Roadmap for Achieving Net Zero Carbon by 2050

The Cosmo Energy Group recognizes that the formulation and implementation of management plans with greater awareness of climate change is essential for the planet, society, and the company to achieve sustainable growth. Accordingly, the Cosmo Energy Group announced its 2050 Net Zero Carbon Declaration in May 2021. We have developed a roadmap summarizing our efforts and processes to achieve this goal, based on a scenario analysis recommended by the Task Force on Climate-related Financial Disclosure (TCFD) and analysis of our external and internal environments.

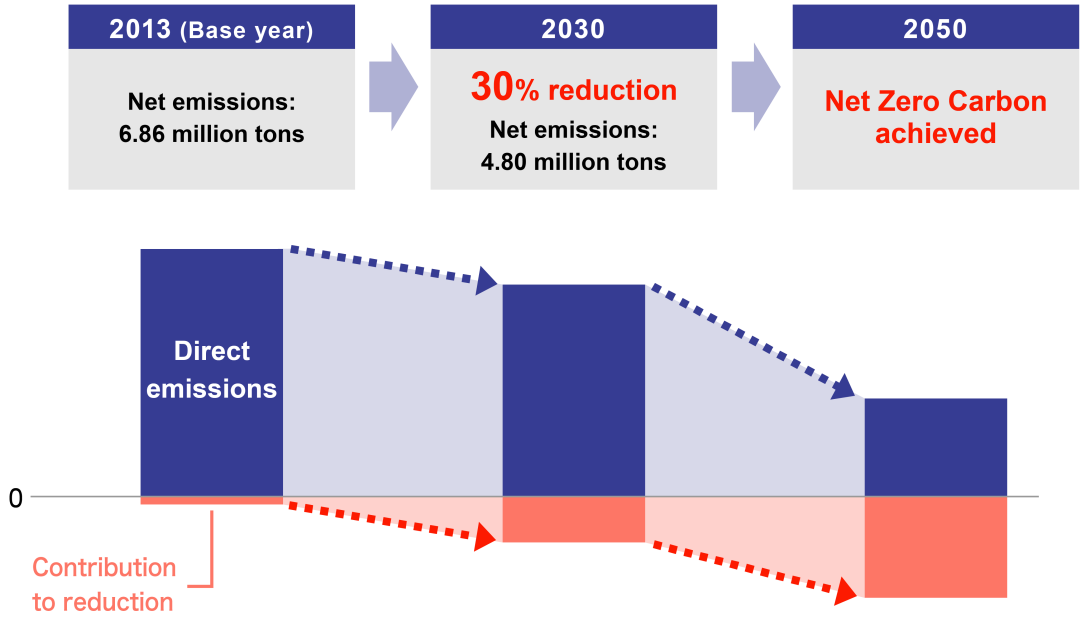
Addressing Climate Change — Support for the TCFD Recommendations

GHG Emission Targets and Reductions

While fulfilling its responsibility to provide a stable supply of energy, the Group aims to reduce GHG emissions from its business operations (Scope 1+2) by 30% in 2030 (compared to fiscal 2013) through a shift to decarbonized energy and the use of negative emissions technologies. In addition, the Group is aiming for net zero carbon emissions, including Scope 3, by 2050 to contribute to carbon neutrality

for society as a whole.

Scope 1 and 2 Emissions Reduction Targets



Scope 3 Emissions Reduction Initiatives

We will work together with our stakeholders on “To create energy that shapes the future” and contribute to the realization of a decarbonized society.

- Bolster green electricity supply chain
- Development and supply of biofuels including SAF
- Initiatives for hydrogen supply chain and carbon recycled products

Priority Themes for Achieving Net Zero Carbon

The Group will contribute to the carbon neutrality of society as a whole by striving “to create energy that shapes the future” as well as working on the shift to decarbonized energy and negative emission technologies.

1 Direct reduction

- Reduce Scope 1 and Scope 2 emissions through shift to low-carbon fuels (LNG, biofuels, etc.) and decarbonized fuels (hydrogen, ammonia, etc.), introduction of renewable energy, energy conservation, etc.
- Introduce virtually all renewable energy at service stations directly operated by the Group

2 Use of negative emissions technologies

- Study feasibility of CO2-EOR technology in oil fields and other locations where Group holds concessions
  Study feasibility of CCS and CCUS technologies to recover CO2 from major equipment and utilize CO2

3 Bolster green electricity supply chain

- Aim for total renewable energy generation capacity of 2,000 MW by 2030, including over 1,500 MW of onshore and offshore wind power.
- Study geothermal, solar, and biomass power generation projects utilizing Group technologies, networks, and assets
- Expand green electricity sales to 4 bil.kWh by 2030, in line with value-added services such as installation of rapid EV charging equipment at service stations and provision of EVs through Cosmo My Car Lease and EV car sharing
- Started power storage business validation, aiming to build 500 MW of storage battery function by 2030.
- Contribute to co-creation with local communities

2050
Net Zero Carbon

Vision 2030

To create
energy that shapes the future,
energy that sustains society, and
new forms of value

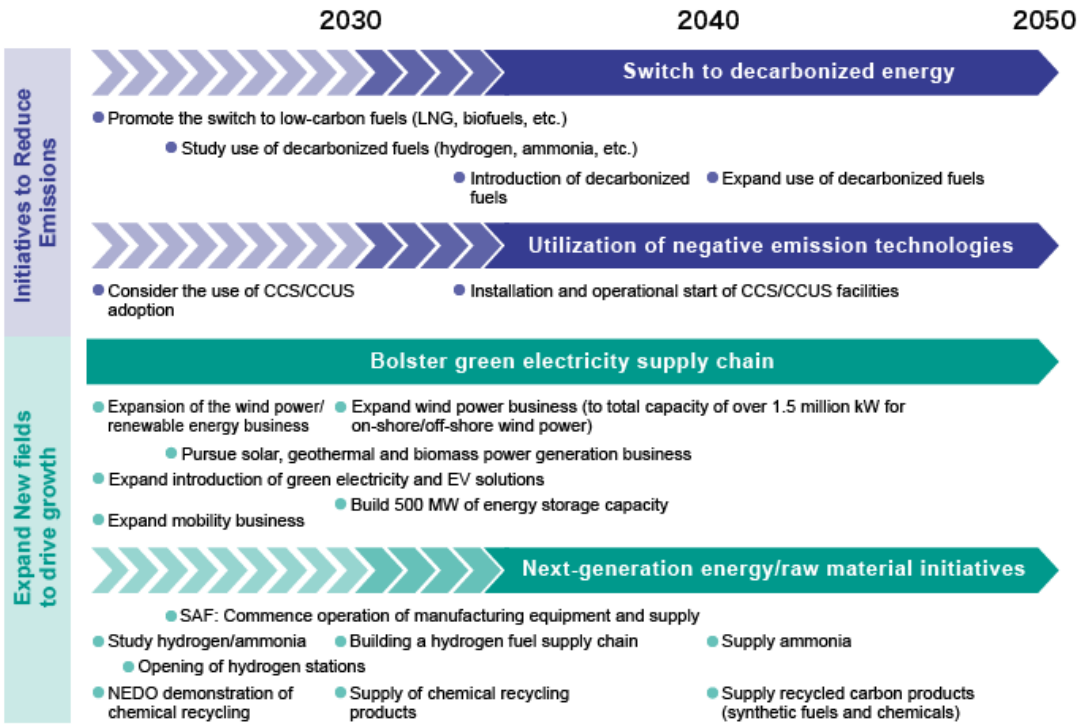
4 Initiatives for next-generation energy/raw materials

- Further accelerate business development to build SAF supply chain, aim for operation of Japan's first large-scale SAF production facilities and fuel supply 30,000 KL by 2025 and 300,000 KL by 2030
- Use existing assets to open the first hydrogen station in 2024, develop hydrogen stations for trucks and enter the hydrogen supply chain
- Study recycled carbon products (ammonia, synthetic fuels and chemicals) supply
- Study chemical recycling

5 Use of carbon credits

- Use negative emissions technologies, reduction contributions from renewable energy projects, carbon credits and other means to cover remaining emission from our own operations that cannot be reduced to achieve 30% reduction (compared to 2013) by 2030 and zero carbon emissions including our supply chain by 2050

Basic Approach and Procedures for Achieving Net Zero Carbon



History of Group Initiatives

As a petroleum company, the Cosmo Energy Group has been operating its business with a strong awareness of environmental issues for over 20 years. Our environmental efforts began with the establishment of a Global Environment Committee in 1994. Then in 2001, we established the Cosmo Energy Group Management Vision: “In striving for harmony and symbiosis between our planet, man and society, we aim for sustainable growth towards a future of limitless possibilities.” Based on this philosophy, we have pursued environmental initiatives across our business activities, for instance, establishing the Eco Card Fund and entering the wind power generation business.

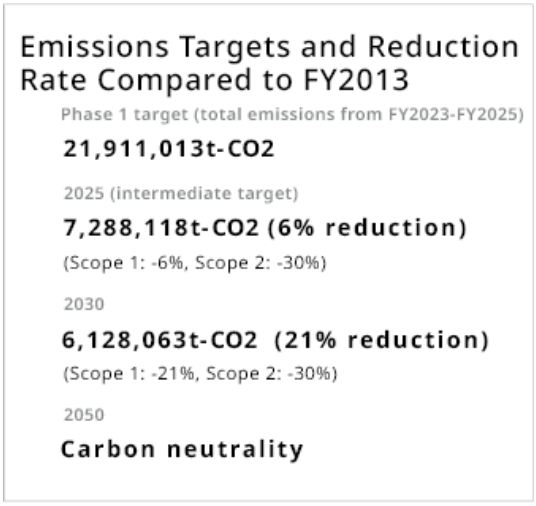
Decarbonization Initiatives

In 2013, the Group closed its Sakaide Refinery as part of supply system restructuring in order to strengthen the competitiveness of its refineries. As a result of this closure, the Group’s CO2 emissions were reduced by approximately 1 million tons per year. Since 2013, we have fulfilled our responsibility to provide a stable supply of petroleum products by maintaining high operation rates at our three remaining refineries.
Along with implementing energy-saving measures, we are striving to improve efficiency and reduce our emissions per unit of production, aiming for a 7% reduction over 10 years.

GX League Targets

Group Targets for the First Phase of the GX League Initiative

The Cosmo Energy Group participates in the GX League initiative launched by the Japanese government. The emission reduction targets for GX League members are shown below. The GX League target figures are different from those of the Group’s Roadmap goals for the following two reasons.
(1) Differences in the net zero target calculation methods used by the Group and the GX League
(2) Differences in the 2030 target setting approach



(1) Differences in the net zero target calculation methods used by the Group and the GX League

The three differences between the method for calculating GHG emissions used for the Group's net zero target and for the GX League are listed below.

- Overseas emissions: The Group's net zero target accounts for emissions outside of Japan.
- Electricity and heat supplied to others: Deducted under the Group's net zero target (SHK system [1]).
- Avoided CO2 emissions: The Group's net zero target accounts for avoided CO2 emissions within the larger society.

(2) Differences in the 2030 target setting approach

Following the release of its roadmap for net zero carbon, the Group has continued to search out all untapped potential for further boosting reduction measures. When submitting the target to the GX League, the 2030 target was set at 21%, a figure which takes into account the reduction potential currently under review.
The Group plans to update its roadmap for net zero carbon, as well as the GX League targets, as its review of these reduction measures continues.

1. SHK is a system for calculating, reporting, and publishing greenhouse gas emissions based on the Act on Promotion of Global Warming Countermeasures.

Initiatives for Achieving Net Zero Carbon: Oil Exploration and Production/Petroleum and Petrochemicals

Understanding the External Environment

Further efforts are required to achieve decarbonization in Cosmo Energy's oil exploration and

production/petroleum and petrochemical businesses. Negative emissions technologies are expected to be more commonplace by 2030 as the development of separation, recovery and utilization technologies reduces cost.
In the hydrogen sector, pilot manufacturing is underway, though further cost reduction is needed. As for ammonia, efforts are underway to secure its use as an energy source as quickly as possible.
Progress is being made outside of Japan on the practical application of next-generation fuels, and the goal in Japan, too, is to achieve its widespread use in the future.

Initiatives to Reduce and Eliminate Carbon

1. Shift to Decarbonized Energy

The Group will reduce Scope 1 and Scope 2 emissions through a fuel shift (to use of LNG, hydrogen, ammonia, etc.), introduction of renewable energy, and energy conservation. The Group is working to switch virtually all electricity used at all service stations operated by Cosmo Oil Sales to electricity from renewable energy sources.

2．Use of Negative Emissions Technologies (CCS/CCUS, CO2-EOR, etc.)

The Group will study the feasibility of utilizing carbon dioxide enhanced oil recovery (CO2-EOR) technology in oil fields and other locations where it holds concessions. Studies will also be conducted on carbon dioxide capture and storage (CCS) and carbon dioxide capture, utilization and storage (CCUS) technologies to recover CO2 from major equipment and utilize CO2.
Further, the Group has concluded a memorandum of understanding with the Abu Dhabi National Oil Company based on an agreement to begin a joint investigation for the exploration of technologies that can contribute to decarbonization and a feasibility assessment regarding CCS/CCUS in the Emirate of Abu Dhabi.


3. Initiatives for Next-Generation Energy and Raw Materials

Utilizing its expertise in producing and handling hydrogen, the Group will consider the hydrogen station business, engineering related to hydrogen production and other matters, and the use of receiving terminals in Japan and overseas hydrogen sources to establish a hydrogen supply chain.
Further, the Group has concluded a memorandum of understanding with Masdar, a UAE-based company with which the Group has maintained a close relationship, regarding the consideration of collaboration in the field of decarbonization in, for example, offshore wind power farms, hydrogen, and ammonia projects.
In addition, the Group’s proposal of “Establishment of a Supply Chain Model for Bio-jet Fuel Production from Domestic Used Cooking Oil” was selected as a public call project by the New Energy

and Industrial Technology Development Organization (NEDO). Through this project, the Group aims to demonstrate and establish a supply chain model for bio-jet fuel production from used cooking oil and to begin full-scale supply of sustainable aviation fuel (SAF) by 2025.
The Group company Maruzen Petrochemical was selected for a NEDO Green Innovation Fund project in recognition of its chemical recycling technology. Through this project, the company aims to establish chemical recycling technology by 2030.
As a further initiative, the company is also studying the possibility of supplying recycled carbon products (synthetic fuels and chemicals).

Initiatives for Achieving Net Zero Carbon: Renewable Energy Business

Understanding the External Environment

In 2021, the Japanese Cabinet approved its Sixth Strategic Energy Plan. This plan presents an outlook that, in light of the new GHG emission reduction target for fiscal 2030, anticipates renewable energy accounting for 36–38% of power sources in fiscal 2030 under the ambitious assumption that various challenges in both supply and demand will be overcome. As part of these efforts, the introduction of solar photovoltaic/onshore wind generation is expected to continue and offshore wind projects are expected to accelerate.
In addition, with an eye toward achieving a carbon neutral world, efforts to decarbonize led by corporations and local governments are expanding. The Group recognizes the growing need for electricity from renewable energy sources and increased expectations for the development and supply of renewable energy power sources.

Initiatives to Reduce and Eliminate Carbon

1. Onshore/Offshore Wind Power Projects

The Group company Cosmo Eco Power plays a central role in the Group's renewable energy business. The company is building an entirely in-house system capable of developing, designing, constructing, operating and maintaining onshore wind power plants. The company is also engaged in offshore wind power projects, which are expected to expand in the future.

2. Retail Electricity Sales (Supply of Electricity from Renewable Energy Sources)

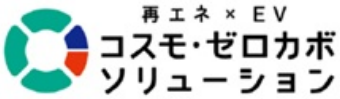
The Group supplies renewable energy generated at Group power plants to both individuals and corporations.

3. Other Renewable Energy

The Group is studying the possibilities for solar, geothermal and biomass power generation that utilizes its technologies and networks.

4. Cosmo Zero Carbon Solution

The Group has consolidated its assets to provide a package of products related to the introduction and utilization of renewable energy and EVs to help promote decarbonization by corporations and local governments.



Initiatives for Achieving Net Zero Carbon: Mobility Business

Understanding the External Environment

In light of Japan's 2050 Carbon Neutral Declaration, the Group recognizes the growing demand among corporations and local governments for EVs and other next-generation vehicles.

Initiatives to Reduce and Eliminate Carbon

Package of Solutions for Introduction and Effective Utilization of EVs

The Group has proactively incorporated EVs into its existing car leasing business and has begun providing easy and convenient EV car sharing services. In addition, by leveraging the assets of its renewable energy business, the Group provides comprehensive support for decarbonization efforts.

1. Providing EVs via Cosmo My Car Lease Services

The Group is now able to provide EVs through its Cosmo My Car Lease and Yasashii (friendly) Car Sharing services. By supplying these EVs with its own electricity generated from renewable energy sources, the Group aims to help achieve a zero-emission EV world.

2. Hydrogen Station Projects

The Group is working to enter the hydrogen supply chain by opening its first hydrogen station in 2024, utilizing existing assets and developing a hydrogen station for trucks.

3. Rapid EV Charging Equipment at Service Stations

The Group is focused on installing rapid charging equipment for EVs at affiliated service stations and developing related services.

Initiatives for Achieving Net Zero Carbon: Contributing to Co-Creation with Local Communities

Understanding the External Environment

As more municipalities are declaring themselves to be zero carbon cities, the need for a variety of decarbonization methods is rising. At the same time, companies affiliated with these municipalities are also expected to take the initiative in decarbonizing.

Initiatives to Reduce and Eliminate Carbon

Contributing to Community Decarbonization in Energy and Mobility Sectors

The Group is considering projects that contribute to community revitalization and lead to next-generation businesses in the mobility, renewable energy, and distributed energy sectors. The Group is also pursuing initiatives to help communities decarbonize by utilizing its nationwide network of service stations.

1. Aizu Innovation Office

The Group established its Innovation Office in Aizu Wakamatsu to help create regional models utilizing ICT, environmental technology, and other technologies in Aizu Wakamatsu Smart City. The office aims to analyze energy and mobility-related case studies in order to grasp the needs of the community and incorporate these needs into Group projects.

External Assessments