A world designed to last

Refining

Leading solutions in refining from strategic planning through technologies to full project delivery



TECHNIP ENERGIES

A world-class partner in oil refining

Technip Energies is a leader in the design and construction of refineries. We have 60 years of experience in a wide variety of grassroots projects, integrated refinery and petrochemical complexes, plus major upgrades, revamps and consulting on optimization programs.

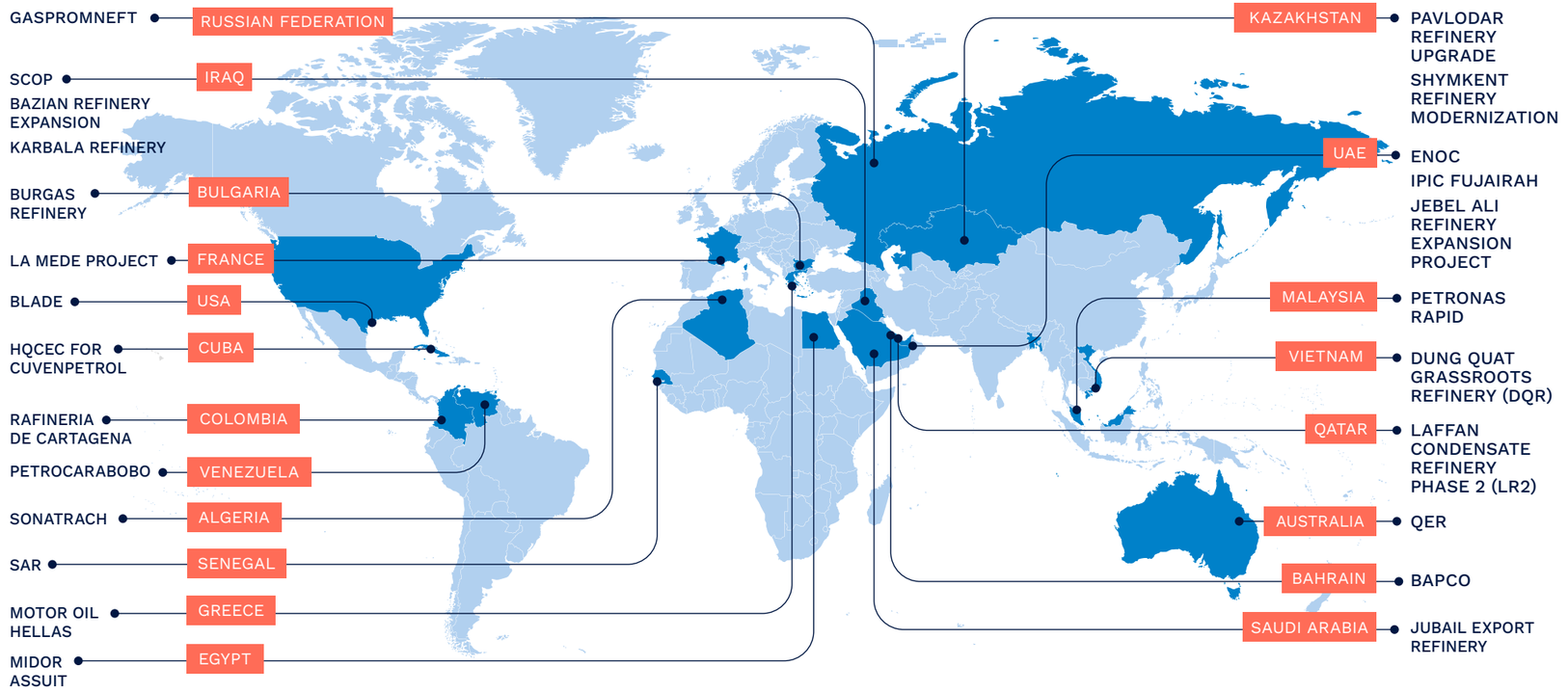
We work with our clients in the early stages of their projects from conceptual design to the startup of complex refineries or single refinery units. We focus on innovative solutions to improve energy efficiency, provide feedstock and product flexibility, and reduce emissions.

Our portfolio of proprietary and licensed technologies for refining includes catalytic cracking and hydrogen. Our newest catalytic cracking technology, PMcc™, selectively cracks a variety of hydrocarbon feedstocks to light olefins, and offers a reliable, low-cost route to propylene production. Our proprietary BenzOUT™ technology reduces benzene, increases octane and improves refinery economics.

Through close collaboration with other international licensors, we offer expertise in refining modeling and process improvement, including integration with petrochemicals. We help our clients define profitable solutions in terms of performance, energy efficiency, operational savings, safety improvements, and ease of maintenance. We offer our expertise and skills to support our customers throughout their energy transition journey.



Expertise in grassroot and expansion projects



30 grassroot refineries with capacities up to 400,000 bpd

+100 major expansion or revamp projects

+75 countries

Offering full project implementation

We provide our clients worldwide engineering, procurement, and construction (EPC) services with unique project management skills.

Technip Energies is one of the few global contractors able to deliver complete world-class refineries and integrated petrochemical complexes. Design development is supported by the most advanced optimization methods and techniques, including constructability analyses, energy audits, HAZOP studies, dynamic simulations, and plant reliability analyses.

“Excellence in project management.”

ENGINEERING

We provide a full range of engineering services including high-quality conceptual and basic design, front-end engineering services with robust cost estimates and plant optimization configuration.

PROJECT MANAGEMENT

For decades, we have demonstrated our ability to successfully manage industrial projects of all types and sizes in all parts of the world. Our experience extends from project management consultancy services to lump-sum turnkeys in all types of contractual relationships.

CONSTRUCTION

We are proficient in managing and delivering simultaneous megaprojects with the highest standards of safety and quality. Our operating centers design and manage construction activities enabling the best knowledge of local construction markets. Our Construction Methods Center in Abu Dhabi provides supervisory resources, helps develop construction methods and processes and fosters long-term construction partnerships.

PROCUREMENT

As a global player, we source competitively through a team of 1,000 professionals responsible for procuring, expediting orders, inspecting incoming equipment and materials, managing delivery and logistics and identifying new suppliers.

Your partner for strategic asset planning

Technip Energies partners with its clients during the crucial phase of planning and investment optimization. Our extensive track record in delivering projects help you shape a robust and reliable strategy.

Technology selection

Decades of cooperation with top-rated technology licensors and catalyst suppliers enable us to ensure an independent selection of the best technologies to meet specific project targets.

Cost estimates, value engineering and project risk management

Our extensive experience in executing lump-sum turnkey contracts gives clients the benefit of realistic cost estimates, value engineering expertise, and project risk management capabilities.

Refining and petrochemicals master planning services

We partner with you early on, during the planning and investment phases, to look for ways to optimize all aspects of your facility. We can provide master planning and configuration screening, perform block optimization, define utilities and offsites concepts, develop investment cost estimates, define project execution planning, and conduct profitability and financial analyses.

An integrated study typically includes:

- Market analysis
- Refining scheme optimization with linear programming software
- Technology selection
- Conceptual definition of new units, utilities and offsites
- Plot plan definition
- Investment cost estimates
- Economic and financial evaluation.

“Partnering with our clients early on.”





Improving plant performance and energy efficiency

We offer our clients a tailored portfolio of services for improved plant performance and energy efficiency in the refining industry.

Profit improvement programs (global or per unit/system)

- Process modeling: Key operating parameters, product routing, over-quality
- Supply chain optimization

Energy efficiency studies

- Comprehensive methodology
- Benchmarks based on refining references
- Customizable power, steam and fuels network modeling and optimization tools

Plant performance improvement

- Real-time optimization and advanced process control
- Combining process and technology expertise with data science capabilities

Hydrogen and flare networks

- Hydrogen pinch analysis
- Realistic flare loads through dynamic simulations
- Comprehensive flare studies

HSE-related services for environmental and safety performance

- QRA, HAZOP
- Explosions, fire and gas dispersion modeling
- Eco-design (life cycle environmental assessment)

Troubleshooting and technical assistance

- Process analysis, thermal rating, and engineering expertise
- Static/dynamic process simulations, CFD modeling

Longstanding expertise in industry trends

Technip Energies is a proven and innovative provider for the refining industry. We help downstream companies adapt to market changes, remain competitive and improve their operating performance while respecting regulatory constraints and the highest environmental performance standards.

An industry focused on greater sustainability

There are three strategic trends driving the refining industry today:

- Bottom of the barrel conversion to transform less desired fuel oil components into higher value products
- Increased integration of refining and petrochemicals, including crude oil-to-chemicals complexes
- Transition to a low-carbon economy (feedstocks bio-sourcing, continuous improvement in energy efficiency, fuels substitution, carbon capture, electrification)

Technip Energies offers significant experience, technological competencies, and solid project development and delivery references in all these areas. Our expertise in the modeling of refinery configurations, whether in existing or future facilities, enables us to recommend successful strategies and technoeconomically optimized solutions to our clients from the earliest stages of project development.



Cutting-edge refining technologies

We offer an expanding portfolio of onshore process refining technologies that includes steam reforming technology for hydrogen plants and fluid catalytic cracking.

We provide open art designs and license proprietary and alliance technologies.

Open-art designs:

- Crude and vacuum distillation
- Amine regeneration unit (ARU), Sour Water Stripper (SWS), Sulfur Recovery Unit (SRU)

Proprietary and alliance technologies

- Hydrogen production
- Fluid Catalytic Cracking (FCC), Resid Fluid Catalytic Cracking (RFCC), and PropyleneMAX™ Catalytic Cracking (PMcc™), including high olefins options
- BenzOUT™ gasoline benzene reduction technology

Crude atmospheric and vacuum distillation units

We have delivered nearly 70 atmospheric distillation units and over 50 vacuum distillation units primarily based on in-house technology.
Optimization studies on internals, trays, grids, random packing and structured packing, as well as vacuum transfer lines, have demonstrably improved product quality.

Software developed in-house using Pinch technology optimizes heat exchange and maximizes energy savings.

We have been pioneering the development of progressive crude distillation where the addition of preflash columns limits high-temperature heating levels, fosters heat integration, and lowers CAPEX solution. In revamp projects, the progressive distillation concept is an efficient and economical solution for greatly increasing the crude capacity of existing ADU/VDU units without replacing or modifying any major equipment items such as heaters, main towers, overhead condensing systems or feed pumps.

Proven technologies for hydrogen production

Our proprietary hydrogen technologies range from BPED to EPC for complete hydrogen facilities:

- Steam reformers: Top-fired, side-fired, bottom-fired
- TPR® heat exchange reformer for a capacity increase of up to 30 percent
- LSV® Ultra low-NOx burner technology
- Selective catalytic reduction (SCR) based deNOx units
- Proprietary process gas boilers
- Steam generation and process condensate recovery
- CO_2 recovery

Our global alliance with Air Products provides the worldwide refining industry with “over the fence” hydrogen supply. Learn more at **www.h2alliance.com**

“A dedicated team of experts and two research centers to ensure technology development.”

World leader in the application of FCC technology

Fluid Catalytic Cracking and Resid Fluid Catalytic Cracking

FCC and RFCC technologies have been developed jointly with Axens, IFPEN, and Total, offer the refining industry superior operating performance, increased profitability and substantial feedstock and product flexibility.

PropyleneMax™ catalytic cracking (PMcc™)

This commercially proven fluid catalytic process is used for selectively cracking a variety of hydrocarbon feedstocks to light olefins, particularly propylene, isobutylene, aromatic naphtha and ethylene. It offers a reliable, low-cost route to propylene production, with yields greater than 18 wt%*. This process is suitable for grassroot applications as well as revamps.

Refining proprietary equipment

Our equipment for FCC technologies includes:

- Trouble-free, high-efficiency feed injectors for optimal yields
- Riser termination devices (RS2) and/or vapor quench
- to minimize undesirable post-riser reaction
- Stripper structured packing for efficient stripping of hydrocarbon from spent catalyst, reduced steam consumption and capable
- of high catalyst flux
- Reliable catalyst coolers with individual tube isolation
- Low-maintenance, high-efficiency combustion air rings
- Spent catalyst distributors for reduced afterburn and reduced NOx

HS-FCC™

High Severity Catalytic Cracking (HS-FCC™) is a high propylene process employing a unique downflow reaction system for the conversion of heavy hydrocarbon feedstocks. The process was co-developed by Saudi Aramco, King Fahd University of Petroleum & Minerals, JXTG Nippon Oil & Energy, Axens and Technip Energies. Axens and Technip Energies are exclusive licensors of this novel technology.



BenzOUT™ gasoline benzene reduction technology

This reformate alkylation process helps our refining clients increase gasoline octane and meet benzene regulations without the need for hydrogen. Developed by ExxonMobil Research and Engineering Company, BenzOUT™ technology is licensed by Badger Licensing LLC, a fully-owned Technip Energies company.technology is licensed by Badger Licensing LLC, a fully-owned Technip Energies company.

* wt%: percentage by weight

Project references



FRANCE

LA MÈDE REFINERY
- Contract: Basic and FEED (Completed Q4 2016), EPsCm
- Award: 2017
- Delivery: 2019

The project involved the conversion of Total's La Mède crude oil refinery into a 500,000 tpa biorefinery facility, the first of its kind in France and one of Europe's largest.



USA

BLADE REFINERY
- Contract: EPC
- Award: Q1 2019
- Expected delivery: 2022
- Client: ExxonMobil

The BLADE Project (Beaumont Light Atmospheric Distillation Expansion) aims to optimize the facility by providing the flexibility to run lighter crudes. The awarded scope covers the integration of four new units into the existing facilities: atmospheric distillation, kerosene hydrotreater, diesel hydrotreater and benzene recovery.



SENEGAL

SAR REFINERY
- Contract: EPsCm
- Delivery: 2022
- Client: Société Africaine de Raffinage (SAR)

The SAR project adapted the refinery to process crude from the future Sangomar oilfield, modernizing existing units and adding new ones to boost capacity. Local content played a key role through subcontracting, use of local resources, and training. Senegalese firms contributed to construction works in civil engineering, structural steel, piping, and mechanical assembly, while local workers received on-the-job training in international standards.



EGYPT

MIDOR REFINERY
- Contract: EPCC (Completed 2023)
- Award: 2019
- Delivery: 2022
- Client: Midor

This contract covers the debottlenecking of existing units as well as the delivery of new units including a Crude Distillation Unit, a Vacuum Distillation Unit, a hydrogen production facility based on our steam reforming technology, as well as various process units, interconnecting, offsites and utilities.



BAHRAIN

BAPCO MODERNIZATION PROGRAM
- Contract: FEED (Completed Q4 2015)/EPC
- Award: Q4 2017
- Expected delivery: 2022
- Client: Bapco

The project involves a major expansion and upgrade of the Sitra Oil facility that will allow total refinery throughput to increase to a maximum of 380,000 barrels per day and a hydrogen production capacity of 250 MMSCFD in 2 trains based on our proprietary technology. The new facility will include a hydrocracker of 3.37 mtpa ebullated-bed residue hydrocracking capacity in two trains.



BULGARIA

BURGAS REFINERY
- Contract: FEED (Completed Q1 2010)/EPC
- Award: Q2 2012
- Delivery: 2015
- Client: Lukoil Neftochim Burgas

This major expansion project enables conversion of residual fuel oil into lighter products and low sulfur fuel oil. The new facilities comprise a 2.5 mtpa ebullated-bed residue hydrocracking unit, a hydrogen production unit, and hydrogen compression, catalyst handling and auxiliary units.



KINGDOM OF SAUDI ARABIA

JUBAIL REFINERY
- Contract: FEED & EPC
- Award: 2006 (FEED)
- Delivery: 2014 (EPC)
- Client: SATORP
- Location: Al-Jubail

Technip Energies completed the FEED of this world-class grassroot refinery with an aromatics complex, and delivered two major EPC packages. The full conversion refinery currently has a processing capacity of 400,000 barrels per stream day of heavy crude oil.



MALAYSIA

RAPID REFINERY
- Contract: FEED (Completed 2013)/PMC/EPC
- Award: 2014
- Delivery: 2019
- Client: Petronas

The RAPID Project is a world-scale, grassroot integrated refinery and petrochemical complex producing 7.7 mtpa* of polymers, rubbers and other chemicals. The refinery uses modern technologies that comply with the most stringent environmental regulations to produce gasoline and diesel that meet Euro 5 fuel specifications. It also supplies feedstocks for the integrated petrochemical complex.

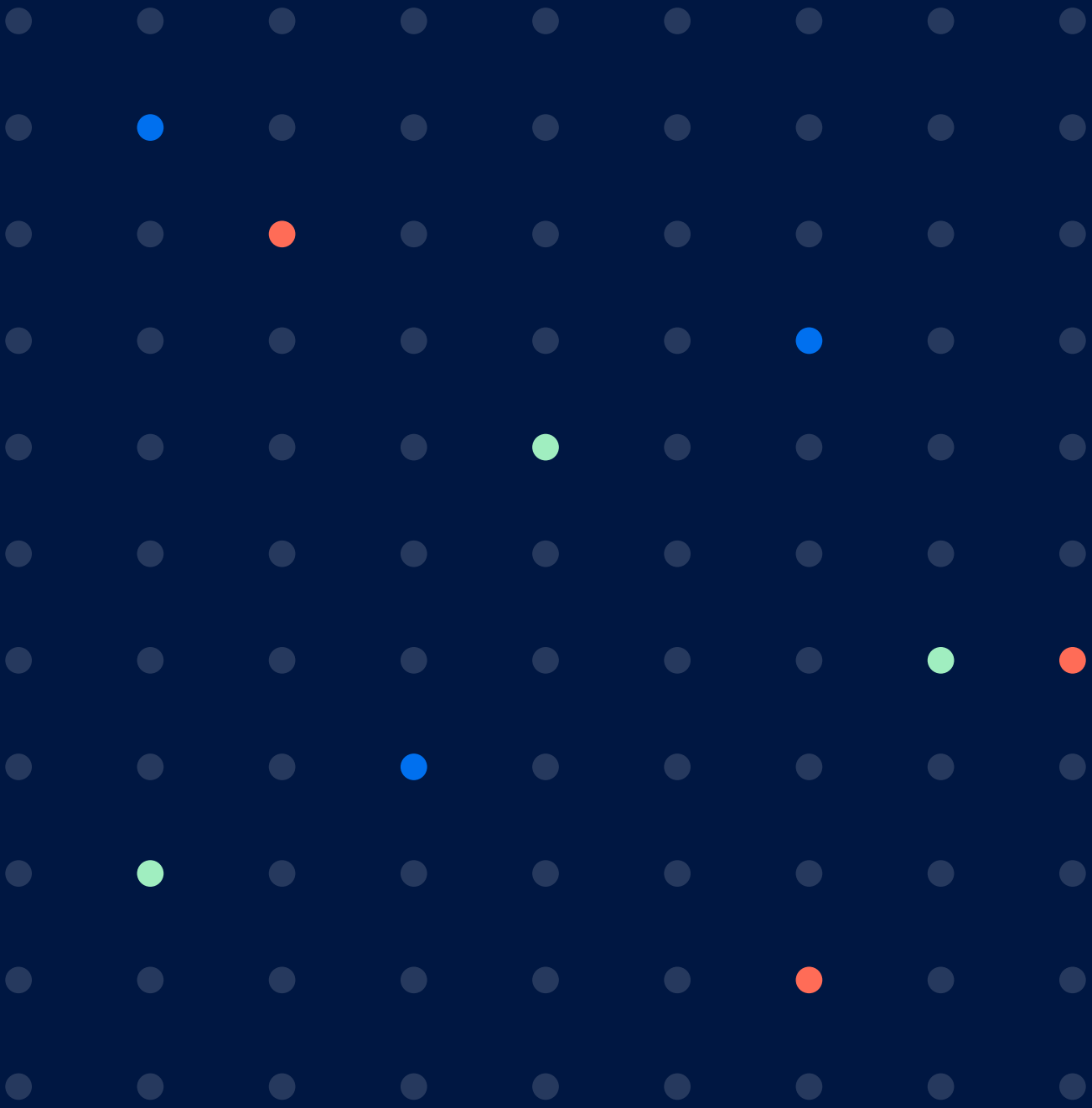
* mtpa: million tons per annum



UAE

JEBEL ALI REFINERY EXPANSION
- Contract: EPC
- Award: 2016
- Delivery: Q4 2019
- Client: ENOC Processing Co. Ltd

The project expands the capacity of the Jebel Ali facility by 50 percent. The existing plant was first delivered and commissioned by Technip Energies in 1999. The project added a new condensate processing train, expanding its capacity from 140,000 to 210,000 barrels per day. Additional processing units also were added, including a new LPG/naphtha hydrotreater, an isomerization unit, a kerosene hydrotreater and a diesel hydrotreater.



Europe
Guillaume Cheviron
Head of Technology - Sustainable Fuels
guillaume.cheviron@ten.com

US
Steve Shimoda
Licensing Manager, Sustainable Fuels
Tel: +1 832 848 5242
steve.shimoda@ten.com

www.ten.com

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