At the Cosmo Energy Group, we have included Harmony and Symbiosis with the Global Environment in the Basic Concept of Sustainability and taken an array of initiatives with the goal of becoming an environmentally friendly energy corporate group.
As the world's attention is being drawn toward initiatives reducing greenhouse gas emissions, we announced our 2050 Carbon Net Zero Declaration.
Here we introduce our energy-saving initiatives and other environmental measures and activities.

Reduction of greenhouse gas emissions

As a part of the sustainability plan, we developed the Long-Term Environmental Vision 2030, consistent with the orientation of the global community and the Japanese government toward realizing a sustainable society. In an effort to contribute to reducing CO_2 emissions, we are targeting a 2 million ton (26%) reduction in emissions by FY2030, compared to the FY2013 level.
In addition, we are targeting a 16% reduction in FY2022, the final year of the plan, again compared to the FY2013 level, so that we are proactively engaged in the advancement of initiatives reducing CO_2 emissions. CO_2 emissions in FY2020 were 6.62 million tons, a decrease of 0.84 million tons from FY2013. (The Group-wide CO_2 emissions of 6.62 million tons ⊘ in FY2020 have received an independent third-party assurance from KPMG AZSA Sustainability Co., Ltd.)
In 2008, Cosmo Energy Holdings acquired a stake in Japan CCS Co., Ltd. and has participated in the practical application of Carbon dioxide Capture and Storage (CCS) technology aimed at reducing CO_2 emissions.

Cosmo Energy Group's CO_2 Emissions (10,000 ton/CO_2)

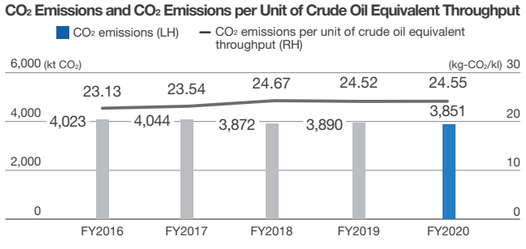
	FY2013 Actual	FY2019 Actual	FY2020 Actual	FY2022 Target	Vs. FY2013
Transportation division (crude oil, raw materials and products)	90	75	71	86	-4
Manufacturing division (petroleum and petrochemical products)	676	650	627	598	-78
Other (service stations, research centers, etc.)	4	2	3	4	0
Biofuel (with ETBE)[1]	-7	-13	-14	-15	-8
Expansion of the renewable energy business (wind power generation)[2]	-16	-27	-25	-46	-30
TOTAL	746	688	662	626	-120

1 The amount due to biofuels is the CO_2 emissions reduction due to the contributions of ethyl tert-butyl ether (ETBE)-mixed gasoline, which is considered to have negative CO_2 emissions.
2 Expansion of the renewable energy business has been calculated using the total power generation volume multiplied by the alternative value for each year. The figure for FY2022 was calculated by using the FY2016 alternative value of 0.587 kg-CO_2/kWh.
3 Refer to the Cosmo Energy Holdings' sustainability website for the differences in the methods for calculating CO_2 emissions in Cosmo Energy Group's CO_2 Emissions and the Environmental Impact of Business Activities, disclosed on the website (Japanese).

Energy conservation at refineries

In FY2020, the energy consumption rate increased slightly because of the decline of the operating rate of plants due to large-scale regular maintenance (turnaround maintenance) which offset the improvement of energy-saving activities (including the increase of the capacity of a high-efficiency heat exchanger at Chiba Refinery and the optimization of the temperature at which FCC raw materials are supplied at Yokkaichi Refinery).
However, CO_2 emissions were reduced approx. 1% due in part to the decline in the operating rate of a plant which was a result of the regular maintenance above (turnaround maintenance).

CO_2 Emissions and CO_2 Emissions per Unit of Crude Oil Equivalent Throughput



Reduction of CO_2 emissions by adopting a utility balance optimization calculation system

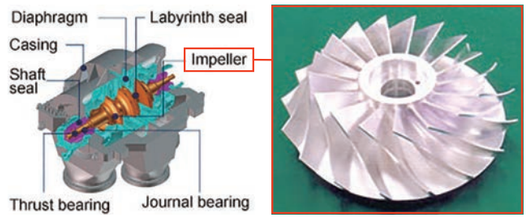
Refineries use diverse sources of energy, such as steam, electricity, and fuel to operate equipment. A utility balance optimization calculation system calculates optimal balance to minimize energy costs.
Cosmo Oil first introduced the system at Chiba Refinery in FY2018, then at Yokkaichi Refinery in FY2019, and plans to install it at Sakai Refinery in FY2021. We will expand energy efficiency through use of the system, contributing to the reduction of CO_2 emissions.

Increase of the capacity of the No.2 Catalytic Reforming Unit's high-efficiency heat exchanger at Chiba Refinery

Chiba Refinery's No.2 Catalytic Reforming Unit had a plate-type heat exchanger. We replaced this heat exchanger to increase the heat-exchanging capacity in FY2020. This has further reduced fuel consumption, contributing to energy conservation and a reduction of CO_2 emissions. We will improve this and other equipment as we work to further mitigate environmental impact.

Maruzen Petrochemical's energy-saving initiative

Maruzen Petrochemical's Energy Management Committee regularly meets as a part of the company's efforts to understand its energy consumption status and encourage energy-saving activities. In addition, the company has set a target of reducing the energy consumption rate by at least 1% per year on a five-year average in accordance with the Act on the Rational Use of Energy. In FY2020, the energy consumption rate worsened significantly due to a decline in production volume because it was the year for the regular maintenance of the No. 3 ethylene manufacturing facility and because inefficient operations were unavoidable due to equipment failure. From FY2021 onward, the company will continue to strive to ensure stable operations and engage in energy-saving activities.
The ethylene manufacturing facilities of Maruzen's Chiba Plant uses a large compressor to produce refrigerant to cool the light gas distillate, a by-product of naphtha cracking. The No. 3 ethylene manufacturing facility was renovated. Two-dimensionally processed impellers were replaced by three-dimensionally processed impellers to enable the more efficient production of refrigerant. This has enabled more efficient operations than before and allowed the company to reduce its energy usage by about the equivalent of 2,300 kiloliters of crude oil per year.



Horizontal split centrifugal compressor

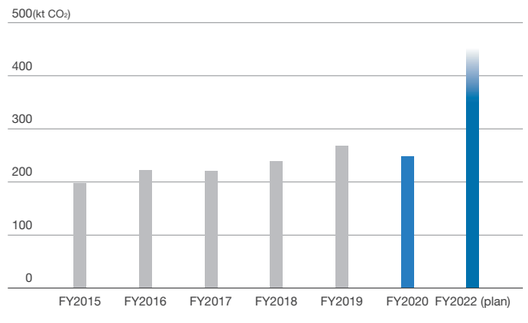
Internal blades of impeller

Source: Mitsubishi Heavy Industries Compressor, Ltd. website

Encouraging the wind power generation business and contributing to the reduction of CO_2 emissions

Wind power is an eco-friendly, clean energy without the need for concern over the depletion of resources or CO_2 emissions. The total wind power generation capacity of Cosmo Eco Power Co., Ltd. in the Cosmo Energy Group reached 303,000 kW as of June 30, 2021, contributing to CO_2 emission reduction and to improvement in the energy self-sufficiency rate of Japan, which highly depends on imported energy. Our strategy is to continue new investment in onshore wind farms and to enter the offshore wind power generation business early. Through expansion of the wind power generation business, we aim to be beloved by the local community and to contribute to realizing a sustainable society.

CO_2 Emission Reduction by the Wind Power Generation



E Engagement with the Environment

Cosmo Denki (Electricity) Green

Cosmo Oil Marketing began to sell Cosmo Denki (Electricity) home-use electricity, in FY2019. Four plans are available to meet customers' diverse needs. In recent years, the number of customers demanding environmentally friendly electricity has been increasing in response to growing concerns about the environment and increasing demand for renewable energy. In response, the company began to offer Cosmo Denki (Electricity) Green, one of the Cosmo Denki (Electricity) products, in December 2019. Cosmo Denki (Electricity) Green provides virtually CO_2 emissions-free electricity from renewable energy sources, which has environmental value (electricity from wind power and other renewable energy sources whose environmental value is endorsed by a non-fossil certificate). By joining Cosmo Denki Green, customers can participate in the Cosmo Oil Eco Card Fund's eco-friendly projects such as environmental preservation and education. Further, in October 2020, the company began to provide the Cosmo Denki Business and Cosmo Denki Business Green services to its corporate customers.* The company also offers a plan supporting the RE100 initiative, an international initiative whose goal is that 100% of the energy consumed by businesses comes from renewable energy sources. This plan utilizes the electricity generated at the Cosmo Eco Power wind farms.

Moving forward, Cosmo Oil Marketing will expand its business of selling electricity to households and corporate customers, thus catering to the electricity-related needs of customers which are broader than ever. The company will supply energy to enter the residential and local energy markets. The company will also support customers' environmental initiatives. At the same time, Group companies will work together in providing clean energy that integrates power generation to retailing, so as to create more value.

*These plans are offered with Cosmo Energy Group company Cosmo Energy Solutions serving as the electricity retailer and Cosmo Oil Marketing as its agency.

みんなにやさしい
コスモでんき
グリーン

Using electricity from virtually 100% renewable energy sources at all service stations directly operated by the Cosmo Energy Group

As its first step towards the Group's achievement of net zero carbon emissions, we are sequentially switching the electricity used at the service stations operated by Cosmo Oil Sales to electricity that is virtually all from renewable energy sources, with the goal of switching all of our service stations to renewable energy. We are the first oil wholesaler in Japan to begin to switch to electricity that is virtually entirely from renewable energy sources, something we will do at more than 600 locations.

A part of this initiative is non-fossil certificates with tracking information linked to the wind energy generated by Cosmo Eco Power. By providing service stations with power that is virtually all from renewable energy sources and whose CO_2 emissions have been offset, we will achieve virtually zero CO_2 emissions from the power consumed by service stations.[1, 2]

Cosmo Oil Sales, which is in charge of sales at service stations, operates a total of 605 service stations, vehicle inspection stations, etc. across Japan that consume approx. 40 million kWh of electricity annually.[3] As of FY2020, the annual CO_2 emissions due to the power consumption of our service stations was 20,800 tons of CO_2.[4] In addition, at the Cosmo Oil Sales' Self Pure Shinjuku Chuo location, where this initiative was launched ahead of other locations, the virtually CO_2 emission-free electricity from Cosmo Eco Power wind power plants is also used for the rapid charging equipment for EVs and EV car sharing services[5].

The Cosmo Energy Group will continue to work to help achieve a sustainable global environment and society by playing a leading role in the spread of renewable energy while also catering to its customer needs.

1 Excluding CO_2 emissions from the use (consumption) of fuel oil and other products sold at the service stations
2 Electricity combined with non-fossil certificates with tracking information qualify as FIT electricity and other electricity provided by Cosmo Eco Power in the form of specified wholesale supply
3 As of May 10, 2021, the number of services stations among the 605 directly operated facilities was 589.
4 Figure as of the end of FY2020 from the page of the Group's website introducing its sustainability activities
5 This service is provided as Yasashi (friendly) Car Sharing, a car sharing service operated jointly with Homenet Cars Co., Ltd.

Contributing to the decarbonization of the aviation sector with a next-generation aircraft fuel

In 2016, the aviation industry's ICAO set the target of keeping the total CO_2 emissions from international aviation at or below the 2019 level from 2021 onward.[1] Airlines are demanding a stable supply of SAF, a dominant tool for achieving this target.[2] JGC Holdings Corporation, JGC Japan Corporation, REVO International Inc., and Cosmo Oil Co., Ltd. have begun to work together to establish a model supply chain for bio-jet fuel produced from used cooking oil, which is said to be a highly effective means of reducing CO_2 emissions.

Cosmo Oil's expertise in fuel production, storage, transportation, and feeding plays a significant role in the establishment of this supply chain. In addition, because this project uses domestic used cooking oil as the raw material, it contributes to the domestic circulation of a valuable bio-resource and also prevents the outflow of the resource abroad, which is a side benefit.

In July 2021, this project was selected by NEDO as the Development of Production Technologies for Biojet Fuels and Development of a Supply Chain Model through Demonstration Projects.[3] While commercial-scale SAF production and supply have yet to be realized in Japan, our goal is to start the full-scale supply of bio-jet fuel by 2025 through the completion of this project.

1 ICAO: International Civil Aviation Organization
2 SAF: Sustainable Aviation Fuel
3 NEDO: New Energy and Industrial Technology Development Organization

Biodiversity Initiatives

Oil development with consideration for the surrounding environment

The Oil Exploration and Production Business entails risks that could affect the environment in terms of its exploration, development, and production processes. We see environmental preservation activities as a priority issue and are promoting initiatives to minimize environmental impact.

The Cosmo Energy Group's Abu Dhabi Oil Co., Ltd. recognized the importance of environmental protection and resource conservation ahead of others. The company began zero-flaring operations in which the associated gases from crude oil production are reinjected into the ground, on a commercial base for the first time in the Middle East.* The company has continued these operations. At the Hail Oil Field, where production began in 2017, zero-discharge operations in which the wastewater, waste soil, sewage-containing water and other waste generated during drilling is injected into the ground, were conducted during development because the area surrounding the sea area of the Hail Oil Field is within a UNESCO Biosphere Reserve. In addition, silt curtains were installed to prevent pollution of the ocean from dredging and disposed dirt as well as muddy water caused by the construction of an artificial island. Moreover, environmental monitoring of air, aquatic life, etc. was conducted, which ascertained that the operation was conducted without environmental impact.

Environmentally friendly oil development technology was highly evaluated, leading to the receipt of the FY2018 Achievement Award from the Japanese Association for Petroleum Technology. We will continue to advance oil development with consideration for the surrounding environment.

*Operations in which gasses associated with crude oil production are not burned


Installation of silt curtains


Zero-discharge operations

Environmental protection activities in oil producing countries

Mubarraz Island, where we have oil pre-treating, storage, and loading facilities, is surrounded by a very beautiful ocean. On this island, we are involved in wide-ranging environmental protection activities, including the planting of mangroves and other green development, and the protection of coral and osprey, a rare bird species.

On Mubarraz Island, water production equipment is used to produce fresh water from seawater. The fresh water is provided to employee residential facilities and crude oil processing facilities. Further, we have been actively involved in green development on the island, which had previously been a desert island. In order to re-use the precious manufactured freshwater, sewage-containing drainage water is treated and used for watering planted trees. On what was once a desert island, cultivated trees sway in the wind, improving the work environment.


Farmed coral


Planted mangroves