CHIYODA CORPORATION

Energy and Environment in Harmony

Company Outline

Our Mission

Energy and Environment in Harmony

Chiyoda Corporation, the world-leading engineering company, has wide-ranging business interests in such fields as energy, chemicals and petrochemicals, pharmaceuticals, environmental technology, social infrastructure and industrial facilities. Since its founding in 1948, Chiyoda has built various plants and executed numerous projects in over 40 countries around the world.
Due to the demands of government, industry and the public for energy conservation and an increase in the use of renewable energy, today's global economy is undergoing a fundamental transition toward becoming a low-carbon society.
A front-runner in energy-related technology, Chiyoda has always confronted new business challenges with the aim of achieving a balance and harmony between the exploitation and use of energy and protection of the environment, and now is the perfect time for us to demonstrate our extensive capabilities.

CONTENTS

LNG Plant (Russia) [1]

Photo : [1] Sakhalin Energy Investment Company

From Fossil Fuels to Renewable Energy:
Responding to the Diverse Challenges of
Energy Development

Energy

[Hydrocarbon Energy]

Engineering, procurement and construction (EPC) for oil refining facilities, liquefied natural gas (LNG) plants and LNG terminals, etc, form the core of Chiyoda's business operations. In recent years, we have been engaged in projects aimed at meeting present-day needs by using advanced technology, such as the treatment of heavy oil and the floating LNG (FLNG) plants. Additionally Chiyoda has been expanding into the offshore and upstream fields which are being developed rapidly in the world as ocean energy development. We also provide engineering services to support projects throughout their entire life cycles, from the planning stage through to test operation and maintenance.
Chiyoda plays an important role in the efficient use of oil and natural gas resources. As well, we have been and continue to be engaged in numerous chemical and petrochemical projects that produce products such as fertilizers, resins, synthetic fiber materials and engineering plastics through the chemical reactions of by-products obtained from refining oil and natural gas.

※EPC：Engineering、Procurement & Construction

Coker Unit (Saudi Arabia) 2

LNG Terminal 3

Offshore/Upstream 4

Methanol Plant (Saudi Arabia)

Experience

●Energy

Grass-roots refineries, Catalytic crackers, Lubricant plants, Gas processing plants, LNG receiving terminals, LNG/LPG/GTL plants, Hydrogen production plants, Oil storage, Photovoltaic cell plants, etc.

●Petrochemical and Chemical

Ethylene plants, EO･EG plants, MMA plants, SM･PO plants, Aromatics plants, PTA plants, Ammonia-Urea, Methanol plants, Engineering Plastics plant etc.

Photo：2Saudi Aramco Total Refining & Petrochemical Co.(SATORP) 3Tokyo Gas Co., Ltd. 4Xodus 5Qatargas Operating Company Limited

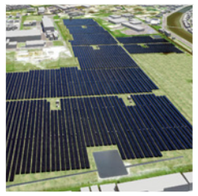
LNG Plant (Qatar) 5

Mega Solar [6]

CIS Solar Cell Plant and Mega Solar [7]

Chiyoda is actively involved in developing technologies for renewable energy, including photovoltaic (PV) . The use of these natural energy resources reduces heat and CO_2 emissions and provides an effective means of combatting global warming. Such sources of natural energy can also be used effectively in a wide variety of ways with Chiyoda's accumulated technologies. Marked attention is paid to hydrogen as the ultimate clean energy and Chiyoda has successfully verified its own "Large-Scale Hydrogen Storage and Transportation System" at its demonstration plant. Our ambition is to establish a hydrogen supply chain where hydrogen can be delivered economically and safely in large volumes using our own innovative technology.

Demo Plant for SPERA Hydrogen



Mega Solar [8]

Experience

● Renewable / Clean Energy

Photovaltaic(PV)Solar Power Plant, Hydrogen Production Plant, etc.

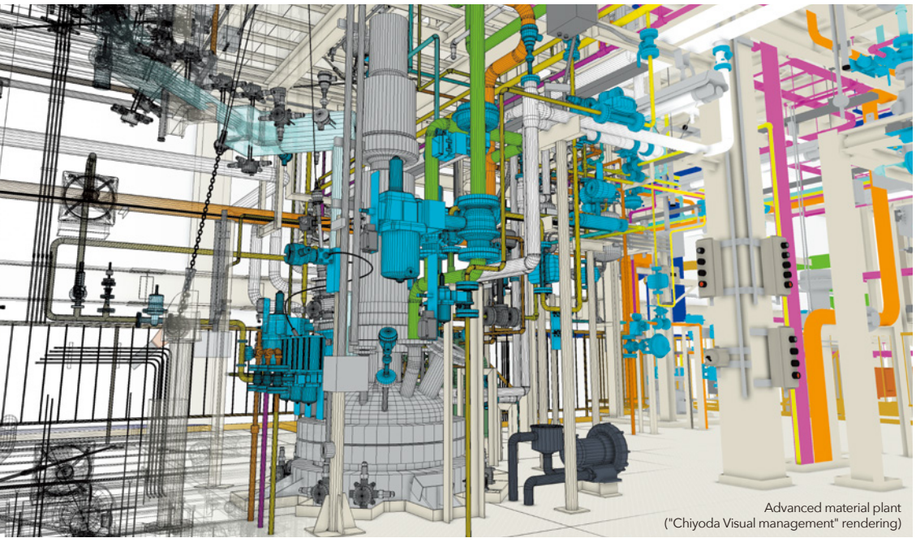
Contributing to the Optimum Energy Mix with Our Own Technologies

Energy

[Renewable / Clean Energy]

Photo：[6]Nagasaki Solar Energy [7]Solar Frontier K.K. [8]Nippon Solar Power 2013 LLC

For a Rich, Prosperous Future
Fuelled by Constantly Innovating Technology



Advanced material plant
("Chiyoda Visual management" rendering)

Industrial Facilities

New materials for next-generation products such as rare metals, electronic materials and functional chemicals are constantly evolving and making a positive impact on our lives. Artificially modifying the forms of these materials allows them to function in new ways and increases their value. It is necessary, in order to manufacture new artificially modified materials, to develop new processes and provide efficient, well-managed facilities.
Chiyoda responds to these needs through its well-experienced engineering services.

Titanium Melting Plant [9]

Food Factory
(Modernized improvement) [10]

Automobile inspection and assembly factory

Refining and recycling of precious metals plant

Experience

Advanced material plant, Metallurgical Plants, Electronic Materials Plants, Food Factory, Automobile factory, FA･Manufacturing and Assembly･Logistics, Industrial Facilities, etc.

Photo：[9]Toho Titanium Co.,Ltd. [10]KAMEDA SEIKA CO., LTD.

Environmental Preservation

Achieving harmony between industry and environment is Chiyoda's prime mission. We have worked on various projects both in Japan and overseas, including development of our own technologies (e.g., for water purification and for the prevention of air pollution). We have also executed EPC works for flue gas desulfurization systems, as well as for water recycling and sewage disposal systems.
These carefully developed technologies support environmental conservation worldwide.

Flue Gas Desulfurization Plant [11]
(CT-121)(Japan)

Flue Gas Desulfurization Plant [12]
(CT-121)(USA)

Experience

FGD plant (CT-121/CASOX), Water/Ash Treatment Facilities, Energy-saving Technology, IGCC (Integrated Gasification Combined Cycle), Gas Oil Deep Desulfurization Plant, etc.

Chiyoda's Advanced Technology
Helps Protect the Environment to the Next Generation

Photo：[11]Tohoku Electric Power Company [12]Georgia Power Co.

Engineering that Contributes to
People's Lives and Health

Pharmaceuticals & Fine Chemicals

The manufacturing of pharmaceutical products impinges on people's lives and health, so careful management of the safety and quality of such products is required, as well as a high level of engineering skill that meets strict standards. Based on experience accrued from 500 pharmaceutical-related projects over the course of 40 years, Chiyoda provides total engineering services that meet various industrial needs including globalization, diversification and improvements in efficiency.

Pharmaceutical Plant 9

Centrifuging Room 10

Experience

API/Intermediate Plant, Solid/Injectable product/Bio Pharmaceutical Plant, Pharmaceutical Laboratories, etc.

Providing Solutions through
Engineering Consulting Services

Consulting & Licensing

Chiyoda has developed advanced technologies and acquired expertise through its own independent research and development as well as through its experience in plant engineering, procurement and construction, thereby enabling it to provide engineering consulting, analysis, licensing services, solutions by advanced analytic technology, and equipment diagnosis. By combining its professional skills (including those of its group companies in Japan and overseas) with the advanced technologies and services that it tailors to its individual customers' needs, Chiyoda is able to provide optimal solutions to any of the challenges they may face.

Experience

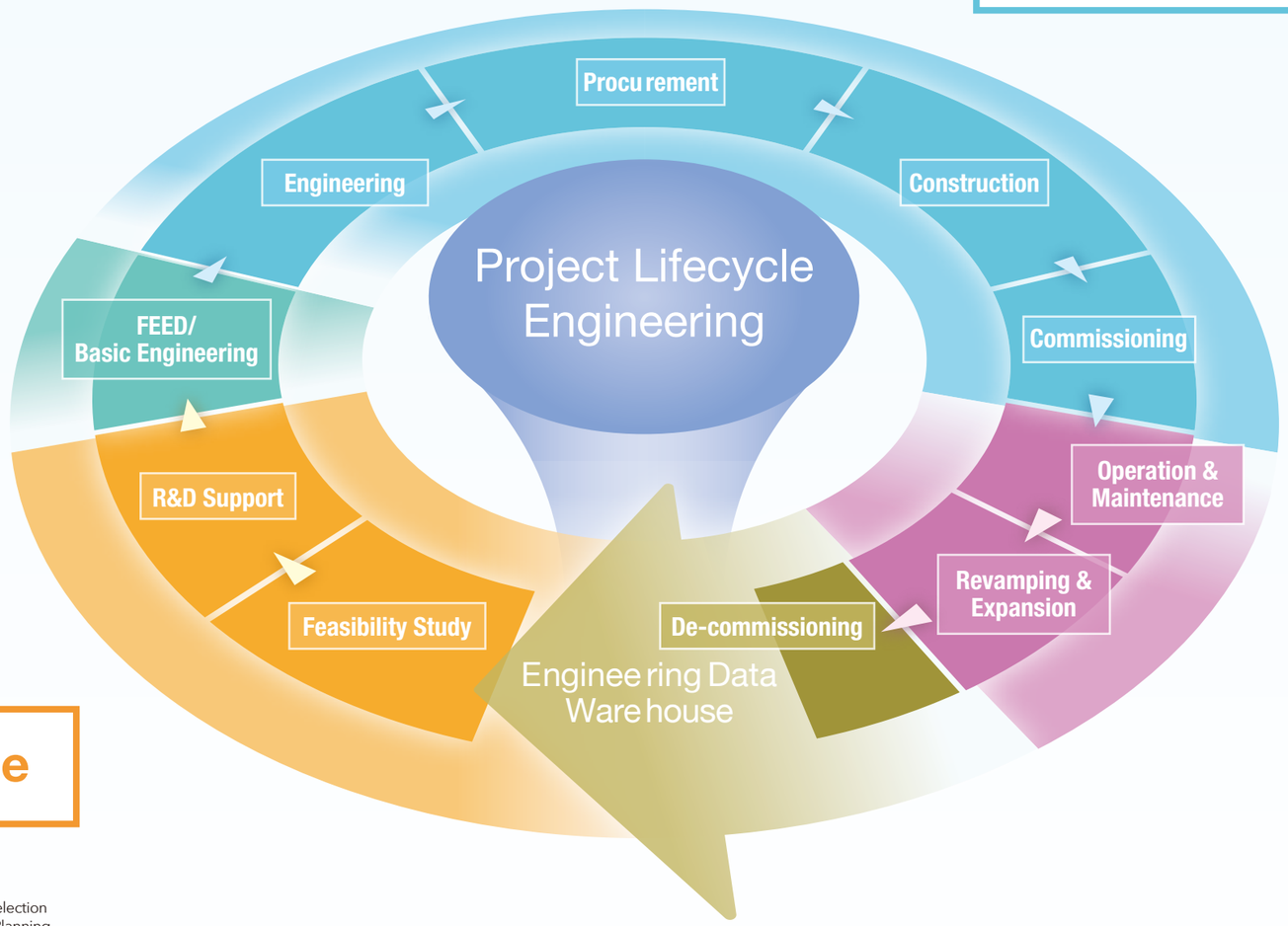
Technology consulting (Integrated utilities/Gasification of Coal, Heavy Oil, Energy-saving, Carbon Management), Licensing (Catalyst/Process Development/FGD Technology/Acetic Acid Technology), etc.

Photo: 9 10 Eisai Co.,Ltd.

Service

Chiyoda is always ready to provide
high quality service at any phase of project,
anytime and anywhere in the world.

Chiyoda is engaged in numerous projects in countries throughout the world. Our activities, which are focused mainly on plant engineering, procurement and construction (EPC), are wide ranging–from energy to industrial facilities, pharmaceutical products and fine chemicals. Additionally, we are actively developing our own technologies in order to provide further advances in the fields of environmental and chemical engineering.
Using the skills and expertise we have acquired throughout the years in plant construction, we have also developed Project Lifecycle Engineering. This service helps provide support for plants and the social infrastructure throughout their entire life cycles, starting with project planning and consulting, through to engineering, procurement, construction, operation and maintenance.



EPC Phase

EPC Services

- Engineering
- Procurement
- Construction
- Project Management

EPCm Services

- Engineering
- Procurement Service
- Construction Management
- Project Management

FEED※1 Phase

FEED Services

- FEED
- Basic Engineering
- Case Study / Optimization Study

※1 FEED: Front End Engineering Design

Planning Phase

Consulting Services

- Conceptual Design
- Preparation of Pre-FEED
- Feasibility Study
- Process Development Support
- Technology Selection
- Construction Planning
- Existing Plant Re-use Planning

Operation and Maintenance Phase

Operation & Maintenance

- Training
- Technology Transfer
- Shut-down Maintenance
- Emergent Maintenance
- Maintenance Planning
- Spare Parts Management
- CMMS※2

※2 CMMS: Computerized Maintenance Management System

Asset Management Service

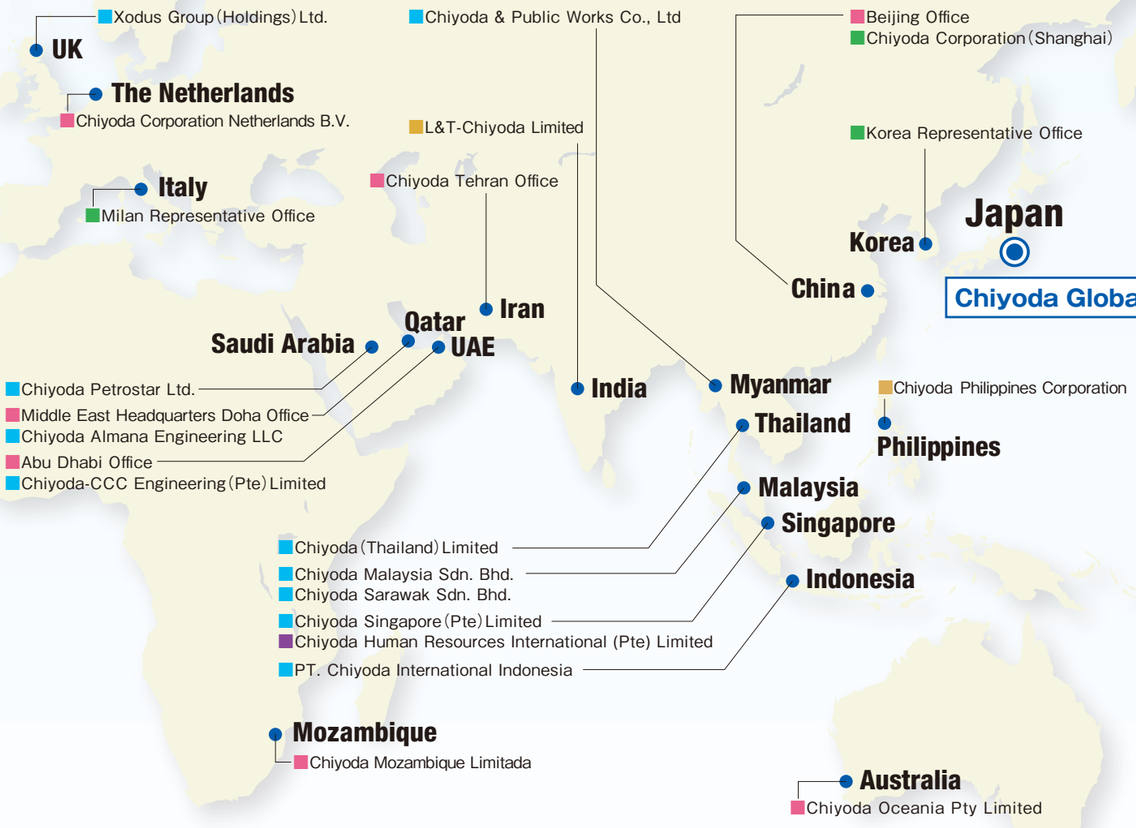
- Risk and Reliability Management
- Equipment and Machine Diagnostics
- Energy Saving
- Advanced Process Control
- Advanced CAE※3 Solutions
- Debottlenecking

※3 CAE: Computer Aided Engineering

Global Network

Optimizing Chiyoda's Strength through Global Operations

Chiyoda's global network enables Project Lifecycle Engineering to be offered all over the world. Chiyoda has expanded its network in order to provide prompt support for customers' business activities on a global scale. We pursue a "group operation style" based on region, business fields and function under the core strategy of CGH (Chiyoda Global Headquarters).Our services cover the entire life cycles of project–from planning, engineering, procurement and construction through operation and maintenance. With a view to meeting the ever-changing needs of our customers, we offer services by utilizing local offices and group companies with a thorough knowledge of the latest local and global circumstances in countries around the world.



Major Group Companies in Japan

Chiyoda Kosho Co., Ltd.
Engineering, construction and maintenance of domestic energy and chemical plants; life and non-life insurance agent

Chiyoda System Technologies Corporation
Engineering, procurement, construction and maintenance of electrical and instrumentation, and of social infrastructures. Consulting, development and operation for integrated IT systems

Chiyoda TechnoAce Co., Ltd.
Engineering, construction, supervision, surveying, planning and consulting for research laboratories and fine chemical and hydrocarbon facilities

Chiyoda U-Tech Co., Ltd.
Feasibility studies and consulting for energy, oil, chemical and environment-related plants and various types of industrial facilities

Arrow Human Resources Co., Ltd.
Temporary staffing, job placement, outsourcing services for engineering, administrative and government office related work, and education and training

Arrowhead International Corporation
Business travel and relocation agent; materials export and air cargo agent

(As of February 1, 2017)

Corporate History

1948 Foundation of the Company.
Receipt of the first order (Oil extractor).
1949 Receipt of the first order for a cracking plant.
1960 Receipt of an order of grass-roots refinery in Mizushima.
1961 Listed on the first section of Tokyo Stock Exchange.
1966 Receipt of the order for Jeddah Refinery in Saudi Arabia.
1972 Published a booklet "Legacy for the 21st Century" (Environmental Declaration).
1973 First order awarded for LNG plant (UAE).
1984 First order awarded for CT-121 Flue Gas Desulfurization plant (USA).
1994 Foundation of Engineering Center (India).
1995 Foundation of Engineering Center (The Philippines).
1999 Commended by the Project Management Institute for Qatargas LNG project as the "International Project of the Year".
2000 Received from the Japan Industrial Journal "the Grand Prize for the Global Environment Award".
2001 Expansion of natural gas related business.
2003 Receipt of the order for Sakhalin II LNG Project
Achieved no LTI throughout the year at domestic projects.
2004 Order awarded for 6 trains of the world's largest LNG
plants for Qatargas and RasGas from 2004 to 2005.
2008 The 60th anniversary of our company's establishment
Capital and Business Alliance with Mitsubishi Corporation.
2012 Receipt of the order for Ichthys LNG Project (Australia).
2013 Order awarded for refinery and petrochemical complex (Vietnam).
Formed a strategic capital alliance with Xodus Group to expand into offshore and upstream business fields.
Confirmed proof of concept for SPERA Hydrogen, a system and technology for massive H_2 storage and transportation, through 10,000 hours of operation in its demo plant.
2014 Order awarded for Cameron LNG Project (USA).
Order awarded for Yamal LNG Project (Russia).
2015 Order awarded for Titanium Sponge Plant (Saudi Arabia).
Order awarded for Freeport LNG Project Train 3 (USA).
2016 Order awarded for Tangguh LNG Project Train 3 (Indonesia).

Chiyoda Corporation

Minato Mirai Grand Central Tower
4-6-2, Minatomirai, Nishi-ku, Yokohama
220-8765, Japan

www.chiyodacorp.com

FTSE4Good

Selected in FTSE Group's responsible investment index
〔As of February, 2017〕

17090150