Environment



Considering that prevention of global warming and the preservation of the global environment are recognized as common issues facing all humanity, our group has established following ideology:

- "to contribute to sustainable development capable of both environmental protection and development of mankind.
- to contribute to environmental protection by providing engineering services in harmony with the global environment as prime international company."

In order to realize this philosophy, TOYO will continue to resolve environmental issues of our customers actively in the future.

Applying Technology to Preserve Environment

TOYO offers a variety of solutions to promote the development, introduction and improvement of technology to contribute to the preservation of the environment, as well as prevention of pollution of the environment and technology which are best suited to our clients.

Photovoltaic Power Plant

TOYO has been awarded a large-scale photovoltaic power plant project planned in Okayama Prefecture, Japan by Pacific Energy K.K. The plant will have a power generating capacity of approximately 32 MW and is scheduled for completion by March 2016. The power generated will be sold to major utility company, Chugoku Electric Power Co., Inc.

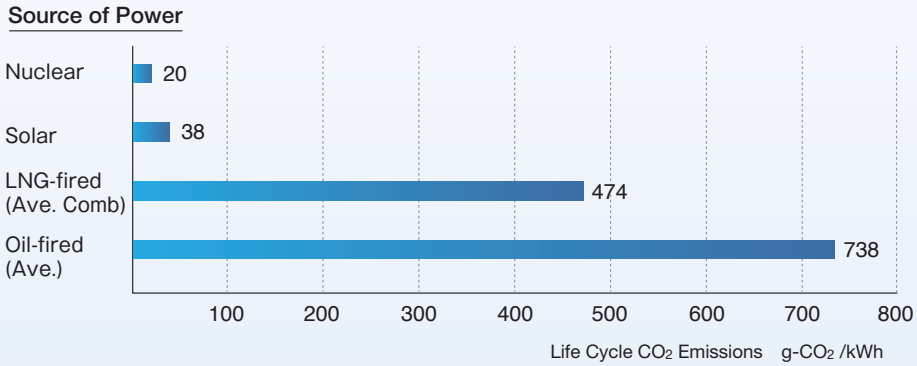
Photovoltaic power generation, a system that produces renewable energy, is expected to play an increasingly important role from global environment conservation viewpoint. TOYO will continue to work on photovoltaic power plant projects as part of its infrastructure business.

Construction site (panels are an artistic rendering)

Tips

Life Cycle CO_2 (Note) in Solar Power Plant

CO_2 emissions during life cycle of solar power plant is less than a small percent compared to oil-fired and LNG-fired power plants. CO_2 emissions of nuclear and solar power plants during power generation is zero.



(Note): Life cycle CO_2 means total amount of CO_2 produced in all process (of mining/refining raw material, fabrication, transport/installation, power generation, dismantling, and disposal) divided total amount of power generation in life of a power plant. Plant life is considered as 30 years for solar and 40 years for other types of power plants.

(Source): General Incorporated Foundations/Central Research Institute of Electric Power Industry/Mr. Eiichi Imamura/CRIEPI Report Evaluation of Life Cycle CO_2 Emissions of Power Generation Technologies Update for State-of-the-art Plants, Fig 4.1 Life Cycle CO_2 Emissions of Power Generation Technologies Estimated in FY2009.

Tips

How much CO_2 does a human discharge by breathing?

CO_2 concentration in exhaling breath of a human being increases according to amount of exercise, from 1% during rest to 9% in heavy exercise. If we consider 3% of CO_2 concentration as average, then a human being is estimated to produce 19m^3 CO_2 per day.

The weight of CO_2 per 1m^3 is 1.8kg. When CO_2 density is 3%, then weight of CO_2 is calculated 1kg per day and 40g per hour.

Source: Web homepage/National Institute for Environmental Studies/Center for Global Environmental Research

Environment

Urea Process (ACES21®)

Urea fills that role as a common type of nitrogen fertilizer produced by reaction of ammonia and CO_2. It is used not only as fertilizer but also as a raw material for the industrial production of resins, adhesives, etc. Urea is also used as a deNOx agent by selective catalytic reaction for controlling gaseous emission of diesel engines. Demand of urea fertilizer is increasing day by day.

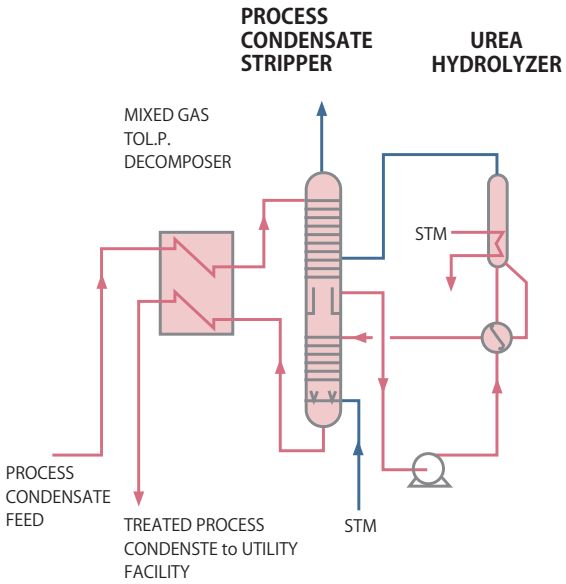
Urea is an extremely important chemical product for solving world food shortages, environmental and energy issues.

Urea product

Urea plant Pupuk Kujang Ltd.

Pollution Control Technology for Effluent

The process condensate containing urea and ammonia from a urea plant is treated to reduce urea and ammonia of 1ppm each in process condensate treatment unit (stripper & hydrolyser). Treated process condensate is recovered as boiler feed water in a utility facility. Therefore, there is no effluent from TOYO's urea plant during normal operation.



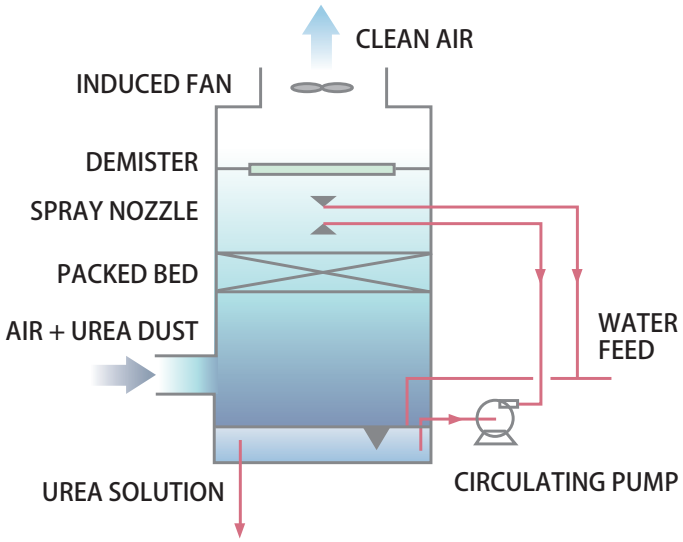
Flow scheme of process condensate treatment unit

Pollution Control Technology for Emission

Exhaust air form prilling tower or granulation unit containing urea dust is treated in dust scrubbing system and sent out to atmosphere to less than 30mg/Nm^3 of urea dust.

The ammonia in exhaust air is reduced to less than 20mg/Nm^3 by introducing acid to dust scrubbing system.

(Reference: World Bank Group/International Finance Corporation/Environmental, Health, and Safety (EHS) Guidelines specify emission for urea: 50mg/Nm^3, ammonia: 50mg/Nm^3)



Flow scheme of dust scrubbing system

Plant Rejuvenation & Revamp by Optimum Engineering

TOYO (consortium of Toyo-Japan and Toyo-Malaysia) executes rejuvenation revamp project number 4 (PRR4 project) for PETRONAS Gas Berhad (PGB). PRR4 is a project to rejuvenate the forth PGB's gas processing plant at 250 mmscfd located in Kerteh, Terengganu, Malaysia. The scope of the project for TOYO is a turnkey lump-sum including engineering, procurement, construction and commissioning.

The objective of PRR4 is to extend plant life of existing gas processing plant, product gas compressor system and dew point control facility for another 20 years based on the basic design.

TOYO has conducted optimum engineering with diagnosis of exiting facility and application of integrated applied technologies and technical database developed through long experiences in plant engineering business.

As a result, the plant life extension is achieved through introduction of state-of-the-art technology, improving safety and operability and minimizing unnecessary waste and disposal. This approach is more environment conscious compared to scrapping and building a new project.

Refurbishment of flare structure and replacement of tip

Piping replacement work (only damaged portion is replaced)

Environment

Efforts for Reducing Environmental Load

Efforts in Office (*1) to Save Energy and Resources

*1: Office means Head Office and Engineering Center in Japan.

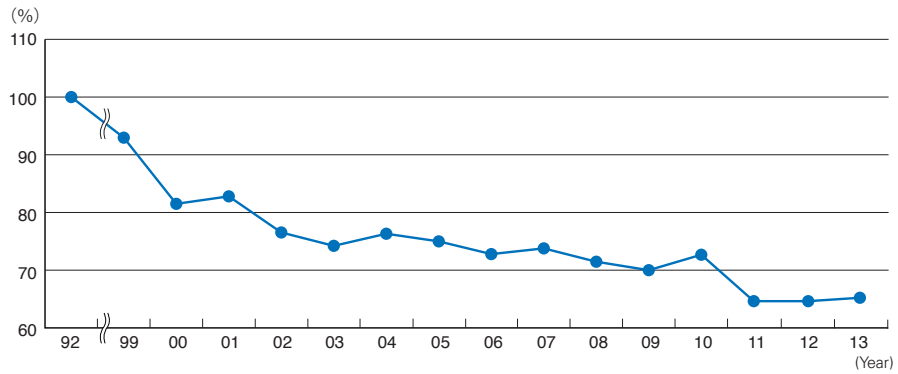
Reduction of CO_2 emissions

CO_2 emissions from office are calculated based on electricity consumption, fuel gas consumption (supplied by cooking gas utility company network) and consumption of fuel oil used for emergency power generation by DEG set.

Toyo-Japan launched more energy-saving efforts activities from year 2000 with office lights being turned off during lunch breaks, removal of lights deemed unnecessary and energy saving investments, such as installing lighting inverter stabilizers.

As result, CO_2 emissions were reduced by 35% compared to the 1992 level.

Relative CO_2 Emissions (%)



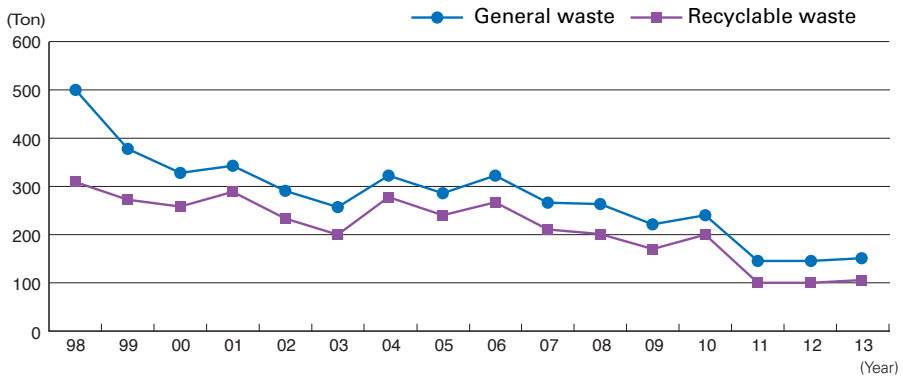
Reduction of general waste and recyclable waste (*2)

Resource conservation efforts in office includes promoting both-side-copy and printing, strict separation of general waste before disposal.

Disposal of general and recyclable waste is reduced to 160 ton and 114 ton respectively and reduction of 68% and 65% respectively comparing to year 1998.

*2: Recyclable waste is the waste including paper prints, output from personal computer and photo-copy machines, newspaper, glass bottles and cans.

Discharge of General Waste and Recycle Waste (Ton)



Construction Waste Disposal

Project sites in Japan

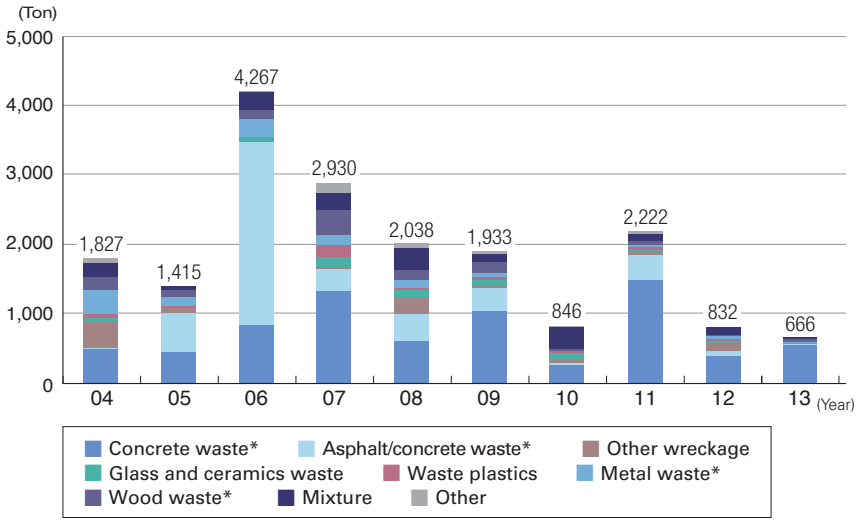
1 Percentage of construction waste by category

The figure to the below shows the weight of construction waste and its categories in proportion.

Toyo-Japan undertakes various kinds of construction work and percentage of waste by category tends to be different in each year.

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

Percentage of construction waste by category



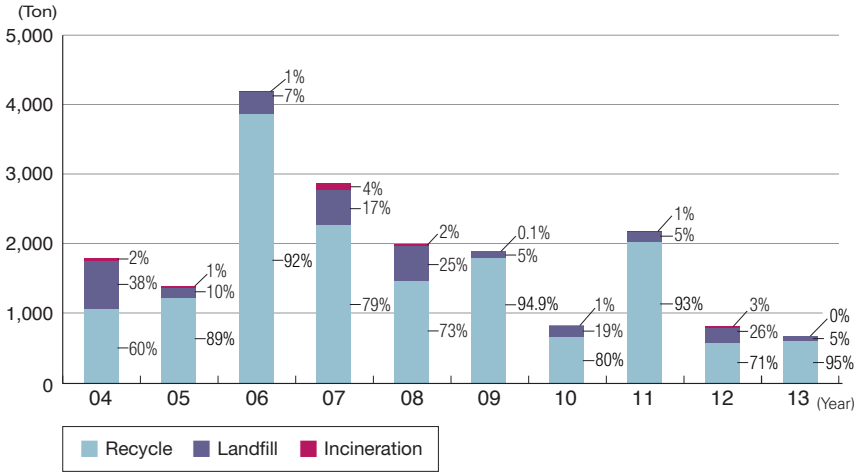
2 Percentage of construction waste by disposal method

Percentage of construction waste by disposal method (recycle, landfill, and incineration) is shown in the figure to the below.

For year 2013, it was 95% recycle, 5% landfill and 0% incineration waste.

During year 2013, due to increasing recyclable concrete waste and wood waste, recycle ratio is higher than past year.

Percentage of construction waste by disposal method

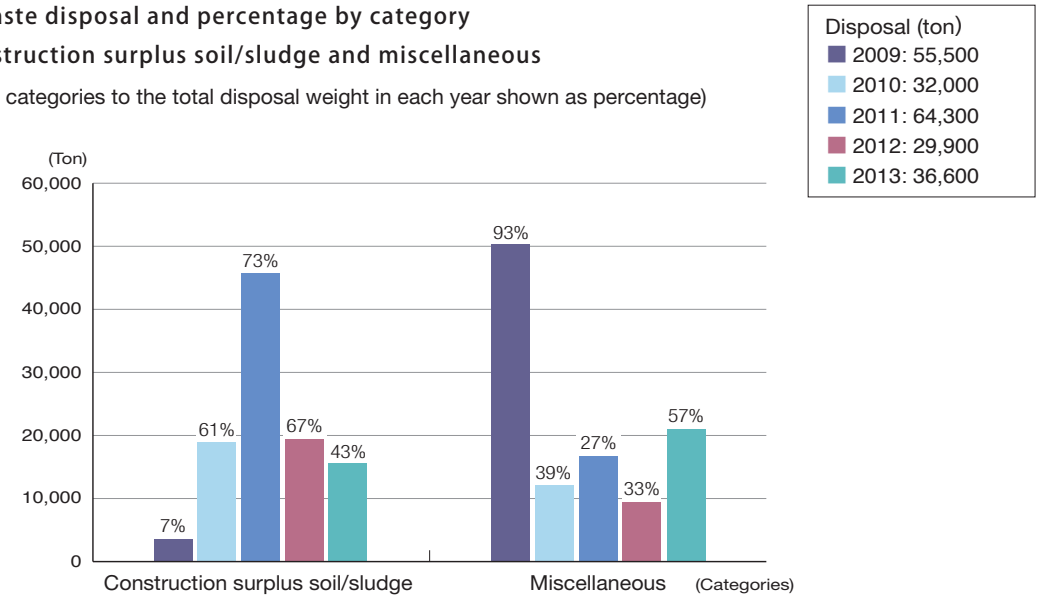


Overseas project sites

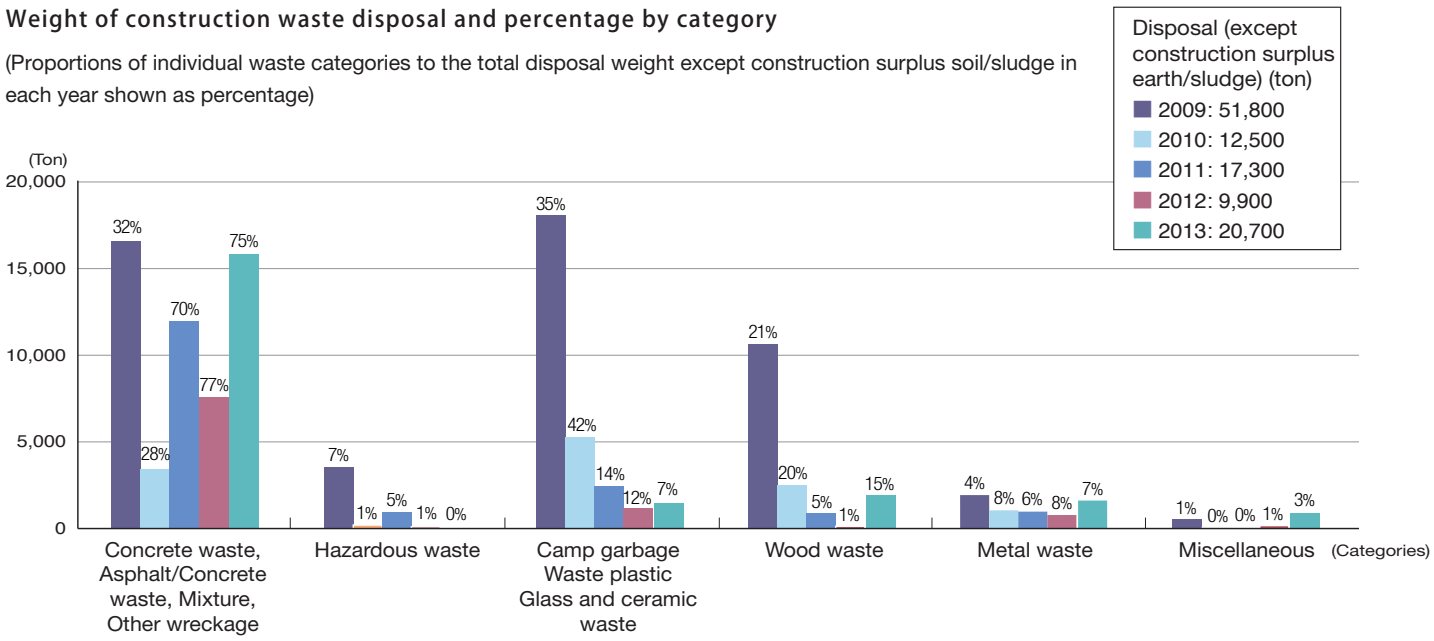
Weight of construction waste disposal and percentage by category

The total construction disposal weight in 2013 (Jan. to Dec. 2013) was 36,600 tons. Ratio of construction surplus soil/sludge and miscellaneous is 43% and 57%.

Weight of construction waste disposal and percentage by category
Comparison between construction surplus soil/sludge and miscellaneous
(Proportions of individual waste categories to the total disposal weight in each year shown as percentage)



Weight of construction waste disposal and percentage by category
(Proportions of individual waste categories to the total disposal weight except construction surplus soil/sludge in each year shown as percentage)



The weight of construction waste disposal in year 2013, except construction surplus soil/sludge was 20,700 tons, and total disposal weights were increased because of the increase of total construction volume by the increase of project orders.

TOYO will continue to summarize construction waste disposal weights to utilize the data for reducing environmental load.