Arabia	Shore	G	40	36	Under Constr.	2021	McDermott	Work to be completed by DB50 and DB27. Development delayed for 1 year as of May 2020 due to weak oil demand.
TANZANIA	TPDC	Gas pipeline	Dar es Salaam	Uganda	G	1100	24	Planning	2024		Pass through Tanga to Mwanza. Second proposal would use Hoima-Tanga crude line corridor
THAILAND	TPN		Central Thailand	Northeast Thailand	C	212		Under Constr.	2022	China Petroleum Pipeline Engineering	Funded by Chinese government
TURKMENISTAN	Turkmengaz, Afghan Gas Enterprise, Inter-State Gas Systems (Private) Ltd., GAIL (India) Ltd.	TAPI	Galkynysh field	Fazilka, India	G	1125	56	Under constr.	2022		Saudi-German JV supplying pipe to Turkmenistan, which said in Sept. 2020 it is ready to begin construction. No Afghan construction yet. Pakistan hopes to begin construction in 2021.
UGANDA	Total/Tullow/CNOOC	East African Crude Oil Pipeline (EACOP)	Hoima, Uganda	Tanga, Tanzania	C	899	24	Engineering	2024		Allow export of Ugandan crude via the Indian Ocean through Tanzania. Agreement between countries signed Sept. 2020. Once construction begins will take up to 3 years to complete
UNITED STATES	Mountain Valley Pipeline	Southgate extension	Chatham, Va.	Graham, NC	G	74	24, 16	Engineering	2022		NC reaffirmed water permit denial April 2021
	National Fuel Gas Co.	Northern Access Pipeline	Sergeant Township, Pa.	Elma, NY	G	97	24	Planning	2023		FERC granted 3-year extension to complete project. To be built 2022-23
	Tellurian	Delhi Connector	Perryville Hub	Gillis, La.	G	180		Planning	2023		FID expected 2021
	Eastern Shore Natural Gas Co.	Del-Mar Energy Pathway	Delaware	Maryland	G	19		Under Constr.	2021		12 miles in Delaware, 7 in Maryland
	Veresen Inc.	Pacific Connector	Malin hub	Jordan Cove LNG	G	232	42	Planning	2024		Supply gas to Jordon Cove LNG plant. Development paused April 2021
	Tellurian	Driftwood	Gillis, La.	Driftwood LNG	G	96	48	Planning	2023		Gillis to Driftwood LNG

PIPELINES CONT.

Country	Company	Project	From Where	To Where	Pipeline Type	Project Miles	Diameter	Status	Expected Completion	Contractor	Project notes
	Tellurian	Haynesville Global Access	Haynesville shale	Gillis, La.	G	200	42	Planning	2023		FID expected 2021
	Summit Midstream Partners	Double E Pipeline	Delaware basin	Waha hub	G	120	30	Engineering	2021		Asked FERC Jan. 2021 for permission to start construction
	Enable Midstream	Gulf Run	NW Louisiana	SW Louisiana	G	165	42	Engineering	2022		FERC approved. NW to SW Louisiana for LNG exports
	Consumers Energy	Saginaw Trail	Zilwaukee City Gate	Clawson Control	G	78	24	Planning	2022		Replace 1940s-era pipe
	MDU Resources Group Inc.	North Bakken Expansion Project	Tioga, ND	McKenzie Contry, ND	G	67	20	Engineering	2022		FERC environmental assessment issued Dec. 2020. Dependent on remaining regulatory and environmental permitting and finalization of transportation agreements with customers, construction is expected to begin first-half 2021 and be completed early 2022.
	Venture Global	TransCameron	TETCO interconnect	Calcasieu Pass LNG	G	24	42	Planning	2022		Deliver gas to Venture's liquefaction plant
	Enbridge, NextDecade	Rio Bravo Pipeline		Brownsville, Tex.	G	138	42	Planning	2023		Supply gas to proposed Rio Grande LNG plant
	MPLX, Targa, NextEra, WhiteWater	Whistler	Waha, Tex.	Agua Dulce hub	G	477	42, 30	Under Constr.	2021		Expected to enter service Q2 2021. 450 miles of 42-in. 27-mile 30-in. extension into Midland basin.
	Enterprise Products Partners LP	Gillis Lateral	Cheneyville, La.	Gillis, La.	G	80	36	Under Constr.	2021		Haynesville shale to LNG market via third-party interconnects near Gillis
	Tallgrass Pony Express Pipeline LLC	Pony Express expansion	Guernsey, Wyo	Cushing, Okla.	C	25	12	Engineering	2021		Scaled back, delayed June 2020
	Enbridge Inc.	Line 3 Replacement Project	Neche, ND	Superior, Wisc.	C	364	36	Engineering	2021		Labor contracts signed Dec. 2019. MPUC ruled FEIS sufficient Feb. 2020. In Feb. 2021, Enbridge increased cost $1 billion but kept late-2021 in-service.
	Holly Energy, Plains All American	Cushing Connect	Cushing, Okla.	Tulsa, Okla.	C	50		Under Constr.	2021		Construction delays. Service expected late Q2 2021. Deliver crude to HollyFrontier Corp. refining complex.
	Energy Transfer	Mariner East 2X	Mariner		P	350	20	Under Constr.	2021		Construction suspended Sept. 2020 after drilling mud release (90% complete). Final section rerouted April 2021, 1/4 mile open trench vs. HDD.
	Plains All American, Valero	Byhalia Connection	Memphis	Marshall County, MS	C	45	24, 26	Planning	2021		Connect Diamond and Capline. Shelby County schools refused easement request, Sept. 2020. Memphis city council considering ordinance to expand regulations Apr. 2021
		Wyoming Pipeline Corridor Initiative		EOR sites	G	1914	24	Planning			Would carry CO2. FERC issued draft EIS March 2020. BLM environmental review complete, Jan. 2021.
	EQM Midstream Partners	Mountain Valley	Wetzel County, WV	Pittsylvania County, Va.	G	303	42	Under Constr.	2022		Work 92% complete. Army Corp. of Engineers permits reviewed for almost 2 years, reissued Sept. 2020. March 2021, FERC modified a Dec. 2020 order while reaching the same overall result, allowing construction to recommence for a portion of the project near Jefferson National Forest, Va.
	Williams	Leidy South expansion	Clinton County, Pa.	Lycoming County, Pa.	G	12	36, 42	Under Constr.	2022		Replacement and looping to increase capacity by 580 MMcfd. FERC approved Aug. 2020. Approval to begin work granted Jan. 2021
	PennEast Pipeline Co. LLC	PennEast	Luzerne County, Pa.	NJ	G	116	36	Planning	2022		PennEast proposed splitting into two phases March 2020. Phase 1 650,000 MMcfd inside Pennsylvania. Supreme Court hearing eminent domain case April 2021
	Alaska Gasline Development Corp.	Alaska LNG	North Slope	Nikiski, Alas.	G	800	42	Planning	2024		Department of Interior approved permits July 2020. Feb. 2021 AGDC proposes pipeline to Fairbanks as initial step; seeking federal infrastructure funding for 75% of cost, private partner for balance