

# Carbon Neutral Initiatives in the Fourth Comprehensive Special Business Plan

TEPCO\* has always viewed its initiatives to combat global warming as key business issues, but in light of recent world trends, we are now drastically reforming our business model to focus on carbon neutrality.

## FY2030 target :

**Reduce CO<sub>2</sub> emissions of electricity delivered to customers by 50% in FY2030 compared to FY2013**

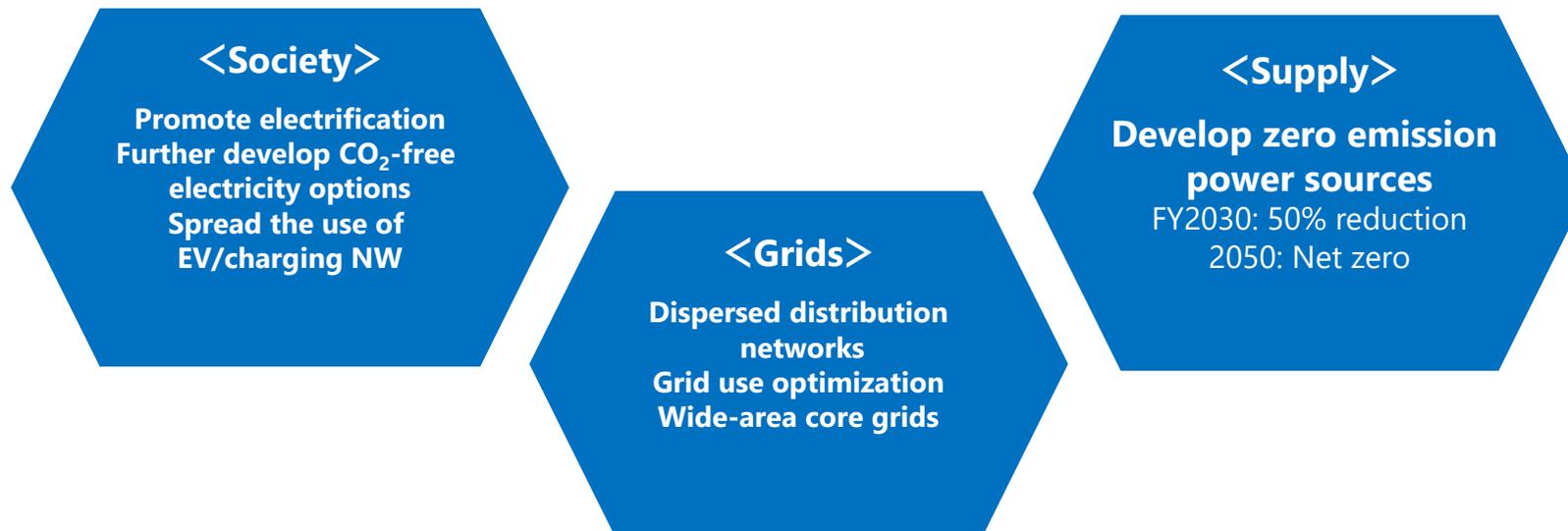
## 2050 challenge :

**Reduce CO<sub>2</sub> emissions from the supply of energy to net zero by 2050**

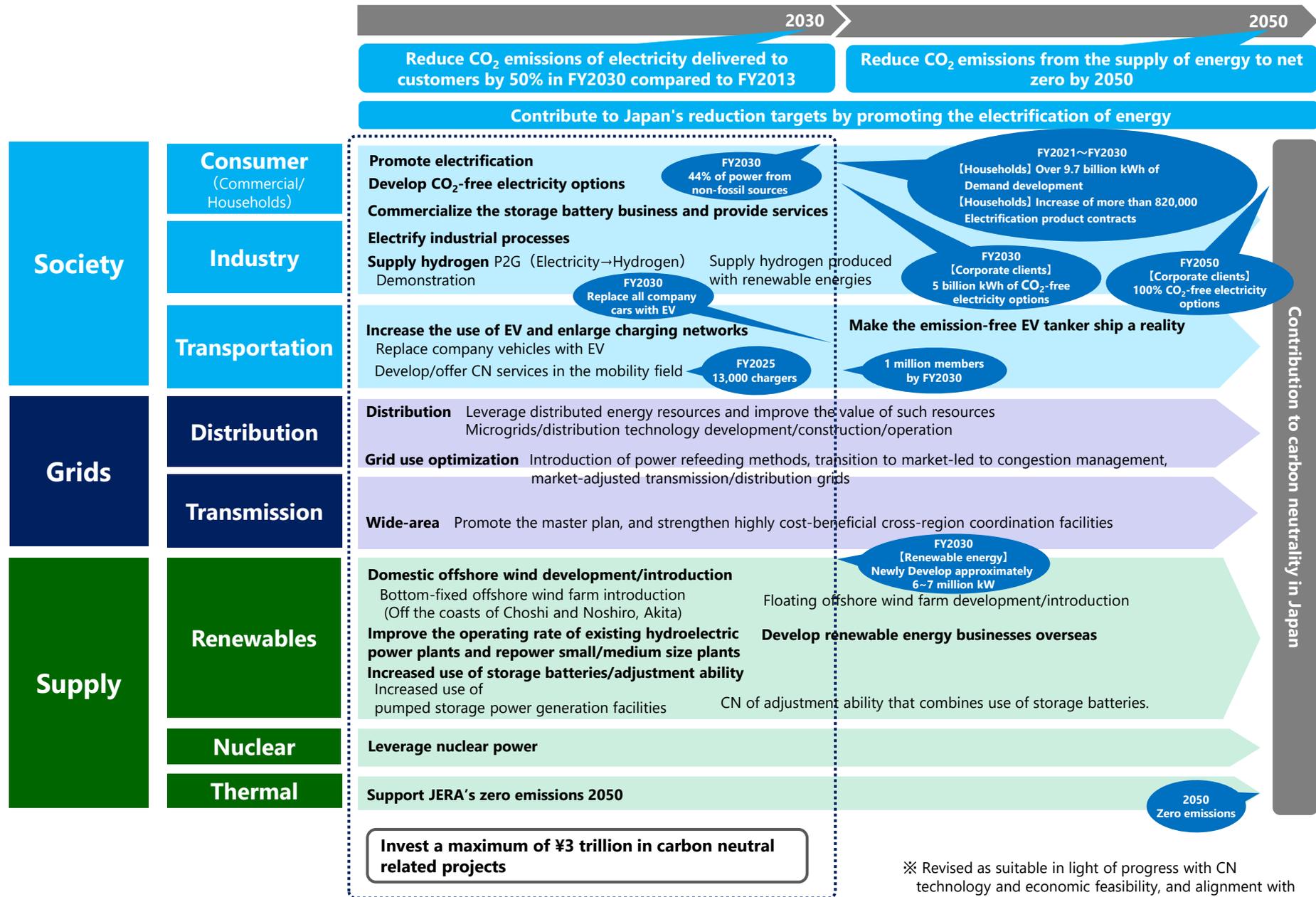
With these objectives in mind the entire Group is engaged in initiatives to both develop zero-emission power sources and further promote the electrification of energy demand so that we can work with society to achieve carbon neutrality.

※ Refers to the five companies. Tokyo Electric Power Company Holdings, Inc., TEPCO Fuel & Power, Inc., TEPCO Power Grid, Inc., TEPCO Energy Partner, Inc., TEPCO Renewable Power, Inc.

## The challenge to achieve carbon neutrality



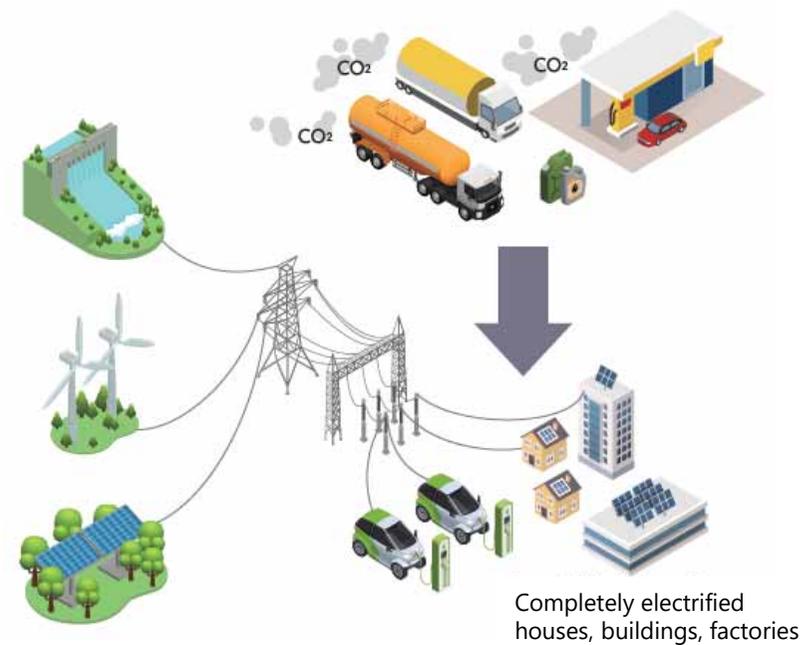
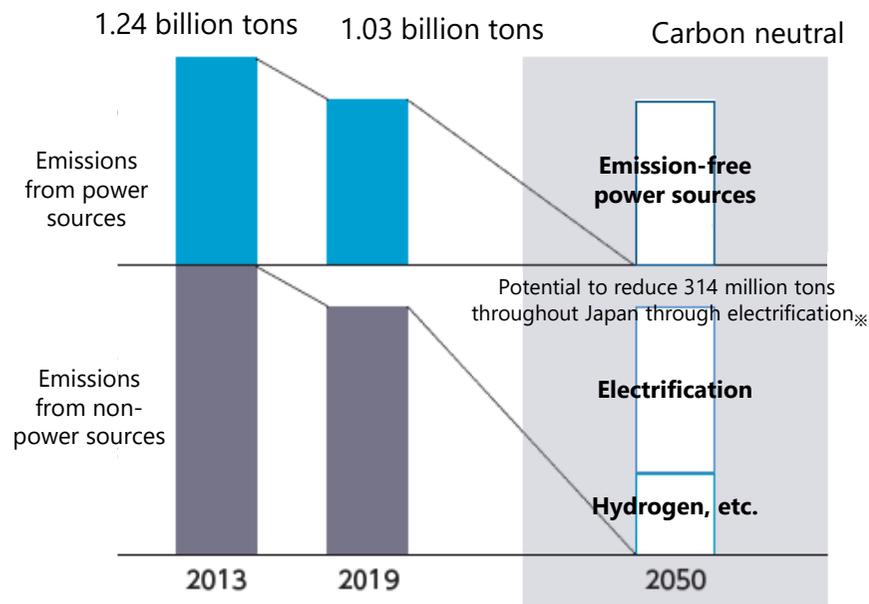
# List of carbon neutrality initiatives



## Society Achieving carbon neutrality with our customers

Initiatives on the energy demand side, such as developing emission-free power sources and replacing fossil fuels with "electrification," etc., are important for achieving carbon neutrality. TEPCO is working with our customers to improve energy resilience during emergencies, live more comfortably, and achieve carbon neutrality.

### Reducing CO<sub>2</sub> emissions from the supply of energy in Japan



※ Reduction potential is an estimate based on the results of scenario analysis based on IEA's WEO2019 SDS

## Society Helping customers to transition to carbon neutrality

In order to support customer initiatives to achieve carbon neutrality, **we will offer CO<sub>2</sub>-free electricity options for receiving power from only renewable energies**, such as Aqua Premium and Sunlight Premium status. Furthermore, we will **not only develop electrification contracting options** but also continue our initiatives to promote the suitable setting of air-conditioners/hot water heaters, and **promote electrification in new fields** in addition to industrial processes. We also aim to **commercialize our storage battery energy service**, which covers everything from the introduction of storage batteries to maintenance/management, **during FY2021**. We will also work with local government in accordance with the conditions and attributes of the region now that the public desires initiatives to help regional public organizations become carbon neutral.

### 【FY2030 targets】

CO<sub>2</sub> emissions:  
**-50% FY2013 levels**

### 【FY2021~FY2030 targets】

Demand development (household):  
**Over 9.7 billion kWh**

CO<sub>2</sub>-free electricity sales (corporate accounts):  
**Over 5 billion kWh/year**

Electrification product contracts (household):  
**Increase of more than 820 thousand**

### 【FY2050 challenge】

CO<sub>2</sub>-free electricity sales rate (corporate clients):  
**100%**



Aqua Premium



Storage batteries

## Supply Mobility/transportation sector electrification

In the mobility sector, **we aim to double the current amount of chargers in e-Mobility Power's charger network to 13,000 by FY2025**, and by **FY2030 increase the number of fixed-use members to 1 million, approximately 10 times what it is currently**. Furthermore, we aim to have **50% of all company vehicles replaced with EV by FY2025, and have 100% electrified by FY2030** (EV100).

We also hope to contribute to carbon neutrality in the transportation sector and create new business opportunities **through tanker ships that promote zero-emissions electricity**.



Emission-free EV tanker ship concept drawing  
(source: e5 Lab)



EV charger concept drawing

## Supply Promoting the use of hydrogen (indirect electrification)

On Mt. Komekura in Yamanashi Prefecture we are producing solar power and utilizing excess power we have been generating since 2016 to manufacture hydrogen. We will leverage the experience and knowledge gained through this experiment to absorb the excess energy produced through renewables, for which output fluctuates second by second, and work with local government to **commercialize a service for providing hydrogen manufactured through the electrolysis of water to fulfill heating and material demands in factories**.



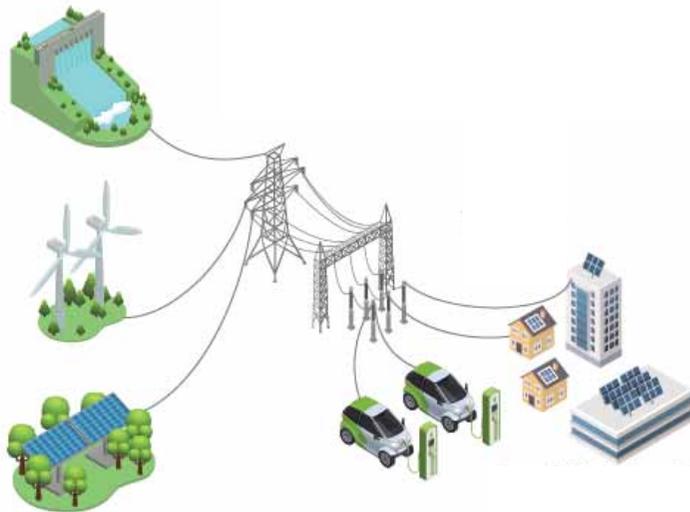
Mt. Yonekura P2G demonstration site  
(Source: Yamanashi Corporate Bureau)

## Grids

### Smart systems for supporting carbon neutrality

Transmission and distribution networks play an important role in the introduction of large amounts of renewable energy. And, they need to be more resilient to natural disasters which are becoming fiercer and affecting larger areas.

In order to achieve carbon neutrality and strengthen the resilience of power grids, we will leverage digital technology to increase the value of regionally dispersed energy, and make changes to both equipment and facility configuration in order to more effectively utilize dispersed transmission and distribution networks.



From results of scenario analysis based on the IEA's WEO2019, we estimate that through the increased use of renewables there is the potential to reduce carbon emissions by 30 million tons a year in the year 2050 in TEPCO power grid's coverage area. In order to reduce CO<sub>2</sub> emissions and support the increased use of a large amount of renewables, we are further strengthening the resilience of transmission/distribution networks that will serve as the platform for renewables.

## Grids Dispersed distribution networks

By leveraging digital technology we can use distributed energy resources (DER), such as renewable energies and storage battery resources introduced to different regions, etc., with maximum effectiveness, and make the transition to next-generation dispersed grid that is carbon neutral and resilient.

By leveraging next-generation smart meter and sensor data to the best of our ability, we will maximize the amount of DER that can be introduced, and create a market and regional energy management system that can enable optimal use of these resources in these regions.

After the distribution license system takes effect, we shall coordinate with operators, including operators in other industries, while leveraging the knowledge and technical prowess we have cultivated through demonstrations on Nijima and Hahajima islands as we engage in initiatives to create new value aimed at solving various regional issues, such as how to increase the use of renewable energies and strength and resilience.

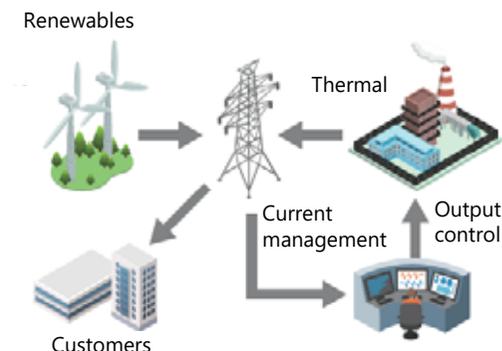


Nijima solar power facility

## Grids Grid use optimization

By promoting connect & manage for effectively using the available capacity of existing grids, and transitioning to power refeeding and market-led congestion management, we will expand the introduction of renewable energies quickly and economically.

In conjunction with this, through coordinated operation of distributed networks and wide-area networks via market mechanisms, we will be able to effectively use the entire grid.



## Grids Promoting wide area core grids

In order to reduce CO<sub>2</sub> emissions by introducing affordable and non-fossil energy sources outside of TEPCO's coverage area, such as large-scale offshore wind farms, etc., we shall build and strengthen highly cost-beneficial cross-regional coordination facilities based upon the master plan of the Organization for Cross-regional Coordination of Transmission Operators



Hida-Shinano DC transmission lines

## Supply

### The best mix for carbon neutrality

Zero-emission power sources are needed if we are going to achieve carbon neutrality. However, in Japan, which has few natural resources, it is important to balance energy security with economic efficiency while prioritizing safety. As an energy provider, TEPCO is aiming for a best mix of energy in order to achieve carbon neutrality that is based on the S+3E's.



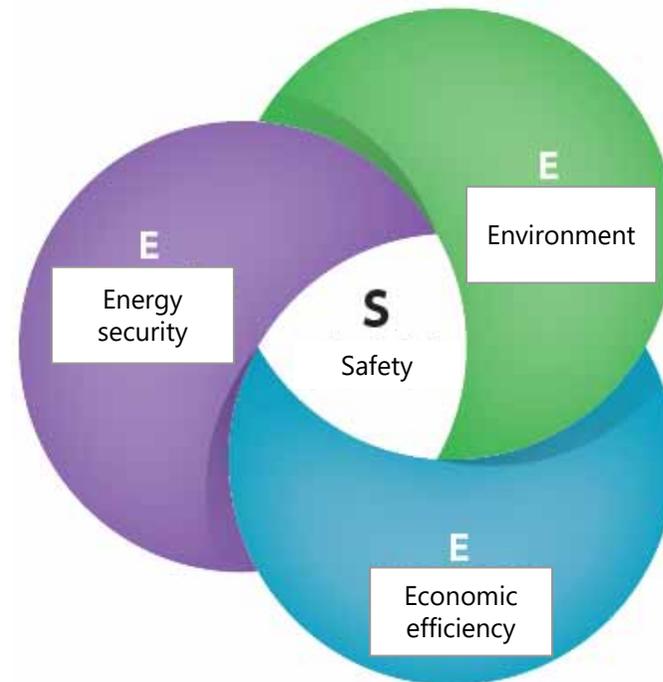
※ TEPCO reduces CO<sub>2</sub> emissions by more than 25 million tons/year through the use of renewables and nuclear power

+

Leveraging zero-emission thermal (ammonia/hydrogen)



**[2050 Challenge]**  
Reduce CO<sub>2</sub> emissions from the supply of energy to net zero



## Supply Renewable energies

While strengthening the foundation of our domestic hydroelectric power business, **by FY2030 we plan to newly develop approximately 6~7 million kW of offshore wind in and out of Japan and hydroelectric power overseas** as we aim to turn renewables into primary energy sources.

And, **we plan to be earning a net profit of ¥100 billion annually** by FY2030 through our renewable energies business.



Offshore wind power station off the coast Choshi

### Offshore wind



【Japan】 We are leveraging the knowledge and experience we gained through demonstration and commercialization to date to commercialize offshore wind farms off the coast of Choshi, Chiba Prefecture and Noshiro in Akita Prefecture.



【Overseas】 We are participating in a demonstration project off the coast of Norway in order to gain know-how and technical prowess with floating foundations that we will leverage to build new infrastructure in the future and utilize for domestic and overseas projects.

### Hydro



【Japan】 Reduce loss through water system integration management, improve operating rate by reducing troubles, and increase generated power volume through repowering.



【Overseas】 In addition to the technical prowess and know-how we have cultivated through many years of domestic hydroelectric plant operation, we shall utilize our experience with projects in Vietnam and Georgia to develop more overseas projects.

## Supply Nuclear power generation

In light of the great concern we have caused throughout society as a result of the recent series of incidents, we are returning to our basic approach of leveraging the regrets and lessons learned from the Fukushima Daiichi Nuclear Power Station Accident as we ascertain the root causes and implement drastic reforms. We aim to recommence operation of the Kashiwazaki-Kariwa Nuclear Power Station, but only after we regain the trust and understanding of the regional community and society as a whole. And, by steadily and safely decommissioning the Fukushima Daini Nuclear Power Station, recommencing construction of the Higashi Dori Nuclear Power Station, and promoting the nuclear fuel cycle, we aim to play an important role in achieving carbon neutrality.



Kashiwazaki-Kariwa Nuclear Power Station

## Supply Zero-emissions thermal

We support JERA's initiatives to achieve carbon neutrality

- Shutdown of all inefficient coal-fired plants by 2030
- Ammonia co-firing (We will proceed with our highly efficient coal-thermal co-firing experiment by 2030 with the aim of replacing coal with ammonia exclusive firing in the 2040s)
- Hydrogen co-firing (full-scale operation in the 2030s with the aim to expand co-firing rate by 2050)
- Participation in the construction of a total green fuel (such as ammonia) supply chain



Hekinan Thermal Power Station (Photo: JERA)

Initiatives based on the Paris Agreement are being engaged in by not only Japan, but countries throughout the world. By developing overseas businesses around carbon neutrality we will grow as a company and contribute to achieving carbon neutrality throughout the globe using technology cultivated in Japan.



## Microgrid business

TEPCO Ventures, Inc. has invested in the Adon Group to develop microgrids that mix solar panels with storage batteries in Hawaii, USA. Going forward we shall acquire know-how about the construction and operation of these microgrids and seek new business opportunities overseas in other regions.



## Storage battery business

Through investing in Zenobe, which shows a remarkable growth in the UK that leads in the expansion of the storage battery market, TEPCO Power Grid, Inc. is leveraging its experience developed as a transmission/distribution operator to contribute to increasing the corporate value of Zenobe while improving its own ability to propose various storage battery solutions, including ancillary services, and accelerating the development and enlargement of new spheres of business both in Japan and overseas.

## **P2G (Hydrogen)**

Abbreviation for Power to Gas. Technology for manufacturing hydrogen through the electrolysis of water that is expected worldwide to help expand the use of renewable energies and reduce greenhouse gases as we seek to achieve a carbon neutral society.

## **Microgrid**

Power supply network for isolated regions, such as islands. Power supply and demand must be balanced within these regions alone.

## **e-Mobility Power**

Established in October 2019. Joint venture owned by seven companies including power companies and automobile manufacturers (investors: TEPCO Holdings, Inc., Chubu Electric Power Company, Inc., Toyota, Nissan, Honda, Mitsubishi, Development Bank of Japan). Builds charging infrastructure, develops charging networks and provides related services.

## **Distribution license**

System that enables new operators (= distribution operators) to purchase or lease distribution equipment currently owned by general transmission/distribution operators in specific regions to provide new consignment transmission services in said region (to begin in April 2022). Expected to enable the local production/local consumption of renewable energies and enhanced resilience.

## **Master plan**

Grand design for transmission/distribution network facilities that aims to make renewable energies primary energy sources and strengthening the resilience of energy supply. Created by the Organization for Cross-regional Coordination of Transmission Operators, a government-authorized company.

## **Connect & Manage**

Mechanism for maximizing usage of existing transmission/transformation facilities and quick connection to grids in order to turn renewable energies into main power sources.