TOYO ENGINEERING CORPORATION

Safety & Environmental Report 2009

Editorial Policy

- **Purpose of the report**

  This report has been prepared to disclose information about Toyo's and the Toyo Group's safety and environmental activities to stakeholders inside and outside Toyo.

- **Reference guideline**

  This report has been prepared referring to the "Environment Guideline (2007)" of Japan's Ministry of the Environment.

- **Period**

  This report covers the activities for fiscal 2008 (April 1, 2008, through March 31, 2009) and for part of fiscal 2009.

- **Scope**

  This report covers the activities of all the organizations of Toyo and the Toyo Group as well as of the construction sites inside and outside Japan.

- **Next report**

  The next issue is scheduled for September 2010.

- **Prepared by**

  Safety, Quality, and Environment Management Division / Environment Management Team
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Toyo Engineering Corporation takes part in "Team Minus 6%."

Stop Global Warming

Team Minus 6%

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Top Management Message

Aiming to be a corporation trusted not only by clients, but also by the local and international communities.

On behalf of everyone at Toyo Engineering Corporation (Toyo), I would like to express our sincere gratitude to you for your understanding and support for our activities over the years.

Toyo provides its clients all over the world with specialized services ranging from the project planning phase to the plant operation phase by utilizing its project management skills and comprehensive engineering capabilities.

In the process of plant construction, we place the highest priority on safety, implementing a wide range of safety measures. However, unfortunate situations may arise as long as construction work is carried out by humans, regardless of the best possible efforts for preventing errors or mistakes. Should any accidents occur, we immediately report them to the client and the relevant authorities, and share the information so that all group companies can implement necessary and thorough safety measures.

While providing specialized services, Toyo fulfills its social responsibility to protect the global environment by employing energy- and resource-saving designs and by paying the utmost attention to environmental concerns in plant construction. We would like to act as a corporation trusted not only by our clients, but also by the local and international communities.

We would be pleased if you look over the "Safety and Environmental Report 2009," which describes Toyo's activities in these fields, and let us know your honest views of these activities.

Yutaka Yamada
President and Chief Executive Officer

Corporate Profile (As of March 31, 2009)

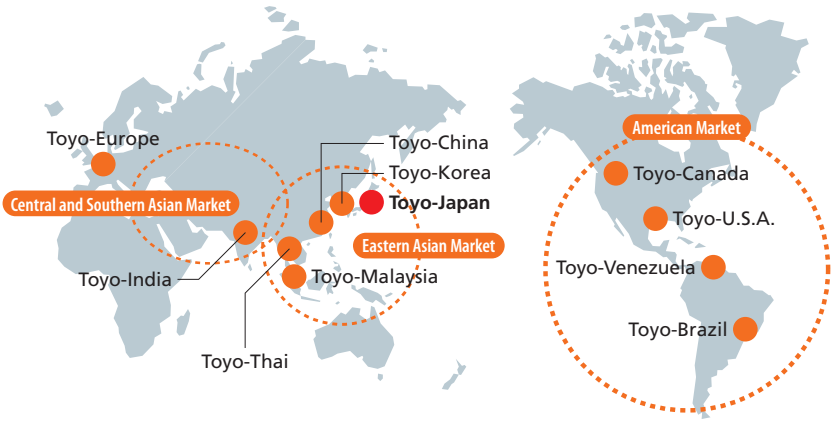
- **Corporate name:** Toyo Engineering Corporation
- **Founded:** May 1, 1961
- **Representative:** Yutaka Yamada, President and Chief Executive Officer
- **Common stock:** 18,199 million yen
- **Number of employees:** 1,088
- **Business activities:** Engineering and Construction for Industrial Facilities
  - R&D support, design, engineering, procurement, construction, commissioning, and technical assistance for industrial facilities: oil, gas, petrochemicals, chemicals, water treatment, transportation systems, power generation, nuclear power, advanced production systems, pharmaceutical, fine chemical, distribution systems, biotechnology, environmental, and others
  - IT engineering services and system software supply

Global Toyo

"Global Toyo" is a globally networked organization in which our group companies around the world collaborate with each other while maintaining close relationships with their respective local markets and clients and carry out work for any client worldwide in the most efficient manner based on common work standards.

Through Global Toyo, we accumulate and share information on such topics as the market, human resources, and technology, thereby enabling us to offer solutions and professional services that meet our clients' needs precisely and promptly.

Worldwide Network



〈Global Toyo〉

Toyo-Japan:	Toyo Engineering Corporation, Japan
Toyo-Korea:	Toyo Engineering Korea Limited
Toyo-China:	Toyo Engineering Corporation, China
Toyo-Malaysia:	Toyo Engineering & Construction Sdn. Bhd.
Toyo-India:	Toyo Engineering India Limited
Toyo-Europe:	Toyo Engineering Europe, S.A.
Toyo-Canada:	Toyo Canada Corporation
Toyo-USA:	Toyo U.S.A., Inc.
Toyo-Venezuela:	Toyo Ingeniería de Venezuela, C.A.
Toyo-Brazil:	Toyo do Brasil—Consultoria E Construcoes Industriais Ltda.

〈Other group company〉

Toyo-Thai:	Toyo-Thai Corporation Public Company Limited

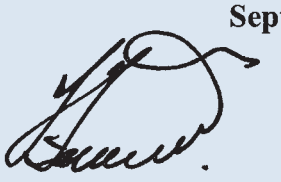
Basic Policies on Health, Safety, Security and Environment (HSSE) and Quality

Toyo Engineering Corporation and its group companies (hereafter TOYO) recognize that satisfying the HSSE and quality requirements called for by our clients and society is an indispensable prerequisite for us to conduct business activities and to fulfill social responsibilities, and abide by the following eight basic policies.

1. Continuously confirm and share the consensus that "Safety takes precedence over all other considerations," and realize and maintain safe, sanitary conditions in all workplaces.
2. Strive to complete all jobs with no accidents and no harm to people by enforcing preventive safety measures.
3. Endeavor to provide our personnel with work environments and opportunities that enable them to maintain and improve their mental and physical health.
4. Ensure information security, and take appropriate safeguards against threats and risks to business assets.
5. Minimize environmental burden by saving resources and energy, detoxifying, reducing and recycling waste, and by preventing pollution during the course of our work duties.
6. Provide high-quality products and services that meet the HSSE requirements of our clients and society.
7. Comply with all relevant laws and regulations, the requirements agreed upon with the client, and our in-house rules relating to HSSE and quality.
8. Establish and continuously improve the effectiveness of management systems, including objective setting, hazard identification, risk evaluation, determination of countermeasures, execution control and review, and education and training, in line with management's firm belief that the securement of HSSE and quality is a prerequisite for business continuity.

These policies shall apply to all staff members of TOYO in any region and country. TOYO will also share the spirit defined by these policies with clients, business partners, and other related parties, and cooperate with them to achieve these objectives.

September 1, 2009



Yutaka Yamada
President and Chief Executive Officer

Safety

Message on Safety

The premises for a corporation that is trusted by the community include paying sufficient attention to safety.

We are confident that our efforts, initiatives, and time and expenses spent to respect human life must take precedence over all other things. Loss of valuable human life must absolutely be avoided in the process of Toyo and its group companies' business evolution, such as plant construction.

With the recognition that "safety takes precedence over all other things," Toyo will continuously implement safety education programs for all its employees to spread awareness of a culture of safety.

Safety is an important brand of Toyo. In order to boost the brand value of all group companies in the world, we are strongly promoting safety measures as part of the company-wide safety target for fiscal 2009: "Make Safety Standard Drill into Global Toyo."

The Toyo Group actively strives to consolidate a firm culture of safety.

Clients' Commendations for Safety

Our mission is to hand over superior facilities to our clients through construction work completed without any accidents or injuries. For this purpose, the Head Office and construction site members, together with clients and partners, conduct safety management activities in a planned and positive manner, with an established Health, Safety, Security and Environment (HSSE) management system.

In March 2009, Toyo received high commendations from Mitsui Chemicals, Inc., Japan, for completing construction without lost time incidents. In July 2009, Toyo achieved a record of 30 million man-hours without lost time incidents at the Singapore site, which was highly appreciated by the client, Shell Eastern Petroleum (Pte) Ltd.


感謝状

東洋エンジニアリング株式会社殿

貴社は今般当社プロピレン新設備建設工事の施工に当たり優秀な技術と誠意ある努力により種々の困難を克服し本工事を無事故・無災害で完遂されました
ここに深く感謝の意を表します

平成二十一年三月十四日

三井化学株式会社
代表取締役社長
竹本 元

Letter of appreciation from Mitsui Chemicals, Inc.

Letter of appreciation from Shell Eastern Petroleum (Pte) Ltd.

Toyo has received letters of appreciation from the clients listed below, in addition to Mitsui Chemicals, Inc., and Shell Eastern Petroleum (Pte) Ltd.

Commendations for safety (January 2008–June 2009)

Year and month	Reason for commendation	Client	Description
May 2009	No lost time incidents	Dow Corning (Zhangjiagang) Co., Ltd.	10 million hours continuous operation without lost time incidents at Dow Corning's silane project, China
Dec. 2008	Completed with no lost time incidents	Bridgestone (Huizhou) Synthetic Rubber Co., Ltd.	3.28 million hours continuous operation without lost time incidents at Bridgestone (Huizhou) Synthetic Rubber's project, China
Aug. 2008	Excellent project execution	Petróleo Brazileiro S.A. (PETROBRAS)	Nominated as the most excellent contractor for 2007 in PETROBRAS' refinery modernization project, Brazil
Jul. 2008	No lost time incidents	Indian Oil Co., Ltd.	10 million hours continuous operation without lost time incidents at Indian Oil's ethylene project, India
Mar. 2008	No lost time incidents	Qatar Shell GTL Ltd.	3 million hours continuous operation without lost time incidents at Shell's GTL project, Qatar

• • • Efforts for Safety • • •

■ Safety Record

Toyo's safety record for 2007–2008 (2009 partially included) is as follows:

Safety record over the past 3 years

Year	Employee Worked (Man-Day)	Employee Hours (A)	Number of Disabling Injuries					LTI Rate*1	Total Recordable Incident Rate*2
			Fatalities	Lost Time Incidents	Non-Lost Time Incidents (Medical Treatment)	LTI Total (B)	Recordable (C)		
2007	9,012,650	89,334,017	1	16	326	17	343	0.19	3.84
2008	9,685,066	96,925,454	3	14	236	17	253	0.18	2.61
2009*3	5,366,536	53,050,587	0	5	86	5	91	0.09	1.72

*1: Lost time incident (LTI) rate = (B) × 1,000,000 / (A)
*2: Total recordable incident (TRI) rate = (C) × 1,000,000 / (A)
*3: Figures for 2009 are up to the end of June.

Both LTI rate and TRI rate in fiscal 2008 show a downward trend compared to those in fiscal 2007.

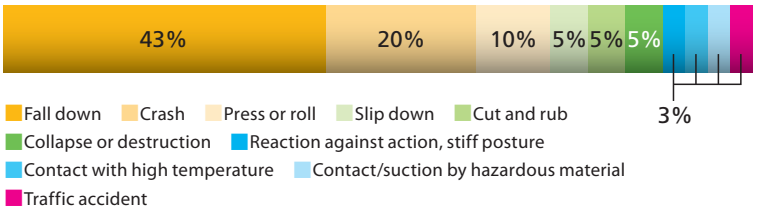
As of the end of May 2009, the total non-lost time incidents (non-LTI) hours of the ongoing projects*4 exceeded 100 million man-hours.

*4: The total non-LTI of ongoing projects is the latest sum of non-LTI hours of ongoing projects (excluding completed projects). Non-LTI of a project in which an accident occurred returns to zero and the count starts again.

● Number of injuries according to types of incidents

When Toyo's number of injuries during fiscal 2007–2009 (figures for 2009 are up to the end of June; 4 fatalities and 35 injured with lost time incidents, total 39 people) are divided in incident categories, 43% of the injuries were due to fall down accidents. Therefore, the implementation of safety management and preventive measures for elevated work places is essential.

Injuries by category of incident (2007–2009*)



* Figures for 2009 are up to the end of June.

■ Safety in Construction: Oil Refinery Modernization Project in Brazil

Joint venture "ECOVAP," composed of Toyo, Construtora OAS Ltda., and Setal Óleo e Gás S.A., is constructing an oil refinery plant as one of the refinery modernization projects awarded by PETROBRAS, the largest oil company in Brazil. The plant site is situated in the suburbs of the city of São José dos Campos, about a one hour drive from São Paulo.

As the construction is now at its peak activity, more than 5,000 workers are at the site. The client, ECOVAP, and all the subcontractors are carrying out safety oriented activities with effective mutual communication, with the slogan: "Safety takes precedence over all other things."

Safety training:

Workers receive training for work in closed spaces and high places from outside instructors, under a priority program in both theory and practice.

Safety guard:

A safety guard is assigned from a work team every day to keep team members safe.

Education and training:

Manpower development programs are implemented with the clients' cooperation. Through this program, many workers receive education and training to improve their skills.

■ Safety in Construction: Ethylene Project in Singapore

This project, awarded by Shell Eastern Petroleum (Pte) Ltd., is to construct a world-class complex producing ethylene and related products. The project is implemented by a joint venture of Toyo and CB&I Lummus.

The plant site is located on an island situated about 5km southeast of the Singapore mainland, or about 20 minutes by ferry. Construction is now at its peak activity with more than 10,000 workers at the site. In addition to top management's firm commitment, various safety activities are carried out under the safety oriented management system, with the slogan: "Think of safety, act safely."

Medical services:

A full-time medical staff, including doctors, provides optimum medical services on a round-the-clock basis.

Green Area:

A safety activity place called "Green Area" is provided at the site. In this area, participants from all subcontractors exchange opinions freely about safety information and improvement proposals.

Various events:

To enhance the safety awareness of the site workers, a safety meeting is held monthly, with events such as a commendation ceremony. These meetings are attended by all site members.

■ Safety in Construction: Propylene Project for Mitsui Chemicals' Ichihara Works

This project, awarded by Mitsui Chemicals, Inc., is to install a new plant for converting C4 fraction obtained as a by-product of ethylene from an existing plant into propylene through catalytic reaction.

This is the first construction project for Toyo at the client's Ichihara Works. Therefore, we are making efforts to comprehend the client's safety management policy and procedures through close communication with the client at progress control meetings and through other actions.

Risk assessment meeting:

Prior to starting construction operations, all subcontractors and Toyo's manager and engineers expose risks and establish safety measures.

Safety meeting:

The client and all the site workers participate in the safety meeting. This energetic meeting features a KYK (*Kiken Yochi Katsudou*; Risk Prediction Activity) demonstration, a safety declaration, safety commendations, and distribution of participation prizes.

■ Global Toyo HSSE Activities

Meeting of persons in charge of Global Toyo HSSE:
Group members participating in the meeting:
•Toyo-Japan •Toyo-Korea •Toyo-India •Toyo-China •Toyo-Malaysia

Toyo and its group members have established Global Toyo HSSE Standards to ensure that safety management is conducted at the same level in all countries and regions. We promote Global Toyo HSSE activities in order to thoroughly follow these standards.

To promote Global Toyo HSSE activities, the persons in charge of HSSE from Toyo and its group members gather together twice a year to discuss the safety activity plan, its implementation, and challenges and measures for safety management activities.

Toyo and its group members will continue striving to establish a firm culture of safety.

■ Continuous Movement toward Establishing a Culture of Safety

● In-house safety education

Since August 2006, Toyo has been conducting safety education programs for all corporate members, including directors, to enhance the safety awareness of each corporate member.

In order to spread a culture of safety, each attendant of a safety session receives renewed or additional follow-up materials.

In parallel with in-house safety education, education about such topics as "Risk Assessment," "OHSAS18001 Occupational Health and Safety Management System," and "Work Execution Register in Compliance with the Construction Industry Act" is given to particular members and particular divisions.

In-house safety education materials

Training session on "Work Execution Register in Compliance with the Construction Industry Act"

● Distribution of supplementary safety education materials to project managers

In addition to creating a safety scheme and operating the structure in a reliable manner, project managers take leadership in enhancing the safety awareness of all workers at sites both in Japan and overseas. Therefore, Toyo distributes supplementary safety education materials to all project managers for their reference.

These materials include points regarding safety management and the latest information about safety.

● In-house safety commendation

Recipients of President's commendation:
- Project for Shell Eastern Petroleum (Pte) Ltd.: 15 million hours continuous operation without lost time incidents
- Project for Indian Oil Co., Ltd.: 15 million hours continuous operation without lost time incidents

Recipients of SQE Promotion Committee Chairperson's commendation:
- Project for Daikin Industries: project completion without lost time incidents
- Project for Takeda Pharmaceutical Co., Ltd.: project completion without lost time incidents

In fiscal 2008, Toyo revised its safety commendation standard.

Before that time, only projects larger than a certain scale that had been completed without lost time incidents were recognized by a President's commendation. From 2008, projects still under progress that have carried out construction work without lost time incidents are also recognized.

As a result, a total of 11 projects were recognized by the President in fiscal 2008.

In addition, a total of 5 projects were recognized by the Chairperson of the SQE Promotion Committee.

● The *Hiyari-Hatto* System

Hiyari-hatto (near miss) is an incident that was prevented just in time before it occurred. At construction sites, people sometimes experience potentially dangerous *hiyari-hatto*. Repeated *hiyari-hatto* may lead to a serious incident. The *hiyari-hatto* data management system, developed by Toyo, has been employed since January 2008 at some domestic construction sites.

Hiyari-hatto data at project sites is collected and analyzed at the Head Office, then fed back to the companies and project sites. In the following report, 304 incidents from July through October 2008 are analyzed:

(1) Summary of *Hiyari-Hatto* System analysis results (indicating the top five items)

Items \ Order		No. 1	(%)	No. 2	(%)	No. 3	(%)	No. 4	(%)	No. 5	(%)
Time of occurrence		Morning	39.1	Afternoon	33.9	Early morning	10.9	Before noon	8.9	Evening/night	7.2
Cause	Material	Fly or drop	59.3	Mudslide	11.4	Fire	9.8	Explosion or rupture	3.3	Leakage	0.8
	Person	Stumble or slip down	36.8	Tumble or fall down	21.5	Collision	17.5	Crushed or caught	8.8	Contact with high/low temperature	6.1
Reason for occurrence	Person	Confirmation not made	21.4	Inability to respond	11.2	Inattention	8.5	Insufficient organization	7.9	No one-person KY*3	7.7
	Work	Insufficient KYK*1	61.1	Work by one person	22.2	Improper instruction	2.8	Insufficient survey	1.4	Other	5.5
								Mix-up	1.4		
						Long time	2.8	Error in planning	1.4		
								TBM*2 not implemented	1.4		
	Material	Improper curing	26.5	Personal protective equipment or tool insufficient or not used	21.7	Insufficient safety equipment	14.5	No periodic checkup	10.8	Improper scaffolding	9.6

(2) Countermeasures based on analysis

We will follow the measures below to prevent the recurrence of *hiyari-hatto*.

1) Countermeasures in view of frequent occurrences in the morning:

- Thoroughly implement the morning meeting, KYK*1 and TBM,*2 and confirm work procedures before morning work.
- Let all workers look around the workplace to identify conditions before work is started.

2) Countermeasures in view of frequent fly or drop accidents as well as stumble or slip down accidents:

- Put the workplace in order every day; be aware of and take countermeasures against hazardous places.
- Provide education regarding instances of accidents and *hiyari-hatto*.

3) Countermeasures against insufficient KYK by referring to potential causes of accidents:

- Provide education to KYK members in accordance with in-house manuals.
- Implement one-person KY*3 using KY cards.

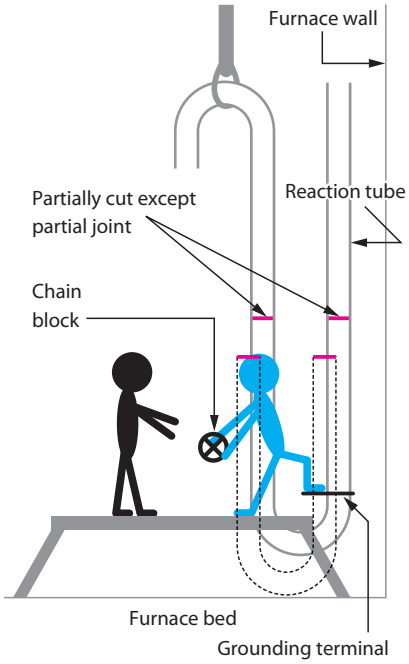
*1: "KYK" stands for *Kiken Yochi Katsudou* (risk prediction activities), which are activities for predicting work-related risks before work is started.
*2: "TBM" stands for "Tool Box Meeting," which is an activity to briefly discuss the contents, methods, arrangements, and problems of the work of the day before starting work at the workplace.
*3: "One-person KY" means KYK that each worker carries out immediately before starting work using "KY cards" (self-questioning cards for risk prediction).

Lessons Learned from Accidents

■Drop and Fall Down Accident

Situation

While cutting and removing a reaction tube (radiant coil) in a furnace, a worker removed a chain block that was hanging the lower part of the cut reaction tube to replace the chain block with another one. Thereafter, when the worker stepped on the grounding terminal for plasma cutting that was installed to the lower reaction tube, a joint of the upper and lower tubes fractured suddenly, and the lower reaction tube dropped down. The dropping tube hit the right side of the worker's face and broke his protective glasses, broken pieces of which tore his right eyelid.



Causes

- The worker tried to replace the chain block without prior communication.
- The worker put his foot (weight) on the grounding terminal for plasma cutting, on which a load should not be applied.
- The worker did not use an access platform suitable for the work.

Countermeasures

(1) To be carried out at the project site:

- The work procedure for cutting a furnace coil was revised (use of safety jack, change of partial cutting method, modification of platform, etc.).
- The revision of the work procedure was explained to all relevant workers so as to familiarize them with the changes.

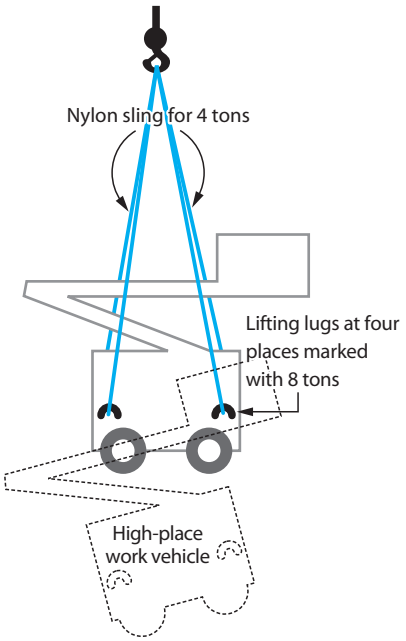
(2) To be carried out by the Head Office:

- The accident was immediately reported to all project sites to promote safety awareness and to prevent similar accidents from occurring.
- The in-house manuals were revised, requiring implementation of risk assessment whenever a work procedure is revised.

■Drop Accident

Situation

While a high-place work vehicle was being lifted with a crane in order to be moved, the nylon sling suddenly broke at a height of 20 meters from the ground, and the vehicle fell. Although the accident did not cause personal injury, it damaged equipment located below the falling vehicle.



Causes

- Error in selection of nylon slings
  Each of the four lifting lugs of the high-place work vehicle was marked 8 tons, which meant a total lifting load of 32 tons (8 tons × 4 lugs). However, the person responsible for the work misunderstood the total lifting load as 8 tons and used four nylon slings specified for 4 tons. This caused an error in the selection of nylon slings.

Countermeasures

(1) To be carried out at the project site:

- A sign board indicating total weight was attached to each high-place work vehicle.
- Safety coefficient for lifting was clarified and described in the work procedure.
- Special training session was given to lifting operators to let them reconfirm the work procedure.

(2) To be carried out by the Head Office:

- The accident was immediately reported to all project sites to promote safety awareness and to prevent similar accidents from occurring.
- In addition to the regular corporate safety audit, an additional safety audit was conducted and guidance for preventive measures was made at sites.

Environment

Message on Environment

Since its inception, Toyo has been exerting advanced comprehensive engineering capabilities to reduce burdens on the global environment through project execution in the energy and material industries.

We are confident that it is Toyo's mission to contribute to "sustainable development" that can balance competing goals for economic development and conservation of the global environment.

In the execution of projects, Toyo focuses on reducing environmental loads of plants by actively employing such measures as energy-saving technology, appropriate wastewater treatment processes, and technologies for removing hazardous substances from emission gases.

As a global corporation, Toyo will strive to develop, acquire, and retain global environment conservation technologies; to promote technology exchanges with clients throughout the world; to make proposals on environmental issues; and to contribute actively to solving environmental issues such as global warming through international cooperation frameworks.

Efforts for Environment

Office Activities*

Reduction of CO_2 emissions

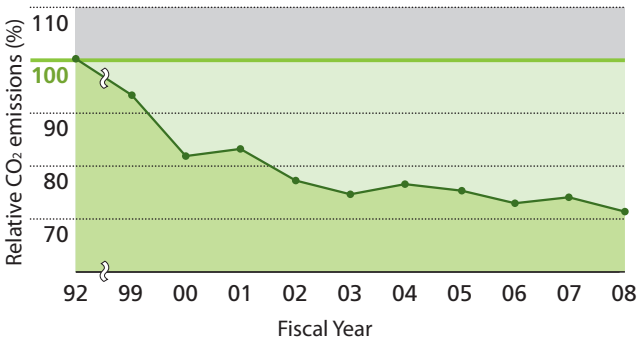
CO_2 emissions from offices are calculated from electricity consumption, urban gas consumption, and consumption of fuel oil A used for emergency power supplies.

Toyo launched energy-saving activities in fiscal 2000, with office lights being turned off during lunch breaks and unnecessary lights removed. In fiscal 2001, in addition to these efforts, we made energy-saving investments, such as installing lighting inverter stabilizers, which produced positive results in fiscal 2002 and after.

CO_2 emissions in fiscal 2008 were reduced by 29% from the 1992 level.

* Office activities are defined as those of the Head Office and Engineering Center (Narashino City).

Relative CO_2 emissions (1992 emissions = 100)

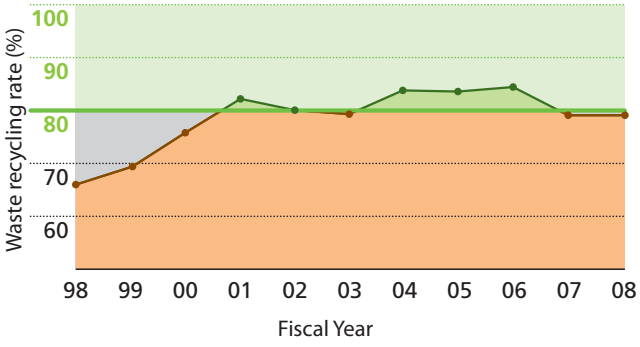


Improvement of general waste recycling rate

Since fiscal 2001, when separation of general waste and double-sided printing were encouraged for the first time, the general waste recycling rate has been more than 80%, as is required by guidelines.

However, the general waste recycling rate in fiscal 2008 decreased to 78.9%. We will analyze the cause of this decrease and make efforts to improve the rate.

General waste recycling rate (%)



Construction Waste Gross Discharge

Domestic project sites

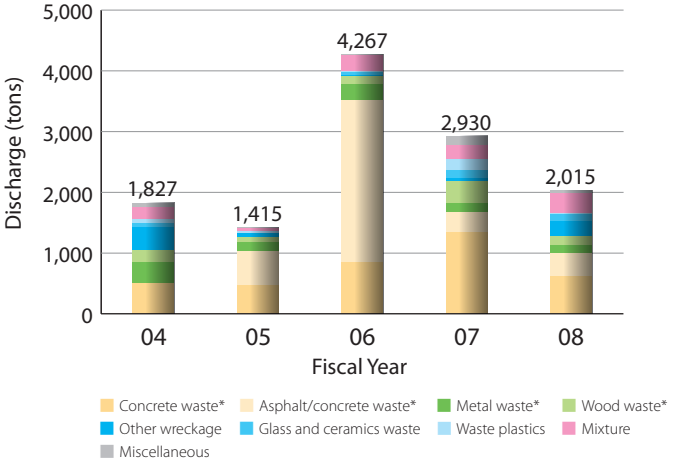
(1) Volume of construction waste discharge

The figure to the right shows the volume of construction waste and its categories in proportion.

The volume of construction waste discharge from domestic project sites in fiscal 2008 was 2,015 tons, about 915 tons less than the 2,930 tons discharged in fiscal 2007.

The four categories of waste marked with an asterisk (*) are recyclable.

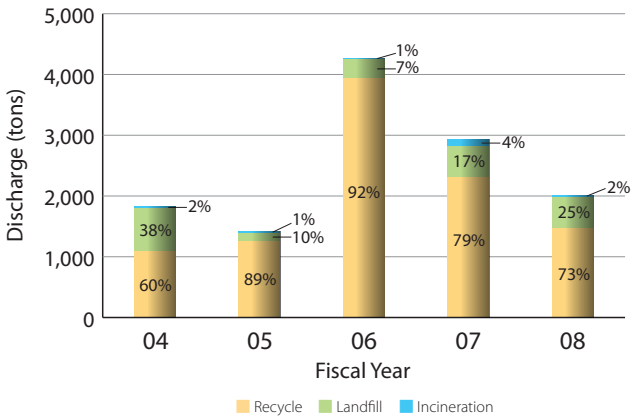
Percentage of construction waste by category (domestic)



(2) Percentage of construction waste by disposal method

Percentage of construction waste by disposal method (recycle, landfill, and incineration) is shown in the figure to the right: 73% recycled, 25% landfilled, and 2% incinerated in fiscal 2008. As the "mix" of construction waste increased, the recycling rate decreased to 73% from 79% in fiscal 2007.

Percentage of construction waste by disposal method



(3) Recycling rates for four items specified by the Construction Material Recycling Act

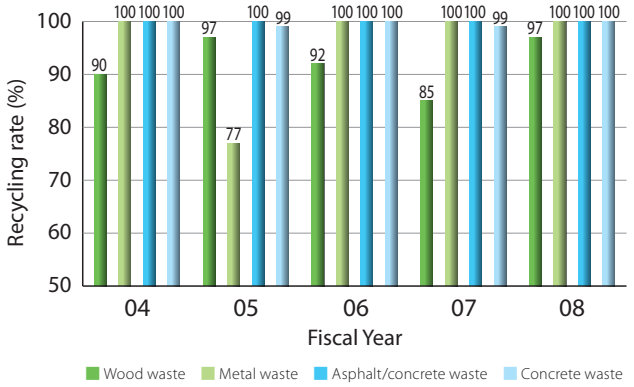
The recycling rates for four items specified by the Construction Material Recycling Act are illustrated to the right.

The recycling rates for concrete waste and asphalt/concrete waste have been kept to almost 100%.

The recycling rate for metal waste was as high as 100%, with the exception of fiscal 2005.

The recycling rate for wood waste was largely improved in fiscal 2008.

Recycling rates for four items specified by the Construction Material Recycling Act



● Overseas project sites

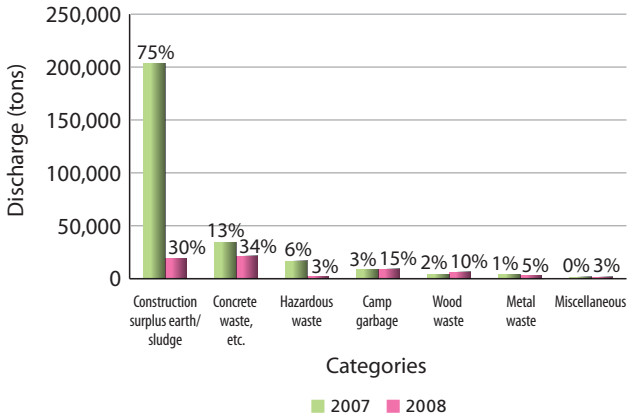
Volume of construction waste discharge and percentage by category

The total discharge volume in 2008 was 63.3 thousand tons, about a quarter of that in 2007. This is because some large-scale projects were completed in 2007, reducing the volume of construction surplus earth/sludge to about 10 percent of that in 2007.

Concrete waste, etc., was the largest in volume, and construction surplus earth/sludge was the second largest in fiscal 2008.

Toyo will continue to summarize the construction waste discharge volumes at overseas project sites to utilize the data for reducing environmental load.

Volume of construction waste discharge and percentage by category
(Proportions of individual waste categories to the total discharge volume for each year shown in percentage)



■ Engineering, Procurement, and Construction Activities

● Engineering

Toyo makes efforts to reduce the environmental load in plant operation. These efforts start in the engineering stage. Based on ISO 14001 and ISO 9001, Toyo reduces the environmental load that occurs in plant operation through the following work processes:

(1) Clarification and confirmation of client requirements (environmental specifications)
(2) Design review
(3) Design verification
(4) Design validation

Toyo makes efforts to reduce environmental load in design work through its activities for "eliminating *muri* (overdoing), *muda* (waste), and *mura* (irregularity)," while striving for efficient design work and methodology as an environmental target.

Moreover, Toyo contributes to client satisfaction with energy and resource conservation at the product plants by actively proposing Toyo's energy- and resource-saving technologies to the clients.

● Procurement

As one of its environmental targets, Toyo has set up "promotion of green procurement." Toyo actively promotes the procurement of equipment and materials from environmentally conscious green enterprises.*

In fiscal 2006, Toyo issued an in-house guideline titled "Guideline for Green Procurement." In line with this, we continue green procurement, aiming to achieve a green procurement rate of more than 90%.

In fiscal 2008, the amount of procurement from green corporations reached 88% of the total procurement amount. Toyo regards this percentage as the green procurement rate. We will make efforts to increase this rate, although it has decreased by 3% since fiscal 2007.

Toyo promotes paperless work to contribute to resource saving by computerizing inquiries from clients, quotation requests to vendors, quotations from vendors, and inspection reports.

*** Environmentally conscious green enterprises are vendors that have acquired ISO 14001 or that are carrying out environmental conservation activities, selected from the 100 largest vendors to Toyo.**

● Construction

Among Toyo's business activities, site construction work causes the largest environmental load. At construction sites, the following environmental targets are set up and efforts are made to reduce the environmental load:

(1) Appropriate treatment of construction waste
(2) Appropriate treatment of chemicals (paint, etc.)
(3) Environmentally conscious construction method
(4) Environmentally conscious material transportation
(5) Turbid water treatment and oily water separation

Safety and environmental meeting at construction site
Meetings are held regularly at construction sites to familiarize workers with knowledge regarding safety and environmental management.

■ In-House Environmental Education

Toyo started in-house environmental education to familiarize all employees with the necessity of Environmental Management System (EMS) activities and their contents.

EMS is associated with the reduction of paper, waste, electricity, and water consumption in offices as well as environmental conservation activities at construction sites. However, attention is also paid to the fact that *muri* (overdoing), *muda* (wasting), and *mura* (irregularity) in overall engineering work are significant environmental aspects. Toyo provides education focusing on these environmental aspects.

In-house environmental education

Environmental Conservation Activities at Overseas Sites

Sakhalin LNG Plant and Oil Export Terminal Project

In September 2008, we successfully completed the Sakhalin LNG plant and oil export terminal (OET) project, which was carried out jointly with Chiyoda Corporation, and we handed over the facilities to the client, Sakhalin Energy Investment Company Ltd. (SEIC). SEIC is an operating oil and gas company and its shareholders are Royal Dutch Shell plc (Netherlands), OAO Gazprom (Russia), Mitsui & Co., Ltd. (Japan), and Mitsubishi Corporation (Japan). The company is the investor and operator of the Sakhalin Ⅱ project, which is the largest integrated oil and gas project in the world. The project entailed the construction of a large-scale LNG plant with an annual capacity of 9.6 million tons and an OET. The LNG and OET facilities of the Sakhalin Ⅱ project were developed by SEIC in the southern part of Sakhalin Island.

Because the construction in Sakhalin occurred in the midst of a vast tract of nature, environmental protection based on RF and local requirements was a major issue. The period from May to August is the spawning period for pink salmon in Aniva Bay, which is part of the construction site. The project restricted dredging and other operations that would disturb the sea bed in the bay during this period. The project teams incorporated these environmental protection constraints into the construction plan at the planning stage.

Environmental survey

Prior to the start of construction at the site, we conducted environmental surveys of animals, plants, water, and other nature at the entire site and in the surrounding areas to obtain baseline data. During the construction period, we continuously monitored environmental impacts by regularly checking over 100 observation points covering the site, including the sea.

Fauna: Bird tagging

Vegetation

Air quality inspection by gas analysis

Soil investigation

Installment of monitoring well for underground water inspection

River monitoring

● Rainwater measures

We surrounded the entire construction site with silt fences* and ditches to lead muddy rainwater to settlement ponds. There, the mud was deposited and clean rainwater was discharged into rivers and the sea.

In addition, we designated a protection zone ranging 50m from both sides of streams running through the plant site in order to conserve nature.

As one of the synergetic effects of these measures, the profuse number of pink salmon that swim up the stream to spawn in autumn is a rare sight at any other plant site in the world.

* A silt fence is a temporary sediment control used on construction sites to protect water quality in nearby streams, rivers, and bays. Silt fences are perimeter controls, typically used in combination with settlement ponds, as well as erosion controls, which are designed to retain sediment in place where soil is being disturbed by construction processes.

Pink salmon swimming up the stream

Settlement pond

● Hydroseeding*

The ground surface that was upturned by civil works was covered with sod or pasture grass via hydroseeding within about 2 months. This protected soil erosion by rainwater and contributed to beautification inside and outside of the plant site.

* Hydroseeding is a planting process which utilizes a slurry of seed and mulch. The slurry is transported in a tank and sprayed over prepared ground in a uniform layer. Hydroseeding promotes quick germination and inhibits soil erosion.

Vegetation

Directly following implementation

50 days later

■ Oil Refinery Modernization Project in Brazil

This is one of the refinery modernization projects awarded by PETROBRAS, the largest oil company in Brazil. The equipment to be constructed consists of a Natural Gas Separation Unit and a Treatment Unit.

The joint venture "TS GAS CONSTRUCOES," composed of Toyo and Setal Óleo e Gás S.A., has been awarded the contract for engineering, procurement, and construction. The project is being implemented at two sites of PETROBRAS: Cabiúnas Terminal near the city of Macaé and Reduc Refinery in the city of Duque de Caxias.

● Environmental education for local residents

As a part of environmental education for local residents, Toyo's staff members teach the importance of biodiversity conservation to schoolchildren near the construction sites, and also plant young trees.

Environmental education for local residents

● Waste management

Construction waste and general waste are stored separately in color-coded containers. Construction waste is sorted into 14 categories and recycled.

Construction waste

General waste

● Preliminary emergency drill

A preliminary emergency oil leakage drill has been implemented.

Leakage preventing apparatus container

Briefing session before preliminary drill

Preliminary emergency oil leakage drill

■ GTL Project for Qatar Shell

This project, awarded by Qatar Shell GTL Ltd., is for construction of a Gas to Liquid (GTL) plant. Construction is now at its peak activity in Qatar.

For this project, Toyo worked out the project's environmental policy, objectives, and targets to meet the strict environmental criteria and regulations of the Ministry of Defense and the Ministry of Environment of Qatar, in addition to the client's environmental policy. Efforts toward achieving the environmental targets are made under the environmental program. These efforts include environmental education, which is obligatory for all workers to improve their environmental awareness and knowledge.

● Noise control and monitoring

Noise is monitored and recorded day by day with noise level meters. Where noise levels exceed 85 dB, an ear protection sign is put in place, obliging workers to wear ear protectors.

● Oil contamination control

Various oil leakage preventing device boxes are arranged in project sites to allow countermeasures to be taken immediately when oil leakage occurs. An oil leakage preventing device box contains oil absorbent, disposable work clothes, rubber gloves, boots, shovels, protective masks, and other items.

A temporary fuel tank is provided with an oil protection bank to prevent oil contamination.

Oil contamination control applies to hydrocarbon storage areas, all fuel-driven machines on the site, and temporary fuel storage areas.

Ear protection sign

Oil leakage preventing device box

Oil protection bank for preventing contamination

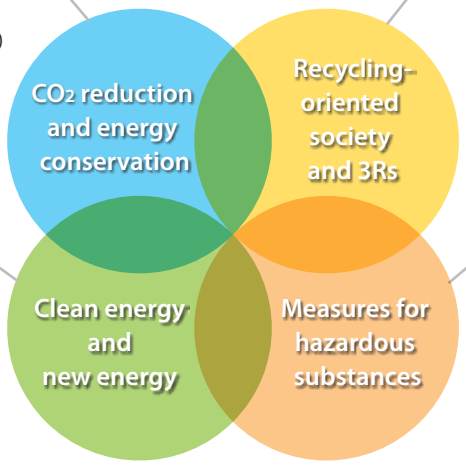
Toyo's Environmental Technology

Toyo actively promotes the development, introduction, and improvement of technologies that contribute to the environment. Through utilizing these technologies, Toyo provides a variety of solutions to environmental conservation and contributes to sustainable economic development with unique engineering services in view of the global environment.

On the basis of accumulated knowledge and experience, Toyo aggressively applies R&D engineering* to the field of environmental conservation, making various approaches to CO_2 reduction and energy conservation, a recycling-oriented society, the Reduce, Reuse, Recycle (3Rs) campaign, clean energy and new energy, and measures for hazardous substances.

* R&D engineering is a technical service to facilitate the quick commercialization of laboratory scale technologies that clients have developed.

(1) Energy-saving urea process (ACES21™)
(2) Energy-saving propylene production boosting process (OCT)
(3) High-activity steam reforming catalyst (ISOP)
(4) New autothermal steam reforming process (ATR)
(5) CO_2 capture and storage (CCS)



(1) Reuse of wastewater
(2) Reduced-product-loss and low-drainage-load type automated line changeover device (XY router™)
(3) Waste biomass recycling technology
(4) Sludge volume reducing technology (using low-temperature hydrothermal reaction)
(5) Incinerator residue recycling technology

(1) Dimethyl ether (DME)
(2) Gas to Liquid (GTL)
(3) Hydrogen
(4) Methanol
(5) Liquefied Natural Gas (LNG)
(6) Biomass energy
(7) Ethyl tertiary butyl ether (ETBE)
(8) Fuel cell

(1) Electric precipitator
(2) Exhaust gas desulfurizer using magnesium hydroxide process
(3) High-performance wastewater treatment unit (BioPOP)
(4) Dioxin decomposing device using catalyst
(5) Hazardous waste treatment (PCB, etc.)

TOYO's Solutions to CO_2 Reduction and Energy Conservation

Energy-saving urea process (ACES21™)

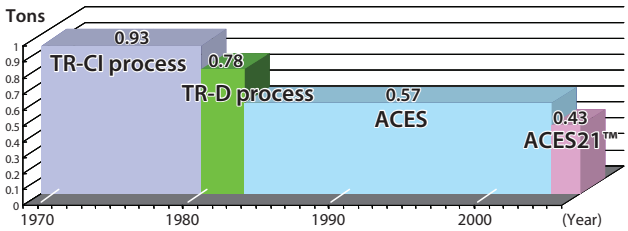
Since its establishment in 1961, Toyo has been a leader in urea technologies worldwide, designing, engineering, constructing, and commissioning almost 100 urea plants based on its own processes. The history of urea plants is the history of energy conservation. While producing one ton of urea required 0.93 tons of steam and 140 kWh of electric power in the past, the newest process, ACES21™, requires only 0.43 tons of steam (54% less) and 118 kWh of electric power (16% less) to produce one ton of urea, which greatly contributes to energy conservation and CO_2 reduction.


ACES21™ urea plant

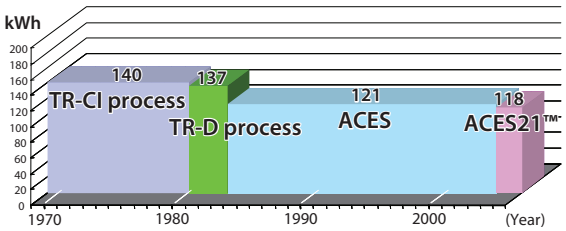

Urea product

Energy consumption per ton of urea

Steam



Electric energy



● High-activity steam reforming catalyst (ISOP)

Toyo has developed the "ISOP catalyst," which is three to four times more active than commercially available conventional steam reforming catalysts. The high activity of the ISOP catalyst promotes endothermic reaction and significantly improves the characteristics of reaction and heat transfer in steam reformers. Because of its superiority, the ISOP catalyst received two awards independently in 2000, from the Catalyst Society of Japan and from the Japan Petroleum Institute.

Replacing a conventional steam reforming catalyst with the ISOP catalyst should yield a savings of 2% in reformer fuel (about ¥50 million per year for a 1,000 tons/day-class ammonia plant). Other benefits to the steam reformer include an extension of the life of the steam reformer tubes by two to three times, and a 20–30% increase in the throughput of the steam reformer.

The commercial track record of the ISOP catalyst has been growing in the field of large-scale syngas and hydrogen production plants. For its superiority, the ISOP has been authorized by Kellogg Brown & Root (KBR), the largest licensor of ammonia processes. In recent years, the ISOP catalyst has been increasingly applied to the field of fuel cells, achieving a high share in the market in Japan.

For fuel cells

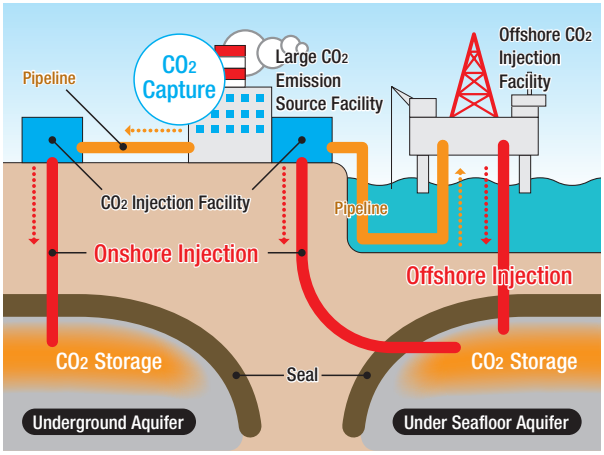
For a large-scale plant

● CO_2 capture and storage (CCS)

Carbon dioxide capture and storage (CCS) is one prospective measure for CO_2 emission reduction on a large scale.

The Intergovernmental Panel on Climate Change (IPCC) estimates in its special report, "Carbon dioxide Capture and Storage" (2005), that CCS could contribute to greenhouse gas emission reduction at a rate between 15% and 55% until the year 2100.

Toyo has participated in the activities of Japan CCS Co., Ltd., which was established in 2008 for the early realization of large-scale CCS demonstration testing in Japan.



CCS image

■ TOYO's Solutions Contributing to Recycling-Oriented Society

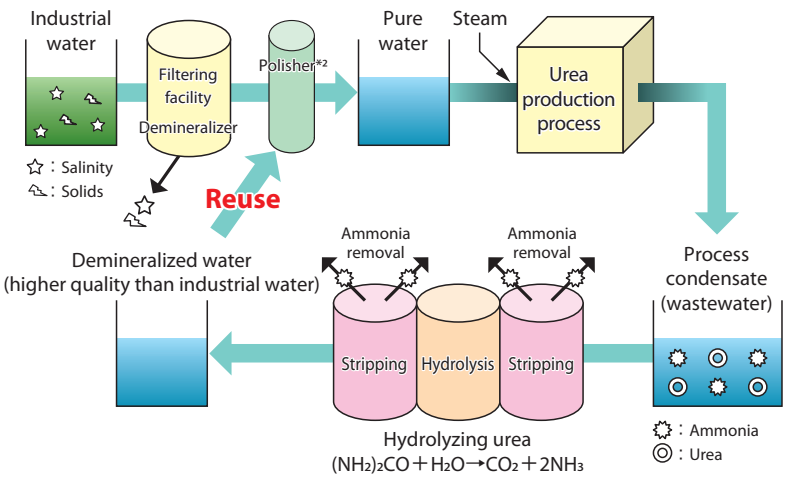
● Reuse of wastewater

The issue of water resource conservation has become more serious than ever in the 21st century.

Where serious water shortages have become obvious in the Middle East and other regions, wastewater is required to be not only treated, but also reused effectively.

Toyo's urea production process hydrolyzes urea contained in process condensate (wastewater), removes ammonia by stripping,*1 and reuses wastewater as boiler feed water, which requires a high water quality level.

*1: Stripping means to separate gas or low-boiling components dissolved in liquid into vapor phase.
*2: A polisher is a piece of equipment used to further improve the purity of demineralized water by ion-exchange resins.



■ TOYO's Solutions Contributing to Clean Energy and New Energy

● Gas to Liquid (GTL)

Gas to Liquid (GTL) is a process that converts natural gas into liquid fuels, mainly diesel fuel. The liquid fuels provide clean energy because they do not contain impurities such as sulfur.

Toyo has concluded an agreement for the joint development and commercialization of floating GTL plants with Mitsui Ocean Development & Engineering Co., Ltd. (MODEC), and Velocys Inc. of the United States.

Toyo and Velocys Inc. are jointly developing a new GTL process using "micro-channel technology," a technology to let exothermic reaction and endothermic reaction take place simultaneously in two adjacent micro-channels.

This will allow the GTL production plot area to be downsized into one-sixth of that of a conventional system, contributing greatly to the commercialization of floating GTL.

Floating GTL effectively utilizes natural gas that was difficult to exploit and oil-associated gas that was discharged into the atmosphere and flared. Therefore, floating GTL contributes to environmental improvement by reducing global greenhouse gas emissions.

Velocys Reactor using micro-channel technology

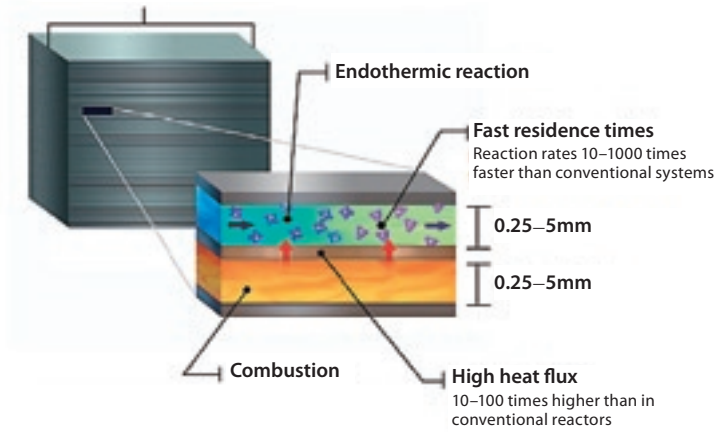
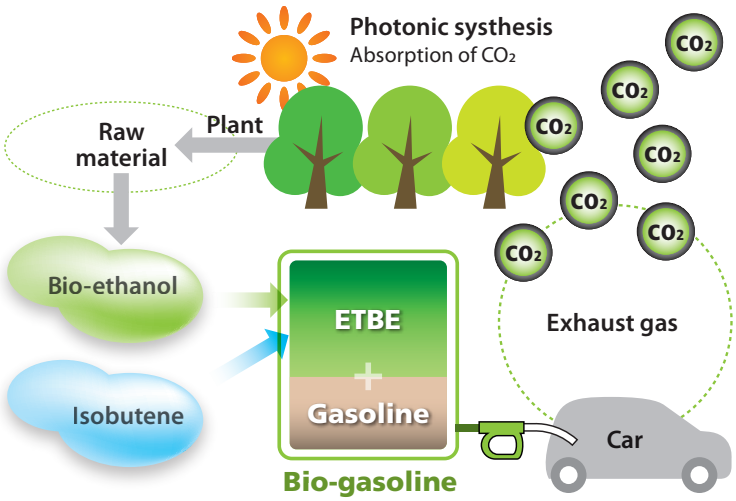


Illustration of the floating GTL (provided by MODEC)

● Ethyl tertiary butyl ether (ETBE)

Bio-ETBE is produced by synthesizing plant-derived bio-ethanol and petroleum-derived isobutene. Bio-gasoline containing bio-ETBE is supplied to ordinary automobiles at gas stations in the same manner as ordinary refilling.

When an automobile runs with bio-gasoline, a reduction of greenhouse gas emissions (mainly CO_2) from the automobile can be expected from the viewpoint of the carbon neutral concept.* The number of gas stations supplying bio-gasoline will gradually increase as permanent introduction of bio-gasoline is scheduled for 2010.



Toyo is implementing an engineering, procurement, and construction project to convert an existing MTBE (synthesized from natural gas-derived methanol and isobutene) facility to an ETBE facility for Nippon Oil Corporation Negishi Refinery. This facility will be the first ETBE commercial plant in Japan.

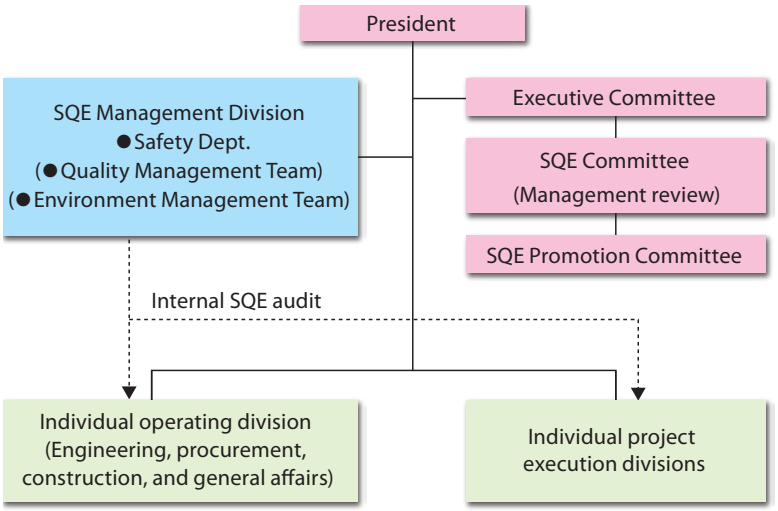
* According to the Kyoto Protocol, CO_2 discharged from biofuel while it is burnt is not calculated as greenhouse gas emissions, because plants, from which biofuel is produced, absorb CO_2 through photonic synthesis while they grow, and therefore CO_2 discharged as the biofuel burns does not increase the total amount of CO_2.

SQE Management Promotion Structure

Safety, Quality, and Environment (SQE) Management Structure

Toyo has set up the SQE Committee, which reports directly to the President, to review companywide SQE management activities. The committee establishes operating policies and assesses and approves the results of SQE activities.

The SQE Promotion Committee promotes companywide activities in line with the basic policy of the SQE Committee, and also promotes specific SQE activities of individual operating divisions and individual project execution divisions.



The SQE Management Division monitors the SQE activities performed by individual operating divisions and individual project execution divisions, conducts internal SQE audits, and reports the audit results to the SQE Promotion Committee and the SQE Committee.

The SQE Promotion Committee and the SQE Management Division cooperate systematically on the axis of the SQE Committee, which is connected directly to the management, to implement the Plan-Do-Check-Act (PDCA) cycle of the individual operating divisions and individual project execution divisions for continual improvement of the SQE management system and performance.

ISO Approval and Internal Audit

■ ISO Approval

In March 1994, Toyo acquired Quality Management Standard ISO 9001:1987 certification from the United Kingdom Accreditation Service (UKAS) and the Japan Accreditation Board for Conformity Assessment (JAB) after surveillance carried out by Lloyd's Register Quality Assurance (LRQA). In March 2009, Toyo passed the fifth Renewal Assessment for ISO 9001:2000.

In October 2004, Toyo obtained Environmental Management Standard ISO 14001:1996 certification, which covers the Head Office and construction sites within Japan. The certification was given by UKAS and JAB. In March 2009, Toyo passed the second Renewal Assessment for ISO 14001:2004.

ISO 9001 Certificate of Approval

ISO 14001 Certificate of Approval

LRQA's surveillance is carried out simultaneously for the above two standards twice a year (in March and September). Toyo takes corrective actions following LRQA's comments so as to continually improve Toyo's quality and environmental management systems and performance.

In March 2006, Toyo obtained the BS 7799 Certificate of Approval for the Information Security Management System, with LRQA as the certification body. In March 2009, Toyo passed the first Renewal Assessment for ISO/IEC 27001:2005.

In activities not related to ISO certification, Toyo is making preparations for conducting OHSAS 18001, an international occupational health and safety management system specification.

Closing meeting of LRQA's surveillance

■ Internal Audit

In order to make sure that Toyo's quality and environmental management is effectively carried out, internal audits are conducted simultaneously for quality and environment. The audits aim to be useful for corporate management, contributing to enhancing corporate value.

Environmental audits on sites are performed partially along with safety audits on site.

• • • SQE Education • • •

Toyo's SQE education includes "TEC Special Course: Quality and HSSE Management," held regularly, and "Internal Quality and Environmental Auditor Training Course," in addition to in-house education for safety, quality, and the environment. All employees are obliged to attend in-house education. Special education by outside instructors is also carried out as required.

■ "TEC Special Course: Quality and HSSE Management"

TEC Special Courses cover a wide range of engineering and management fields for the purpose of "promptly educating young employees as professionals" and "complementing intra-division education and extending peripheral knowledge" by in-house instructors. "Quality and HSSE Management" has been added to the series of TEC Special Courses to implement education on safety, quality, and the environment.

■ Internal Quality and Environmental Auditor Training Course

Selected candidates for Internal Quality and Environmental Auditors are educated by an external auditor training institute.

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