



TOYO
ENGINEERING



C O R P O R A T E
B R O C H U R E

Delivering **Value Creation** and **Innovation** for our clients



LNG

Client: Sakhalin Energy Investment Company Ltd.

Type: Sakhalin-2 Project, Prigorodnoye Asset

LNG Plant 4,800,000 t/y×2

Oil Export Terminal 99,000m³×2

Location: Sakhalin, Russia

©Sakhalin Energy

The Responsibility of an Engineering Company

A state-of-the-art plant surrounded by abundant nature,
infrastructure that provides people with a richer life—
Toyo Engineering Group (TOYO) delivers value creation
through sustainable engineering harmonized with the environment,
supplying energy and materials globally with clients and partners
to contribute to sustainable development.

Your Success, Our Pride.



Energy



FPSO | Floating Production, Storage and Offloading system

Around the world, various initiatives to reduce greenhouse gases are rapidly moving forward, and high-efficiency use of clean energy sources is growing in importance. TOYO is executing natural gas-related projects in areas such as Liquefied Petroleum Gas (LPG), Natural Gas Liquid (NGL), and Liquefied Natural Gas (LNG) in several countries. In addition, TOYO is actively involved in new energy fields such as seabed methane hydrate. TOYO provides optimized, economically effective utilization of energy to clients, ranging from development planning and plant operation tailored to the life stages of gas and oil fields, to effective use by providing fresh perspectives in areas such as Enhanced Oil Recovery (EOR) and Carbon dioxide Capture and Storage (CCS).

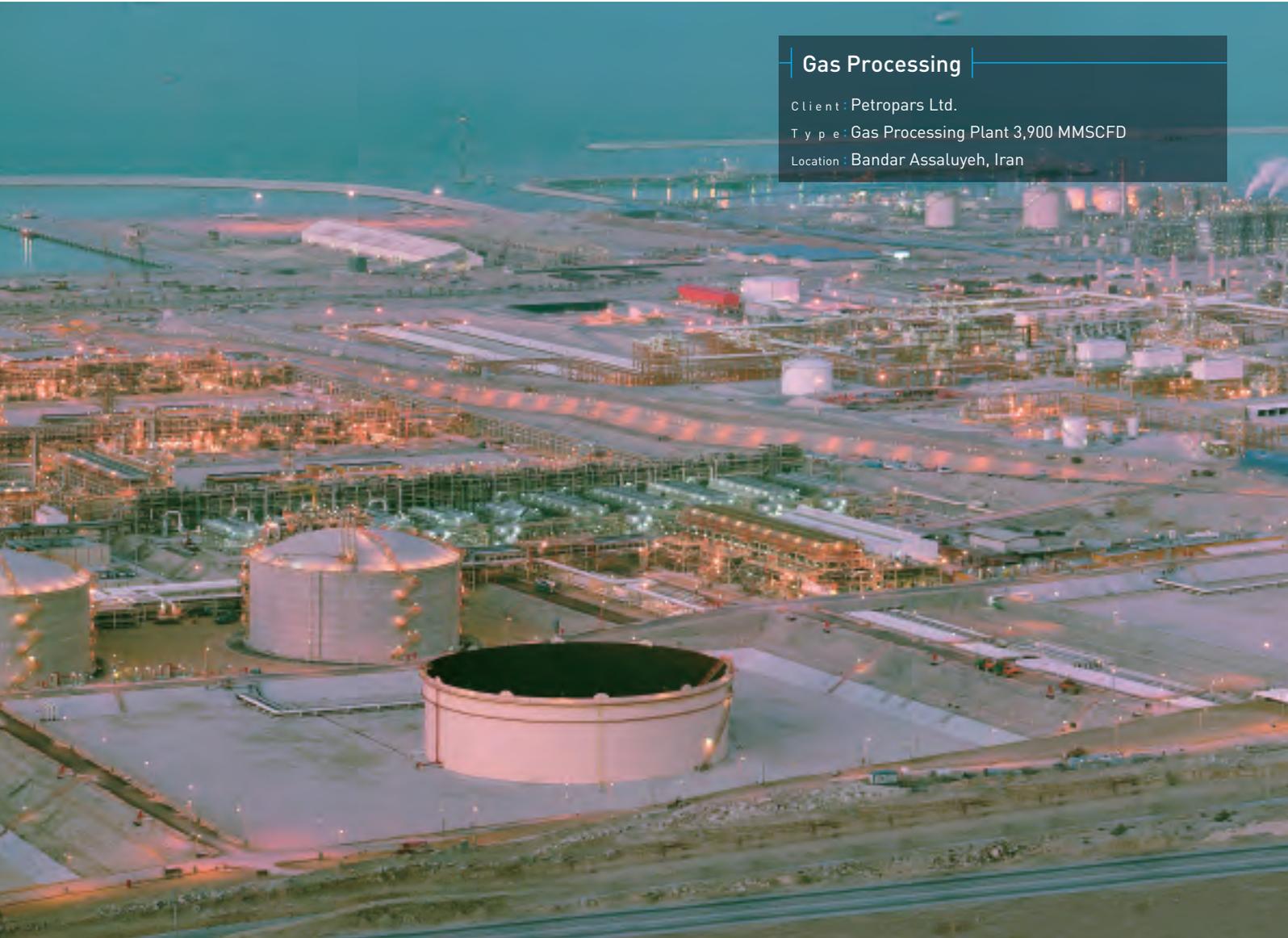


Client: Petróleo Brasileiro S.A. (Petrobras)

Type: Oil 150,000 BOPD

Gas 7,000,000 m³/d

Location: Offshore Rio de Janeiro, Brazil



Gas Processing

Client: Petropars Ltd.

Type: Gas Processing Plant 3,900 MMSCFD

Location: Bandar Assaluyeh, Iran

Gas Processing



Client: Turkmengas

Type: Separation Unit for Gas Chemical Complex
COREFLUX™ 560 MMSCFD

Location: Turkmenbashi suburbs, Turkmenistan

LNG Regasification Plant



Client: GSPC LNG Ltd.

Type: LNG Regasification Plant
5,000,000 t/y

Location: Mundra, Gujarat, India

Other Projects

- Oil and gas development
- Gas production
- Gas receiving, storage and offloading
- Dimethyl Ether (DME) for fuel as clean energy
- Others

Oil Refining

As society shifts toward a low carbon future, oil refining is expanding from the production of clean fuels toward the production of petrochemical feedstock. TOYO has proprietary High Conversion Soaker Cracking (HSC) technology and has executed plant construction projects around the world, such as hydrodesulfurization for clean fuel production, catalytic reforming to enhance octane value and produce aromatics, fluid catalytic cracking to convert heavy oil into lighter products, hydrocracking, and thermal cracking. As the petrochemicals market is expected to continue expanding, and in order to flexibly respond to market needs, TOYO is working on crude-to-chemicals processes which integrate refineries with chemical manufacturing plants and optimize the co-production of fuel oil and petrochemicals.

Heavy Oil Upgrading



Client: Petróleo Brasileiro S.A. (PETROBRAS)

Type: Delayed Coker Plant 31,000 BPSD
Coker Naphtha Hydrotreating Plant
18,900 BPSD

Location: Sao Jose Dos Campos, Brazil



Desulfurization



Client: Slavneft-Yaroslavnefteorgsintez
Type: Visbreaker Plant 28,000 BPSD
Location: Yaroslavl, Russia



Client: S-OIL Corporation
Type: Vacuum Residue Hydrodesulfurization Plant 57,000 BPSD
Location: Ulsan, Korea

Other Projects

- **Grass-roots refineries**
- **Adding value to products**
 - Isomerization
 - Alkylation
 - Methyl Tertiary Butyl Ether (MTBE), etc.
- **Modernizing refineries**
 - Propylene recovery including Olefins Conversion Technology (OCT)
 - Energy conservation, etc.
- **Gasification**
- **Others**

Heavy Oil Catalytic Cracking, Desulfurization

Client: Petróleo Brasileiro S.A. (PETROBRAS)
Type: Residue Fluid Catalytic Cracking Plant 44,000 BPSD,
Gas Oil Hydrodesulfurization Plant 25,000 BPSD
Location: Porto Alegre, Brazil



Petrochemicals &



Aromatics



Client: Borzouyeh Petrochemical Company

Type: Aromatics Plant

Benzene 430,000 t/y

P-Xylene 750,000 t/y

O-Xylene 100,000 t/y

Location: Bandar Assaluyeh, Iran

TOYO provides its clients with the latest technology in the petrochemical and chemical plant fields and has accumulated an extensive performance record and world-class engineering know-how. TOYO has constructed environmentally conscious plants utilizing its robust technologies in areas such as ethylene, propylene, various types of polymers, ethylene glycol / ethylene oxide, aromatics, and high functional plastics among other products in the petrochemical field, in addition to hydrogen, methanol, and its derivatives in the chemical field. These plants are highly energy efficient and have gained a reputation for consistent production of high-quality products in various countries and regions around the world. In addition, TOYO strives to contribute to the construction of manufacturing plants for new products that will help reduce greenhouse gas emissions.

Chemicals



Ethylene Plant

Client: Shell Eastern Petroleum (Pte) Ltd.

Type: Ethylene Plant 800,000 t/y

Location: Bukom Island, Singapore

Methanol



Client: Oman Methanol Company L.L.C.

Type: Methanol Plant 3,000 t/d

Location: Sohar, Oman

Polyethylene



Client: PT Chandra Asri Petrochemical Tbk (CAP)

Type: Polyethylene Plant 400,000 t/y

Location: Cilegon, Java, Indonesia

Other Projects

- Propylene
- Polypropylene
- Ethylene glycol
- Polystyrene
- Aniline
- Vinyl chloride monomer
- Fluorocarbon polymers
- Methanol derivatives
- Others

Fertilizer

Over many years as a licensor of urea technology, TOYO has developed its own proprietary urea synthesis (ACES21™) and urea granulation technologies, aiming to achieve energy conservation, high value-added products, environmental protection, and reduction of lifecycle costs for clients. In 1969, TOYO built an ammonia plant which incorporated the process technology of KBR, Inc., of the United States. Since then, the two companies have partnered to build many ammonia and urea complexes worldwide as fertilizer complex contractors, offering comprehensive services from ammonia production to the finished urea products. TOYO is also responding to scale-up needs related to increased food production in regions with high population growth.

ACES21 is a trademark of Toyo Engineering Corporation, registered in Japan. [Registered Number 4309123].

Ammonia, Urea



Client: PT Pupuk Kalimantan Timur (Kaltim)

Type: Ammonia and Urea Plant

Ammonia 2,500 t/d

Urea 3,500 t/d

Location: East Kalimantan, Indonesia



Urea



Client: Petroquímica de Venezuela, S.A.
(PEQUIVEN)

Type: Urea Plant 2,200 t/d

Location: Morón, Venezuela

Ammonia, Urea



Client: Chambal Fertilisers and Chemicals Limited
(CFCL)

Type: Ammonia and Urea Plant

Ammonia 2,200 t/d

Urea 4,000 t/d

Location: Kota, Rajasthan, India



Ammonia, Urea

Client: Indorama Eleme Fertilizer and Chemicals Limited

Type: Ammonia and Urea Plant

Ammonia 2,300 t/d

Urea 4,000 t/d

Location: Port Harcourt, Rivers State, Nigeria

Infrastructure



Power Generation

Client: Gulf VTP Company Limited and 11 other companies

Type: Gas Fired Cogeneration Power Plant 1,490MW
(120MW×6, 125MW×2, 130MW×4)

Location: Twelve sites, Bangkok suburbs, Thailand

While infrastructure construction is accelerating around the world along with rising living standards, global warming countermeasures represent an urgent issue. TOYO is working actively on projects that utilize renewable energy. TOYO is eager to play a role in building the foundations for the growth of sustainable societies through projects such as power plants that provide a reliable supply of electricity, transportation systems to relieve chronic traffic congestion, and facilities that utilize water resources effectively to supply safe drinking water. TOYO supports international infrastructure servicing through its management and planning capabilities for large-scale projects as well as through its ability to procure large amounts of equipment and materials and manage construction projects.

Biomass Power Generation



Client: Obayashi Kamisu Biomass Power Generation Corp.

Type: Dedicated Biomass-fired Power Plant 50MW

Location: Ibaraki, Japan



Artist's rendering



Transportation



Client: PT Mass Rapid Transit Jakarta
 Type: Full Mass Rapid Transit System and Trackwork Package
 Location: Jakarta, Indonesia

Water Distribution Improvement



Client: Yangon City Development Committee
 Operations: Reduction of non-revenue water rate through leak survey and repair, replacement of aged water pipes and replacement and installation of meters
 Location: Mayangone, Yangon, Myanmar



Active Pharmaceutical Ingredients (API)
 Client: Yuki Gosei Kogyo Co., Ltd.
 Type: Pharmaceutical Ingredient Multi-Plant
 Location: Fukushima, Japan

Pharmaceuticals & Fine Chemicals

In pharmaceuticals and fine chemicals, TOYO provides clients with a wide range of production systems that can meet specific market needs as well as adapt to change. In fields including synthetic pharmaceuticals, medium molecule pharmaceuticals, biopharmaceuticals, and the manufacture of high value-added fine chemicals based on advanced technologies, TOYO takes advantage of its accumulated experience to offer EPC services for facilities, making use of digital data and engineering services that employ the latest technologies such as continuous manufacturing. TOYO welcomes change as an opportunity, supporting its clients' business endeavors as well as contributing to business development from the viewpoint of safety, quality, construction schedules, and costs.

Active Pharmaceutical Ingredients



Client: Shionogi & Company Ltd.
 Type: Highly Potent API Manufacturing Plant
 Location: Tokushima, Japan



Client: Yonezawa Hamari Chemicals, Ltd.
 Type: High Potency API Multi-Purpose Plant
 Location: Yamagata, Japan



Routine Maintenance Management

Client: Japan Petroleum Exploration Co., Ltd.
Type: Natural Gas Processing Plant
Maintenance Management
Location: Hokkaido, Japan

Operation & Maintenance

Working toward the realization of a safer and more secure society as well as sustainable development requires a high-level combination of plant reliability and economic operations. TOYO proposes an optimized maintenance plan, then utilizes its sophisticated project management capabilities to realize integrated operations with clients. The Company contributes to improving clients' competitiveness by leveraging its advanced engineering and procurement capabilities.

Turnaround Planning



Client: Kyokuto Petroleum Industries, Ltd.
Type: Scheduled Maintenance of Oil Refinery
Location: Chiba, Japan



Client: Nippon Petroleum Refining Co., Ltd.
Type: Turnaround for Fluid Catalytic Cracking Plant
Location: Oita, Japan



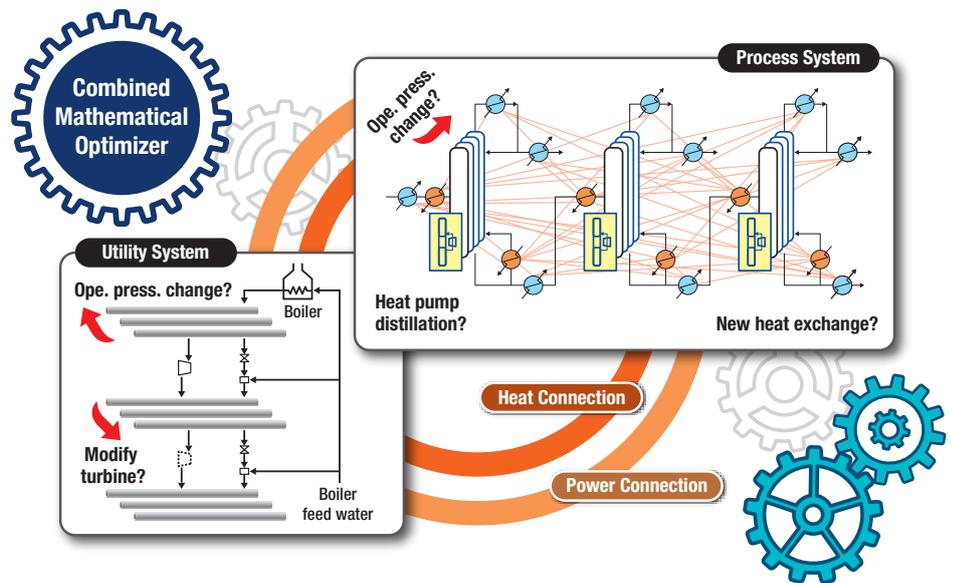
DX-PLANT™

TOYO provides solutions through IoT and AI analysis for the following four fields: engineering information management (E), operation support (O), maintenance support (M), and business support (B). Through secure cloud computing, DX-PLANT™ creates a virtual plant synchronized with an actual plant based on big data from plant operations, inspection records, maintenance histories, and so on. DX-PLANT™ aims at maximizing clients' revenue by enhancing the on-stream factor, and also at minimizing costs by optimizing the operation and maintenance of plants. TOYO contributes to clients throughout the total life cycle of the plant.

Services for Asset Life Cycle

HERO / SUPERHIDIC™

Plant owners are working on various energy saving measures to reduce greenhouse gases. TOYO's HERO (Hybrid Energy system Re-Optimization) is a proposal-type service that achieves energy savings and reduces the environmental load for the entire plant through a mathematical optimization method that simultaneously handles the process unit and utility unit. With the tailor-made model produced by HERO, TOYO can offer feasible and effective ways to apply SUPERHIDIC™, our innovative energy saving distillation system, to plants.





R&D Engineering

Today's common social goals are the pursuit of low-carbon technologies and the creation of a circular economy. TOYO's R&D engineering supports the efficient creation of commercial products based on clients' research stage technology. By providing EPC experience and know-how gained from the development of our proprietary processes and plant engineering, TOYO can shorten the time necessary to enter new markets and minimize investment costs through optimum design. Our services contribute to improvements in the quality of production facilities, including safety and environmental aspects.

Over the years, TOYO has provided EPC services mainly for the construction of oil and chemicals related facilities and for the creation of social infrastructure. Our clients start production and operations upon the handover of the facility and continue business operations for many years afterward. Over that period, not only does equipment deteriorate, but there are also important events such as repairs, capacity enhancements, and new investment planning in response to changes in market needs. TOYO will continue to support clients as an engineering partner in EPC as well as in the EPC planning stage and during ongoing business operations.

Owner's Engineering

Owner's engineering is a service that maximizes clients' business value. After concluding an engineering service contract with the client, TOYO assists with technology development, drafts and proposes business ideas and strategies, and supports business operations and investment planning over a long-term period of three or more years. For example, in areas such as the development of unconventional energy production technologies and the effective use of energy at LNG receiving terminals, TOYO is working as one team with clients and partner companies to carry out technology development and engineering design as well as to support business development.



Delivering

Sustainable Devel

for the global community



opment



A Reliable Engineering Partner

An immense plant that can be seen from several thousand meters in the sky—Our groups of experts in highly specialized fields begin to work with clients right from the conceptual stage. With one common goal in mind, they labor cooperatively for years to complete long-term projects and achieve that goal. To deliver the new value clients need, TOYO collaborates with licensors and partner companies in providing engineering services that integrate world-class technologies. Ensuring that TOYO remains an engineering partner that its clients can trust, we are continually honing those skills.

Your Success, Our Pride.

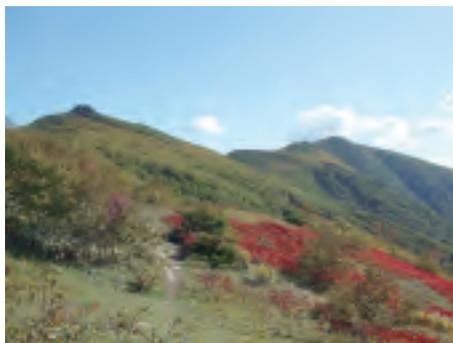
Safety



Safety takes precedence over all other considerations—that is the Company's fundamental policy. Precious lives must not be lost, nor may injuries be sustained, during construction. The Company endeavors to introduce every measure that ensures safety in project implementation. Safety is most important, indispensable in carrying out our business activities, and one of TOYO's most valuable brands. Going forward, TOYO intends to further solidify its safety culture.

Environment

TOYO has two pillars of environmental conservation and human prosperity and, as an engineering company, has made contributing to sustainable development its mission. The Company makes use of its technologies for energy conservation, wastewater treatment, hazardous substance removal from exhaust gases, and other environmental issues. TOYO also applies the latest technologies in constructing plants with a low impact on the environment. With a focus on technology, TOYO will continue to tackle urgent issues such as greenhouse gas reductions and biodiversity conservation.

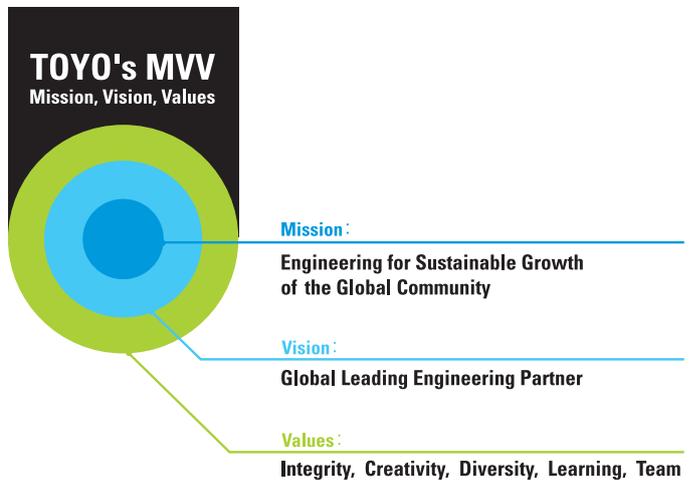


Partnership



To customize solutions to fit clients around the world, it is important to execute projects taking into account the special features of regions or products. To do so, TOYO utilizes a collaborative business framework with its various partners. It builds optimum partnerships for each project by forming strategic technology alliances with the world's leading licensors or by collaborating with other contractors and equipment manufacturers. Based on this framework, TOYO accurately responds to the needs of its clients and sets the stage for the success of its projects.





A Trusted Engineering Partner

TOYO's mission is to exert its best efforts to solve the problems of its clients and to harmonize its plant construction projects with the environment and society. To fulfill this mission and satisfy customers, each individual TOYO staff member is constantly endeavoring to be innovative, improve technologies, and utilize knowledge and creativity to achieve client value enhancement. The Company also seeks to pursue its business with integrity. Overall, TOYO's goal is to be a "Global Leading Engineering Partner."



Your Success, Our Pride.



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