

TEPCO Group

**Business Structure Reforms to
Achieve Balancing Long-term Stable
Supply and Carbon Neutrality**

April 28, 2022

TEPCO

Recently, the external environment is changing drastically, including the global situation related to energy and market conditions for resources. As it is TEPCO's mission to continue stable supply for our customers under the such situation, we will do our utmost to secure supply capacity (kW) and fuel (kWh). To do so, we will closely coordinate with the national government and the Organization for Cross-regional Coordination of Transmission Operators, Japan (OCCTO) and exert all efforts of the TEPCO Group with cooperation from our customers and stakeholders.

On the other hand, it is necessary to reduce the dependence on fossil fuels in the mid to long-term in order to fundamentally solve such energy security issues. TEPCO will also promote carbon neutralization of our existing electricity business (zero-emission thermal power, hydro power, nuclear power, wind power, etc.).

Additionally, we will aim to build a new strong and flexible power system by combining a locally produced and locally consumed system that originates from the customer's energy resources. In order to realize this, we will boldly take on the challenge of creating a new business model and new added values in the form of locally produced and locally consumed facility services, while utilizing our resources to the fullest and forming alliances with other companies.

Under the basic recognition that a shift away from dependence on fossil fuels will also contribute to long-term stable supply, TEPCO will proactively promote carbon neutral initiatives with our customers to meet the expectations of the society, utilizing our comprehensive knowledge and technologies from power generation and supply to the way facilities and electricity are used by customers. We will contribute to realizing a safe and sustainable society through the shift of the energy structure, while fulfilling our responsibility to Fukushima.

1. Initiatives for stable supply

Challenges and response to tight power supply-demand conditions in March

Collective efforts of the Group in light of the challenges of the tight power supply-demand conditions in March

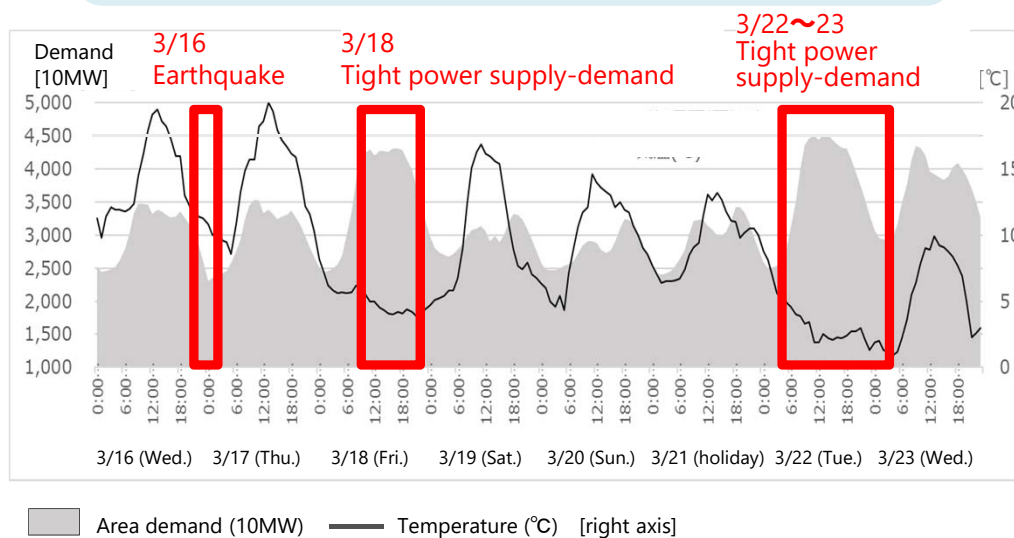
Challenges for securing supply capacity for this fiscal year

2. TEPCO's business policy for the mid to long-term

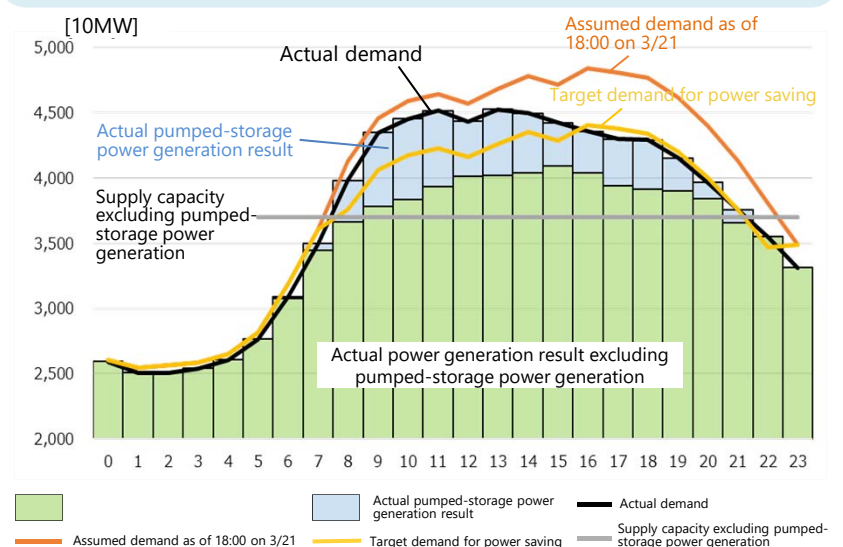
Challenges and response to tight power supply-demand conditions in March

- Due to the earthquake offshore Fukushima Prefecture on March 16, disconnection of approx. 5.25 million kW of power occurred in the Tohoku and Tokyo areas and approx. 2.1 million homes lost power due to UFR operation caused by a frequency decreased; it took approx. 2.5 hours to restore power. We would like to offer our sincere apologies for the inconvenience this has caused customers.
- On March 22, **the tight power supply-demand warning was issued due to the tight power supply-demand condition for extremely cold weather that was rare for March, as power disconnection still continued resulting from the earthquake on March 16.**
- TEPCO coordinated with the national government, OCCTO and other utilities and exerted all efforts of the Group to implement maximum additional supply capacity measures. We also had support from the media to **spread the word about saving electricity**, upon announcing the target and result of saving electricity by our customers. **We would like to once again convey our deep gratitude to society as a whole for their cooperation with saving electricity.**
- **We will do our utmost to address the three challenges regarding tight power supply-demand conditions (①method of determining the level of tightness of power supply-demand conditions and prompt information disclosure, ②possibility of supply shortage due to continuation of power disconnection resulting from the earthquake, ③possible LNG shortage due to long-term shutdown of coal-fired thermal power stations resulting from the earthquake and the situation in Ukraine),** as we are currently verifying them.

Tight power supply-demand conditions in the Tokyo area

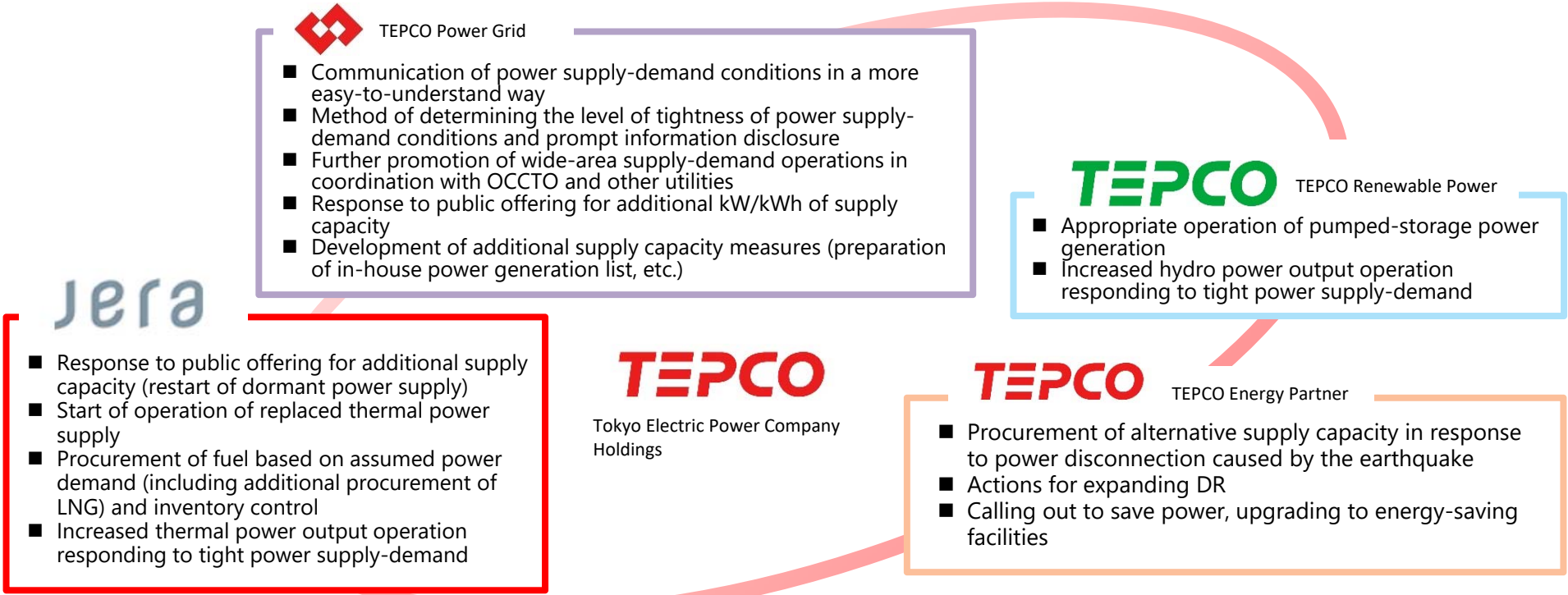


Target and result of power saving in the Tokyo area on 3/22



Collective efforts of the Group in light of the challenges of the tight power supply-demand conditions in March

■ In light of the challenge of tight power supply-demand conditions in March 2022, the entire TEPCO Group will coordinate with the national government and OCCTO to diligently implement maximum efforts, such as disclosing information on the level of tightness of power supply-demand conditions, procuring alternative supply capacity in response to power disconnection caused by the earthquake, expanding DR, and preparing public offering for additional kW/kWh of supply capacity.

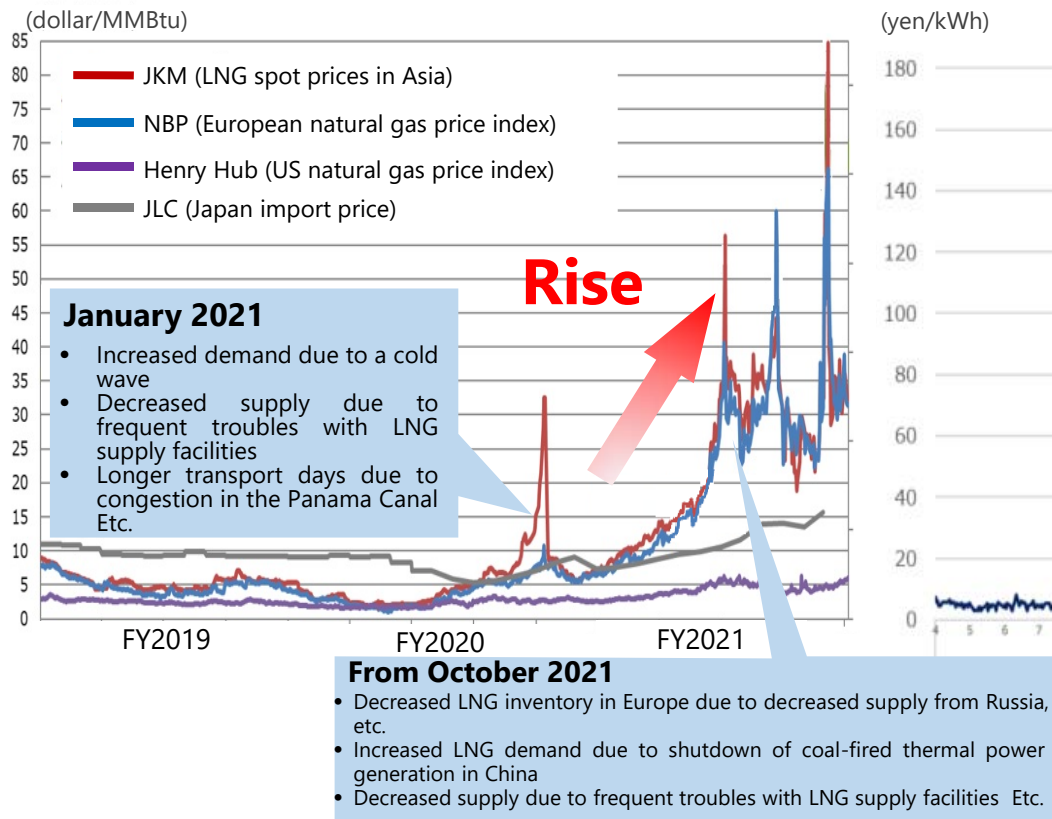


Major actions taken on March 22	
TEPCO Power Grid	Triggering of additional supply capacity measures (triggering of power supply I, additional burn-up for power supply III, additional burn-up for in-house power generation, supply voltage measures, etc.), power reception from power interchange, disclosure of target and result of power saving by customers
TEPCO Energy Partner	Triggering of DR, support for power saving
TEPCO Renewable Power	Appropriate operation of pumped-storage power generation, increased hydro power output operation, power supply repair and adjustment
JERA	Increased thermal power output operation, securing of supply capacity from restarting dormant power supply, power supply repair and adjustment

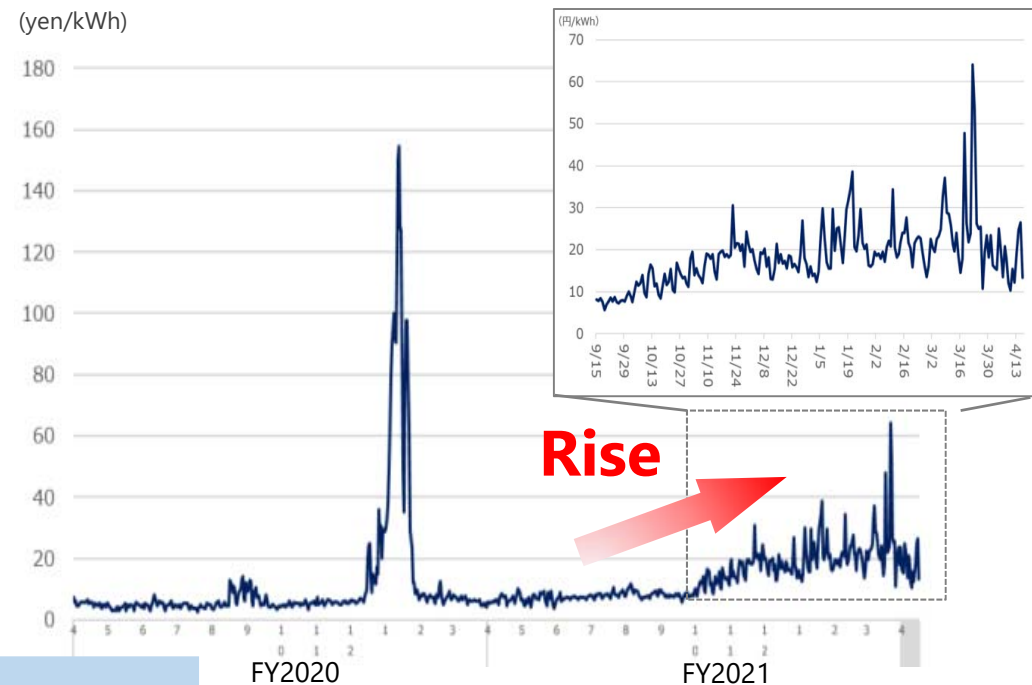
Challenges for securing supply capacity for this fiscal year

- The **LNG spot prices in Asia are rising at a faster speed than at the same time last year** due to concerns for fuel supply from Russia caused by the situation in Ukraine. Affected by this, **prices in the domestic wholesale electricity trading market are also increasing compared to the previous fiscal year.**
- As fuel prices continue to rise due to the aforementioned global situation, the **business environment surrounding TEPCO is unpredictable.** We will continue to carefully monitor the trend, and **make our utmost efforts as the TEPCO Group to secure supply capacity for this fiscal year** with the understanding of the society, while offering efficient energy usage to our customers.

Transition of LNG spot prices in Asia (red line)



Wholesale electricity trading market (spot market system price)



Source: Material 3-2 from the 48th Electricity and Gas Subcommittee, created based on JEPX data

1. Initiatives for stable supply

2. TEPCO's business policy for the mid to long-

term Social changes for the mid to long-term / change of demand structure

TEPCO's business policy

Goal for 2030

Policy regarding supply

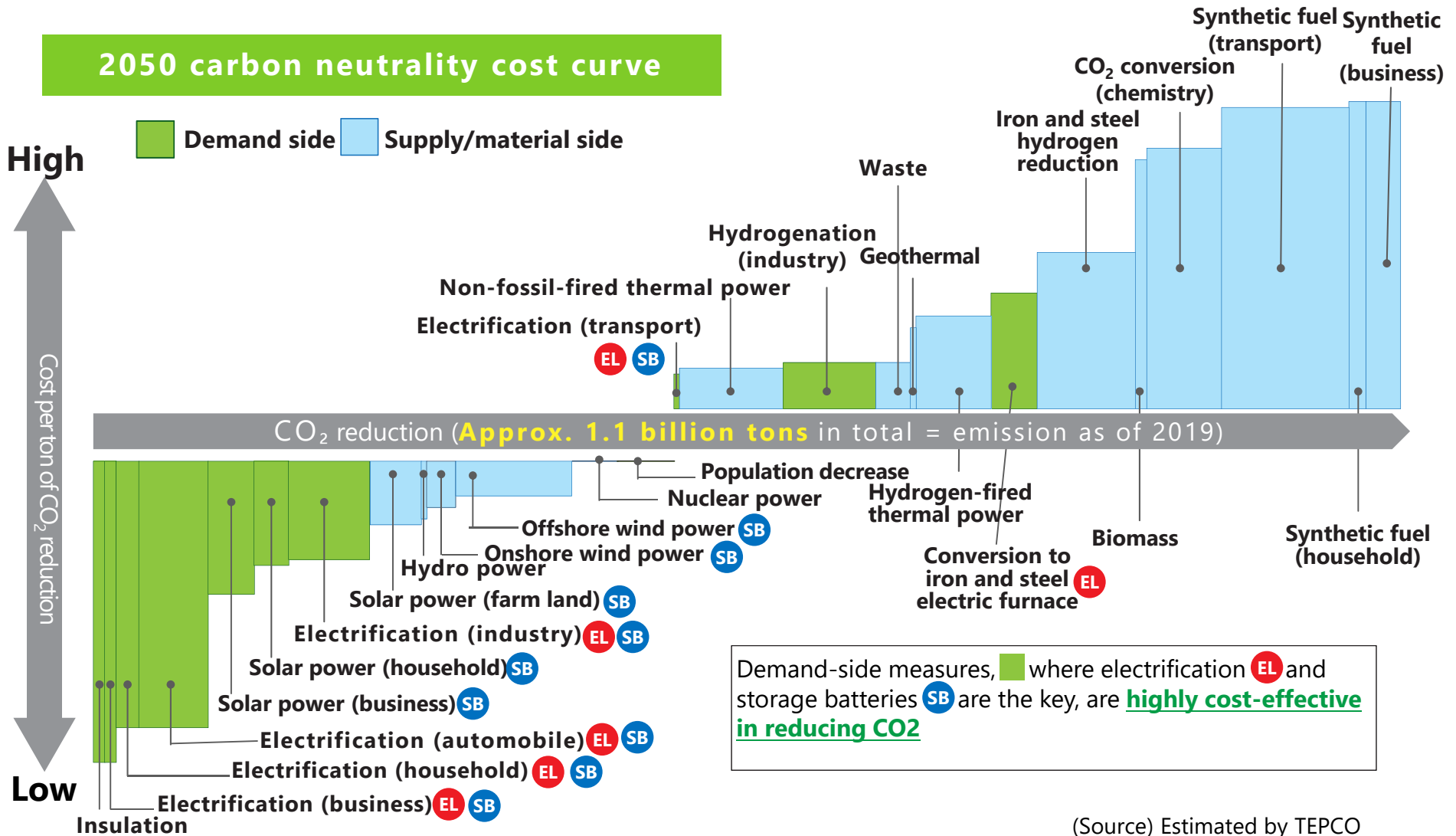
Policy regarding demand

Policy regarding funds and strategic investments

Social changes for the mid to long-term

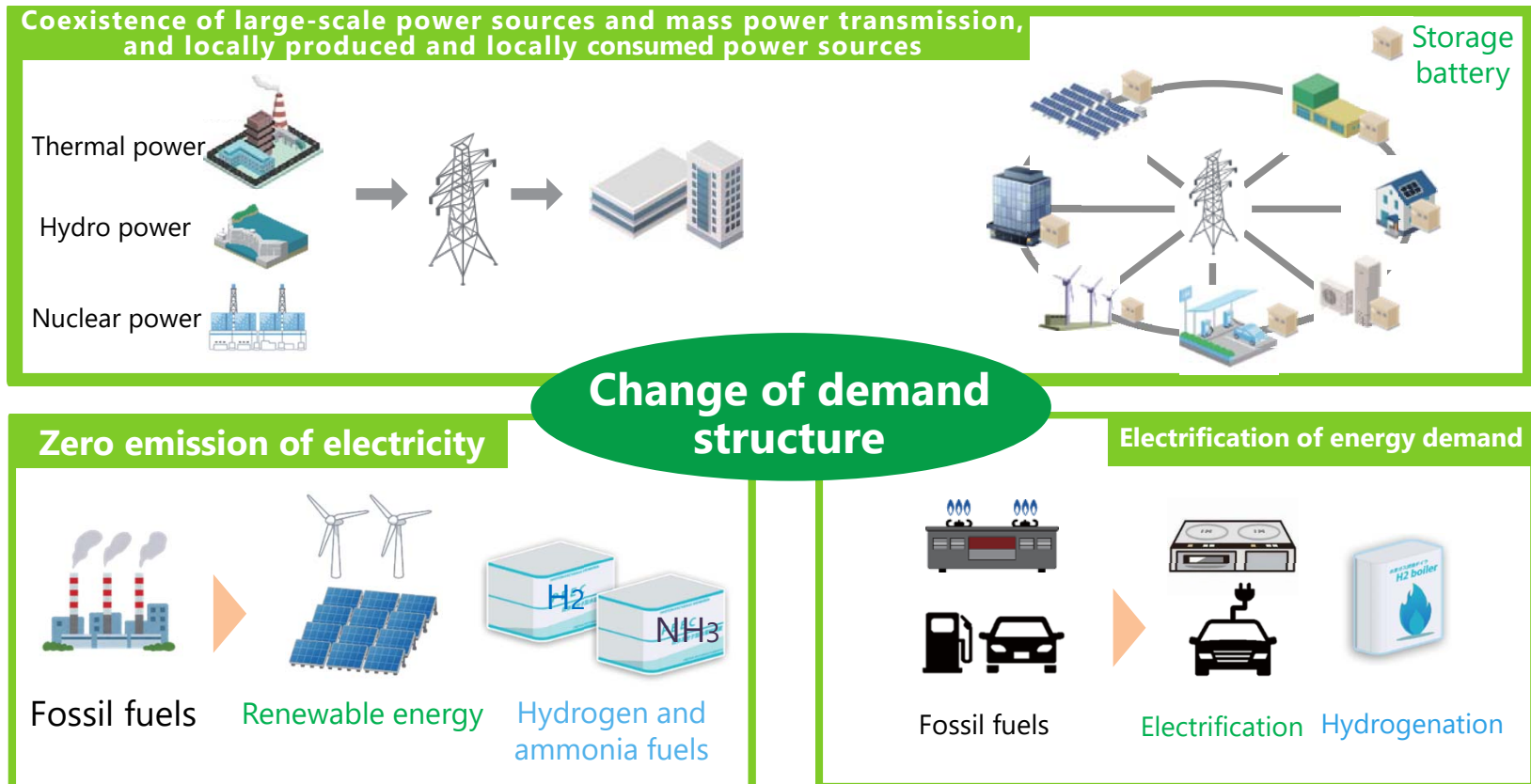
Carbon neutrality measures

■ In order to realize a carbon neutral society, we need to reduce our dependence on fossil fuels in the mid to long-term and mobilize all CO2 reduction measures. Considering cost-effectiveness, relatively affordable **demand-side initiatives (electrification, solar power, installation of storage battery, etc.) are effective.**



Change of energy demand structure associated with carbon neutralization

- **In-house power generation, in-house consumption, and local production and local consumption** are expected to expand, as proliferation of solar power generation and storage batteries expand on the demand side. This is also **effective in enhancing resilience** to respond to disasters.
- On the other hand, solar power and wind power have large fluctuations in power generation, which creates the risk of causing mismatch between demand and supply. For stable supply, it is extremely important to **combine power sources that operate as a base (hydro power, geothermal power, nuclear power) and adjustable power sources that adjust supply-demand balance (zero-emission thermal power)**. In particular, **"storage for usage" that utilizes energy storage (storage battery, hydrogen, etc.) is the key to stable supply.**



TEPCO's business policy

Goal for 2030



Demand side
Locally produced and locally consumed

Expansion of facility service business
(solar power, storage battery, etc.)

Stock scale of facilities nationwide

*Estimated by TEPCO



Pursue **national scale** on the premise of alliances and business structure reform

Supply side

Reduction of CO₂ emission of existing businesses

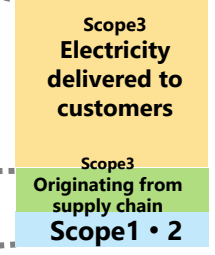
TEPCO Group* CO2 emission



- #### Reduction
- Visualization of emission amount related to materials procurement in coordination with the supplier
 - Procurement of products with low CO₂ emission
 - Electrification of in-house business vehicles
 - Energy-efficient buildings and facilities

Goal for 2030

Electricity delivered to customers
Scope1 • 2 • 3
▲50%



Goal for 2050

Reduce CO₂ emissions from the supply of energy to net zero

Scope1: Direct emission of greenhouse gas by operators themselves (fuel burn-up, industrial process)
 Scope2: Indirect emission due to use of electricity, heat and steam supplied by other companies
 Scope3: Indirect emission other than Scope 1 and Scope 2 (emission of other companies related to activities of the operator)

*TEPCO HD and core companies

Policy regarding supply

Securing supply capacity while reducing dependence on fossil fuels

- We will utilize hydro power, nuclear power and geothermal power as baseload power sources, and also work to develop renewable energy starting with offshore wind power.
- We will also promote zero-emission thermal power (mixed burning and exclusive burning of ammonia and hydrogen) as an adjustable power source that stably supplies carbon-neutral electricity.

Solar power



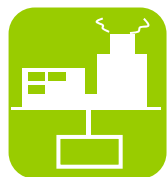
- Development of energy services using onsite and offsite solar power for corporate customers
- Installation of solar power through electrification packages for households

Offshore wind power



- Promotion of seabed offshore wind power by increasing competitiveness to win the public bidding process
- Becoming the top runner in Japan by advancing demonstration of floating offshore wind power

Geothermal



- Site development mainly in the Kanto region

Hydro power



- Improved equipment reliability, longer service life and increased power generation by repowering existing power stations

Nuclear power



- Important stable power source that does not emit CO₂
- Returning to the starting point of “reflecting on and learning from the Fukushima Daiichi Nuclear Power Station accident”, safety first is enforced in light of the series of incidents that caused great anxiety to the society

Zero-emission thermal power

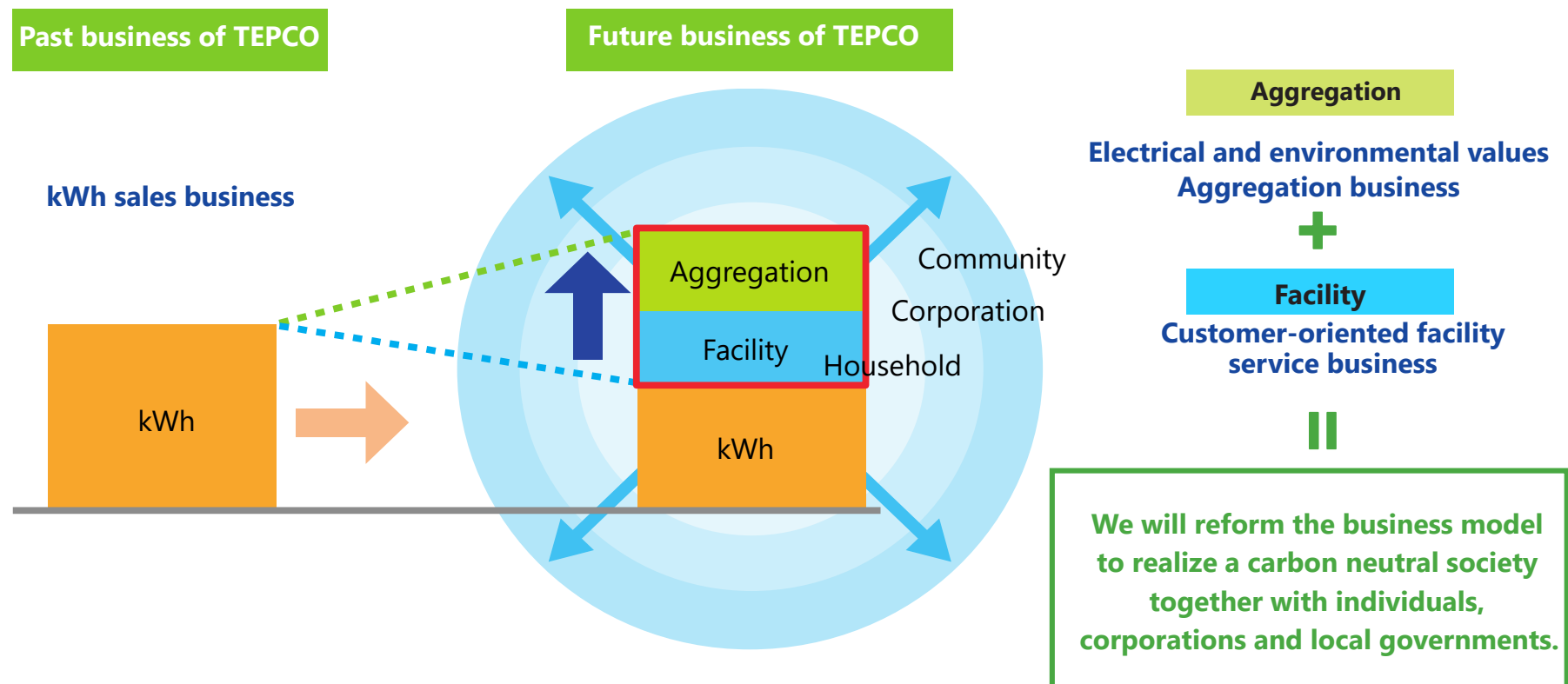


- Support for JERA's efforts to eliminate all inefficient coal-fired thermal power plants by 2030 and to achieve zero emissions through mixed burning of ammonia and hydrogen

Policy regarding demand

Business model reform to build a locally produced and locally consumed system

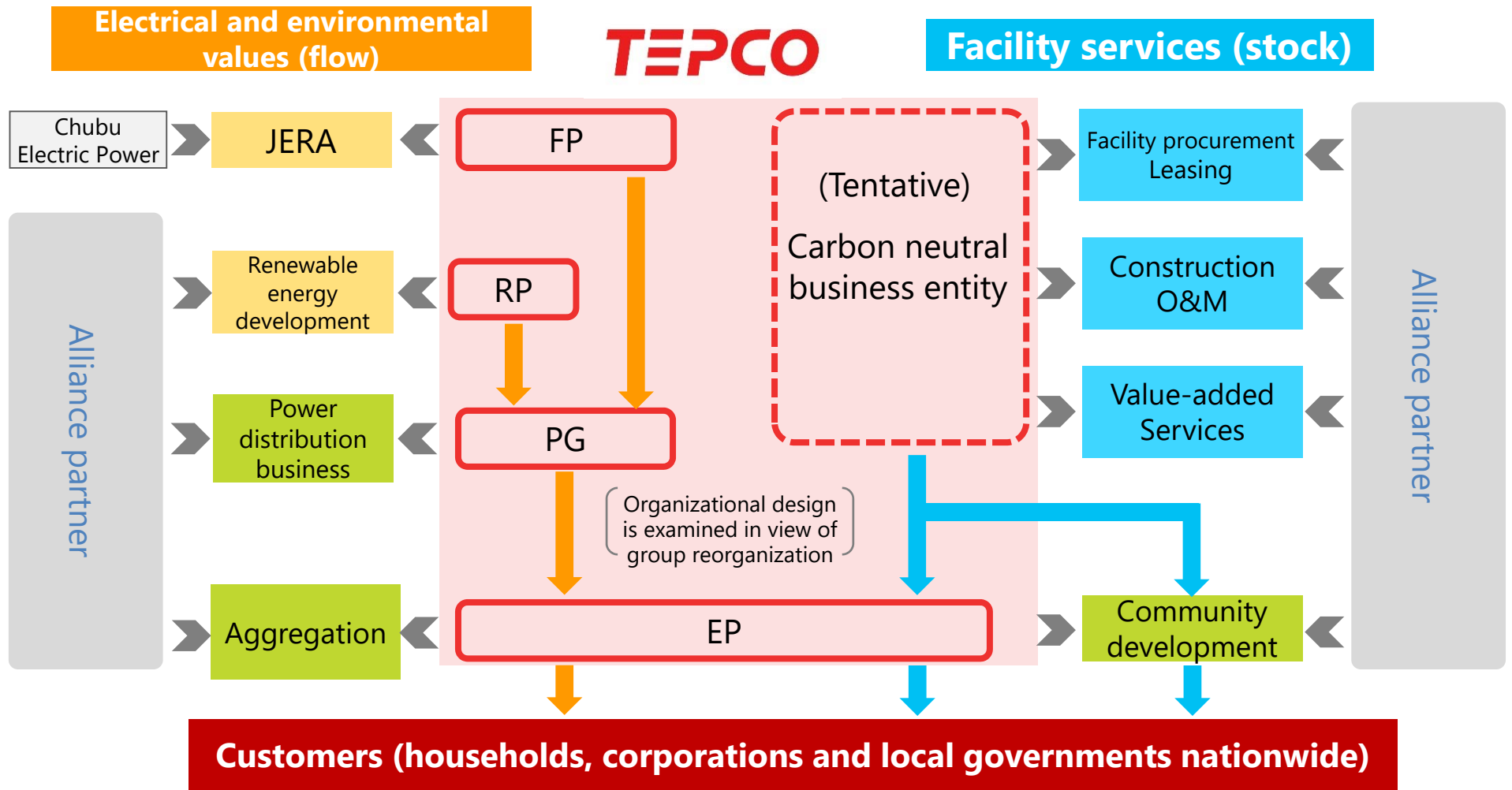
- In order to promote “storage for usage” locally produced and locally consumed system, we will **dynamically shift our business model axis from the conventional electricity (kWh) sales business to customer-orientated facility service business.**
- We will also **develop the aggregation business** which responds to needs such as supply-demand adjustment and environmental value transaction by gathering energy resources produced by customer facilities. Additionally, we will promote efforts to **expand these new businesses on an area-by-area basis in units of society and communities.**
- Through such new business developments, we aim to build a new strong and flexible power system.



Policy regarding demand

Restructuring of the alliance group with the business model reform in mind

■ In reforming our business model, we will promote alliances with a **focus on the nationwide expansion of our facility service and aggregation business**. To do so, we will examine business structure reform in view of group reorganization including recombination of the current business structure.



Policy regarding funds and strategic investments

- We will **utilize new financing methods**, such as Green Innovation Fund, Green Bond and Transition Finance, to prioritize allocation of financial resources to strategic investments, capital expenditures and technological developments that lead to business structure reform.
- We will review and expand our business through alliances and secure autonomous financing, aiming **to invest more than three times the “maximum three trillion yen by FY2030”** announced in the Fourth Comprehensive Special Business Plan.

Use of Green Innovation Fund

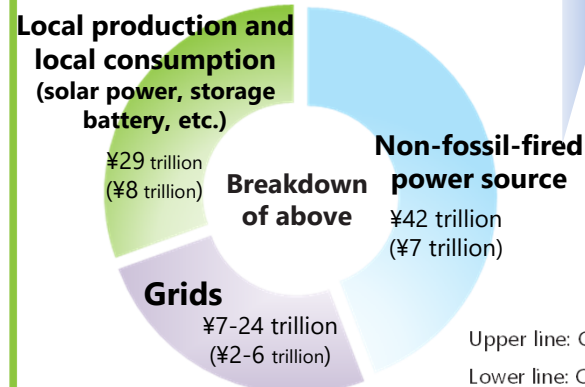
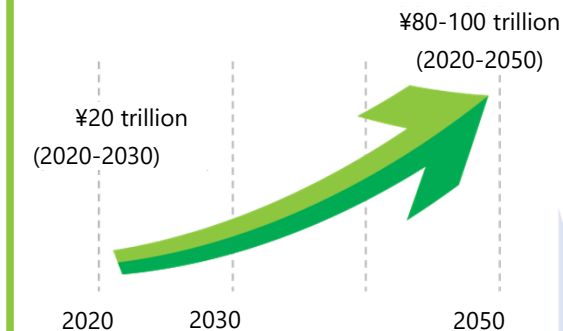
- TEPCO Holdings and Energy Partner started a hydrogen demonstration research project with a five-year support for 10 billion yen from the government's Green Innovation Fund, in collaboration with the Enterprise Bureau of Yamanashi Prefecture and several companies.
- In addition to the above, demonstration research projects for ammonia and offshore wind power also began.

Issuance of Green Bond

- TEPCO Renewable Power issued the first Green Bond (3-year bond, ¥30 billion) of the TEPCO Group in September 2021. The second bond (5-year bond, ¥10 billion) was issued in March 2022.
- It is used for new investments and refinancing of existing investments in projects related to development, construction, operation and renovation of renewable energy.

Carbon neutrality investments

Scale of national energy-related investment



Aim for more than three times the number announced in the Fourth Comprehensive Special Plan

with the national investment size as a merkmal

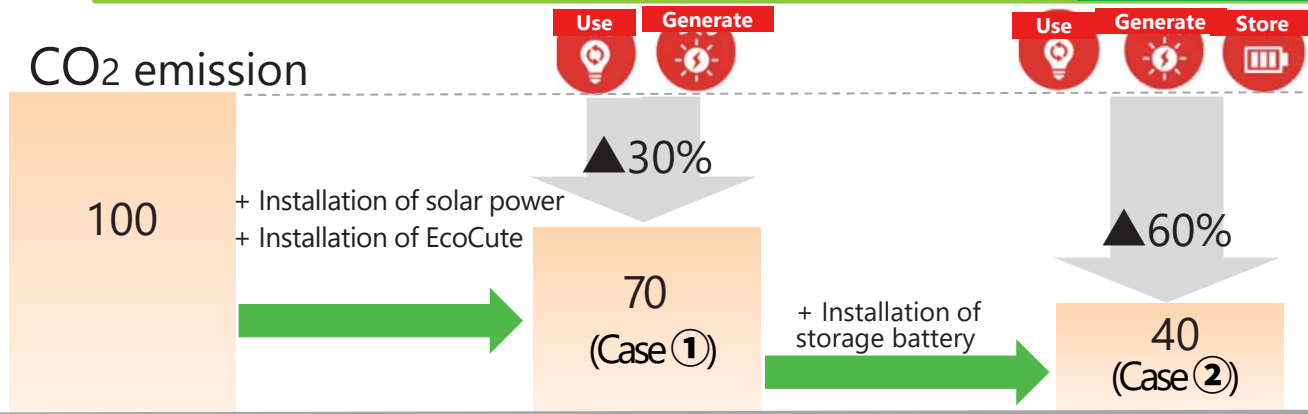
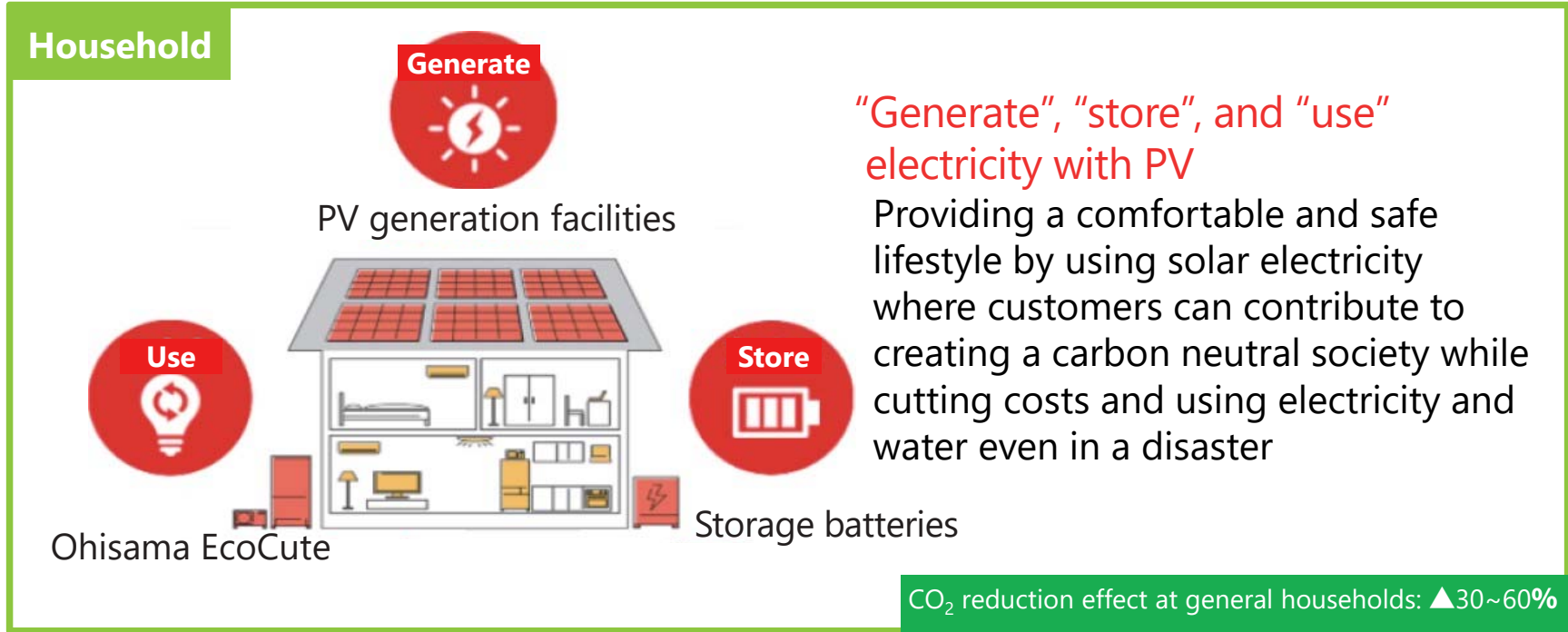
Upper line: Cumulative scale for 2020-2050
Lower line: Cumulative scale for 2020-2030

Reference materials

Action by demand side: Household

■ We are proposing a new lifestyle where customers "generate", "store", and "use" electricity through PV facilities, storage batteries and Ohisama EcoCute

New lifestyles proposed by TEPCO Energy Partners



(Basis of estimate)

- Comparison of our assumed average electricity and gas usage for a house with gas and our calculations for the following plans and usage patterns
 - ① Smart Life Plan (solar power + EcoCute)
 - ② Kurashi Jozu (solar power + Ohisama EcoCute + storage battery)
- CO₂ emission coefficient of electricity: 0.441kg-CO₂/kWh (FY2020 emission coefficient after adjustment of TEPCO EP)
- CO₂ emission coefficient of gas: 2.23t-CO₂/1,000m³ (Guideline for Calculating Greenhouse Gas Emission of the Ministry of the Environment)

■ We offer solutions combining “energy-saving”, “energy-creation” and “supply-demand coordination” as a sustainable partner to realize our customers carbon neutrality.

Carbon neutral solutions offered by TEPCO

① Energy-saving Shaping Up	<p>Consulting for the customer’s carbon neutralization through visualization and improvement</p> <ul style="list-style-type: none"> • Energy consulting service • Building/process electrification service 	② Energy-creation Energy Creation	<p>Support from planning to operation of customer-specific renewable energy installations</p> <ul style="list-style-type: none"> • Energy creation service • Self-delivery of renewable energy 	③ Supply-demand coordination Interaction	<p>Support for further CO2 reduction through a variety of electricity rate options and reduction of emission coefficient</p> <ul style="list-style-type: none"> • Environmental value option
---	---	--	---	---	--

We will offer solutions for the mid to long-term by combining ① ② ③ according to the carbon neutrality needs of our customers.

Industry

Conventional (centralized heat source system)

Electric system (individual steam-less heat source)

- Introduction of warm water HP
- Infrared heater
- Electric steam boiler

CO₂ reduction due to removal of steam pipes and dispersed arrangement of highly efficient electric heat sources (HP, etc.)

*Reduction effect from boiler system

Example CO₂ reduction effect from electrification of boilers at a factory: ▲70%

Business

On-site solar power installation

Renewable energy value

Installation of storage battery

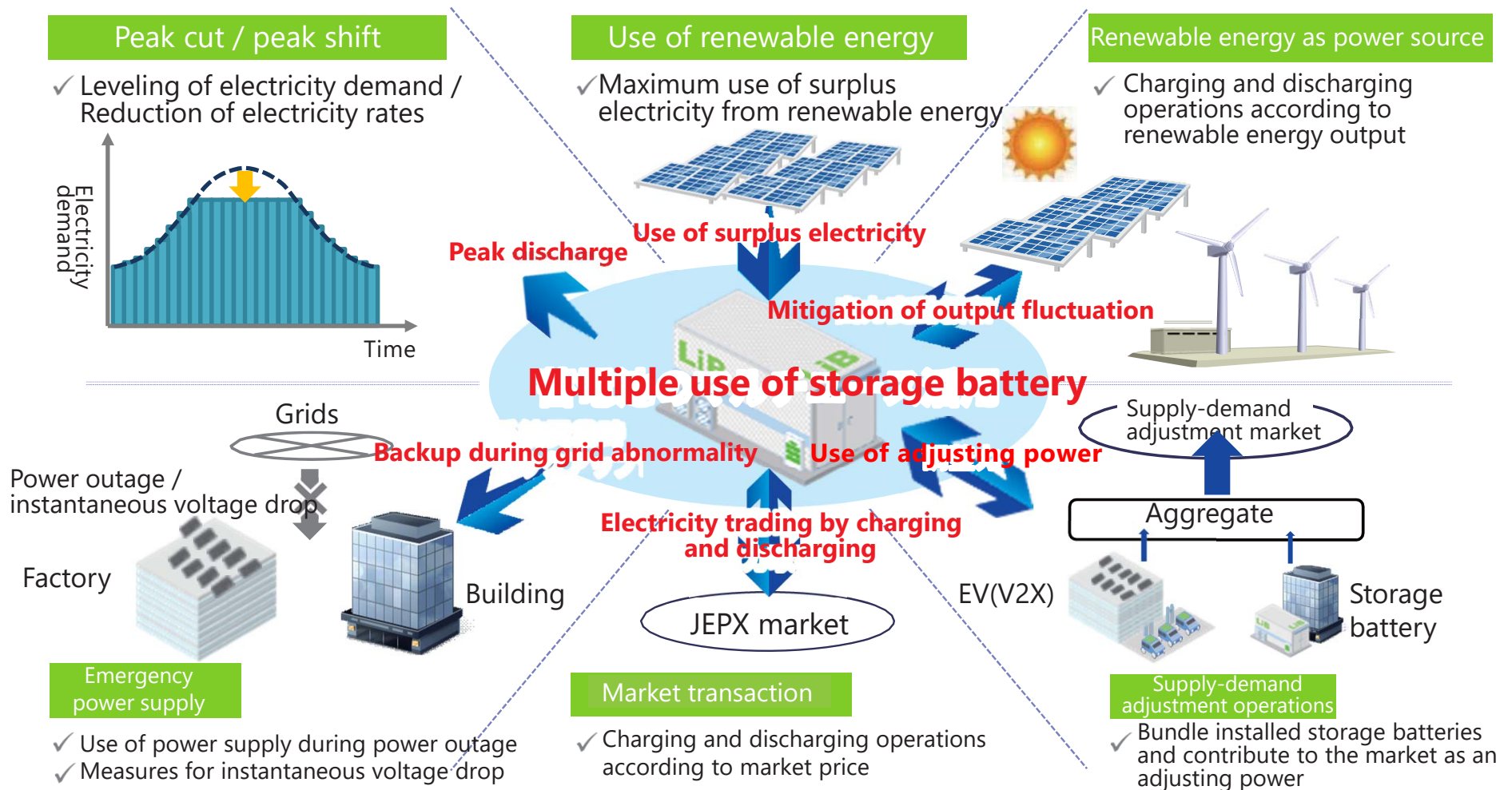
Effective utilization of solar power generation and disaster countermeasure functions

CO₂ reduction due to solar power generation and storage battery

Example CO₂ reduction effect at a commercial facility: ▲30%

Action by demand side: Storage battery

- **Social value of storage batteries will be enhanced and their introduction will be promoted** through multiple use of storage batteries for emergency power supply and supply-demand adjustment, thereby contributing to building a stable power system.
- In addition to the use of stationary storage batteries, energy services that use reused storage batteries for electric vehicles as key devices will be developed.



Action by demand side: Community development

■ **We will implement independent and dispersed energy systems that maximize the use of local renewable energy, in collaboration with local businesses and local governments**, and work to **enhance area value** by strengthening carbon neutrality and disaster prevention performance of the entire region.

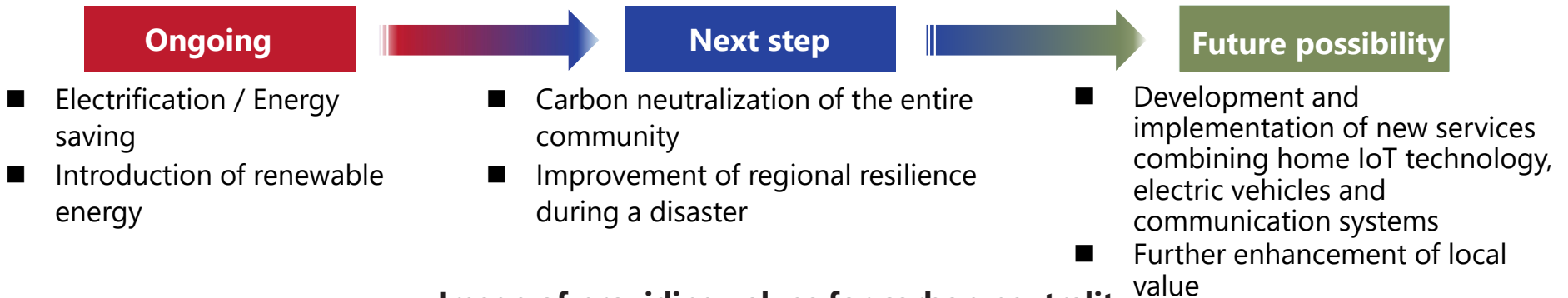
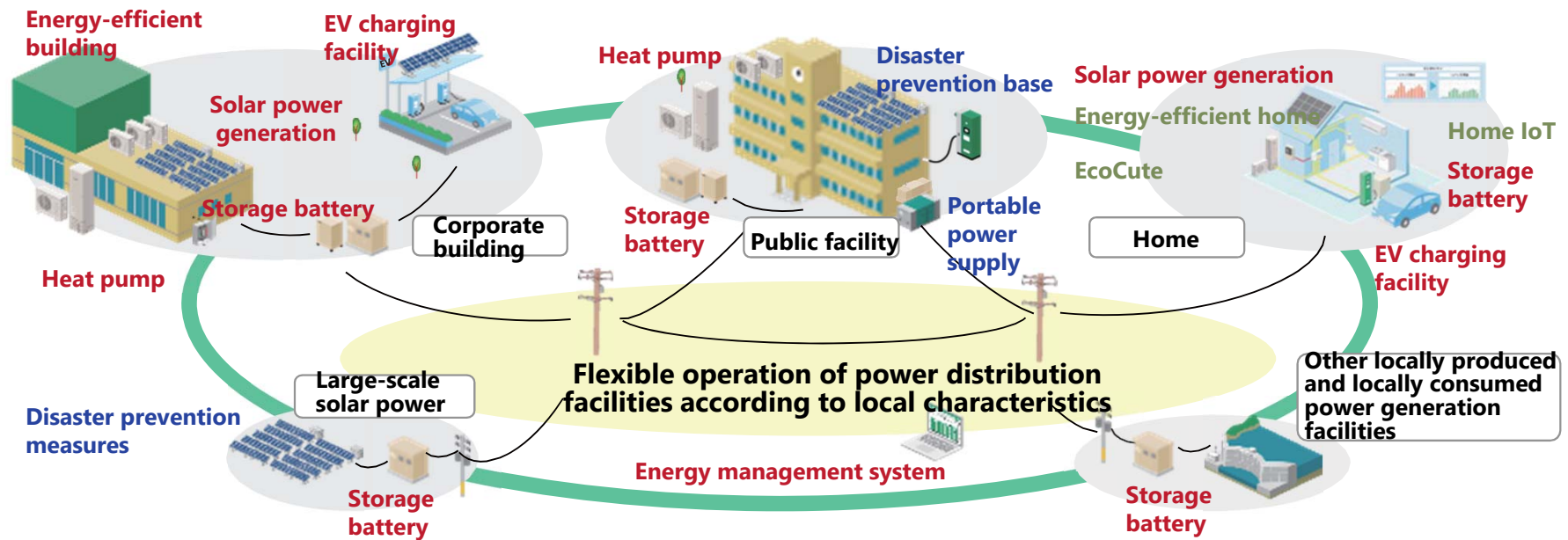


Image of providing values for carbon neutrality



“Next-generation community development” based on carbon neutrality and disaster prevention

Technological development

- We will develop necessary technologies for building a strong power system that combines conventional electricity business and locally produced and locally consumed system. In particular, we will focus on **developing technologies that produce new services** in order to flexibly use electricity in a smart way, in addition to generating and storing electricity, in light of the business model reform.

Supply

Offshore wind power



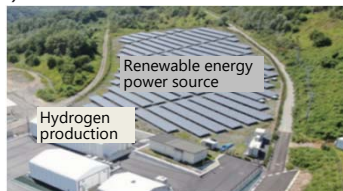
- Low-cost floating offshore wind power
- Practical application of versatile multi-terminal DC transmission system



Hydrogen / ammonia



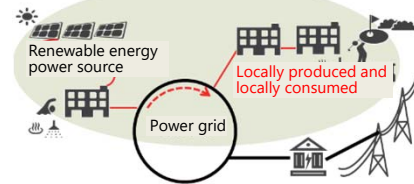
- Large-size and low-cost hydrogen production originating from renewable energy
- Advanced ammonia synthesis technology (JERA)



Grids

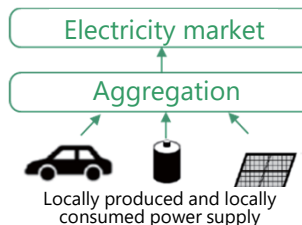
Independent and dispersed

- Development of energy management system
- Improvement of accuracy of power generation and demand forecasting



Adjusting power

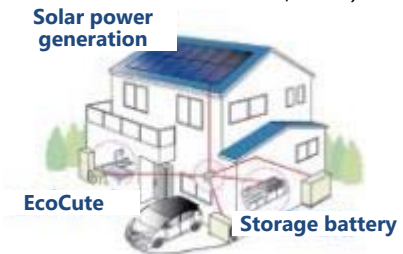
- Establishment of VPP and V2G technologies according to market needs
- Evaluation of inertial forces and establishment of countermeasure technology



Demand

Electrification + Added values

- Energy-saving measures
- Equipment development in view of UX service (multi-functional PCS, smart distribution board, etc.)



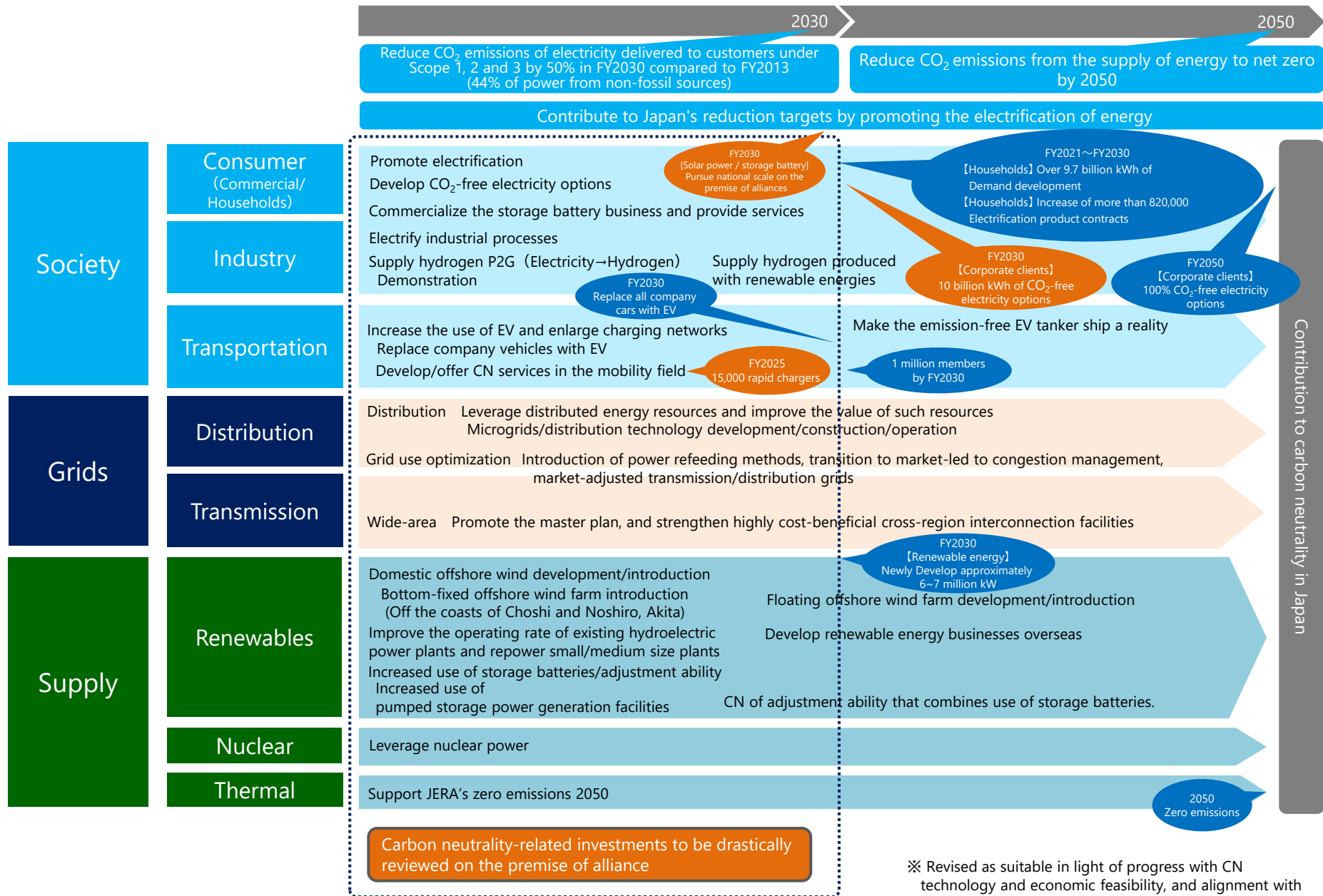
Power storage

- Development of multiple-use storage battery system
- Establishment of methods for evaluating safety and performance of the storage battery system



*GI Fund: Green Innovation Fund of the Ministry of Economy, Trade and Industry

(Reference) List of carbon neutrality initiatives <updated>



※ Revised as suitable in light of progress with CN technology and economic feasibility, and alignment with the government's energy/global warming policies

Term definitions

~~Aggregation~~

Business that controls demand and supply and provides energy services by integrating and controlling a diversity of dispersed energy resources such as small-scale solar power, electric vehicles (EV) and storage battery.

~~Environmental values~~

Mainly refers to the added value of "not emitting CO2". Purchases and trades are promoted through the form of "J-Credit", "Certificate of Green Power" and "Non-fossil Certificate".

~~Interregional interconnection line~~

Transmission line that mutually connects grids and facilities of different electricity supply areas.

~~Resilience~~

Word that means "recovering power" and "flexibility". Functions can be recovered as soon as possible when receiving damage from a disaster.

Term definitions

DR (Demand Response)

Controlling electricity on the demand side in order to balance supply and demand of electricity.

EMS (Energy Management System)

System that realizes optimum energy usage by grasping energy usage status of households, office buildings and factories through the use of information communication technology.

PCS (Power Conditioning System)

Device for converting direct current electricity generated by solar power into alternating current so that it can be used by household electrical appliances.

P2G (Power to Gas (hydrogen))

Technology to produce hydrogen through the electrolysis of water using surplus electricity from renewable energy.

Term definitions

UFR (Under-Frequency Relay)

Emergency measure to automatically cut off load (demand) from the power grid network when there is supply shortage due to emergency shutdown of the power station caused by an earthquake, in order to prevent supply-demand imbalance and large-scale power outage.

VPP (Virtual Power Plant)

Providing the same level of functions as a power station by using IoT technology to bundle and remotely integrate and control dispersed power supplies, such as solar power of factories and households, and DR functions.

V2G (Vehicle to Grid)

Supplying electricity stored in electric vehicles (EV) to the power grid, using electric vehicles as a "power source".

V2X (Vehicle to Everything)

Supplying electricity to various household appliances, buildings and grids from electric vehicles (EV). General term for V2L (Vehicle to Load), V2H (Vehicle to Home), V2B (Vehicle to Building), V2G (Vehicle to Grid).