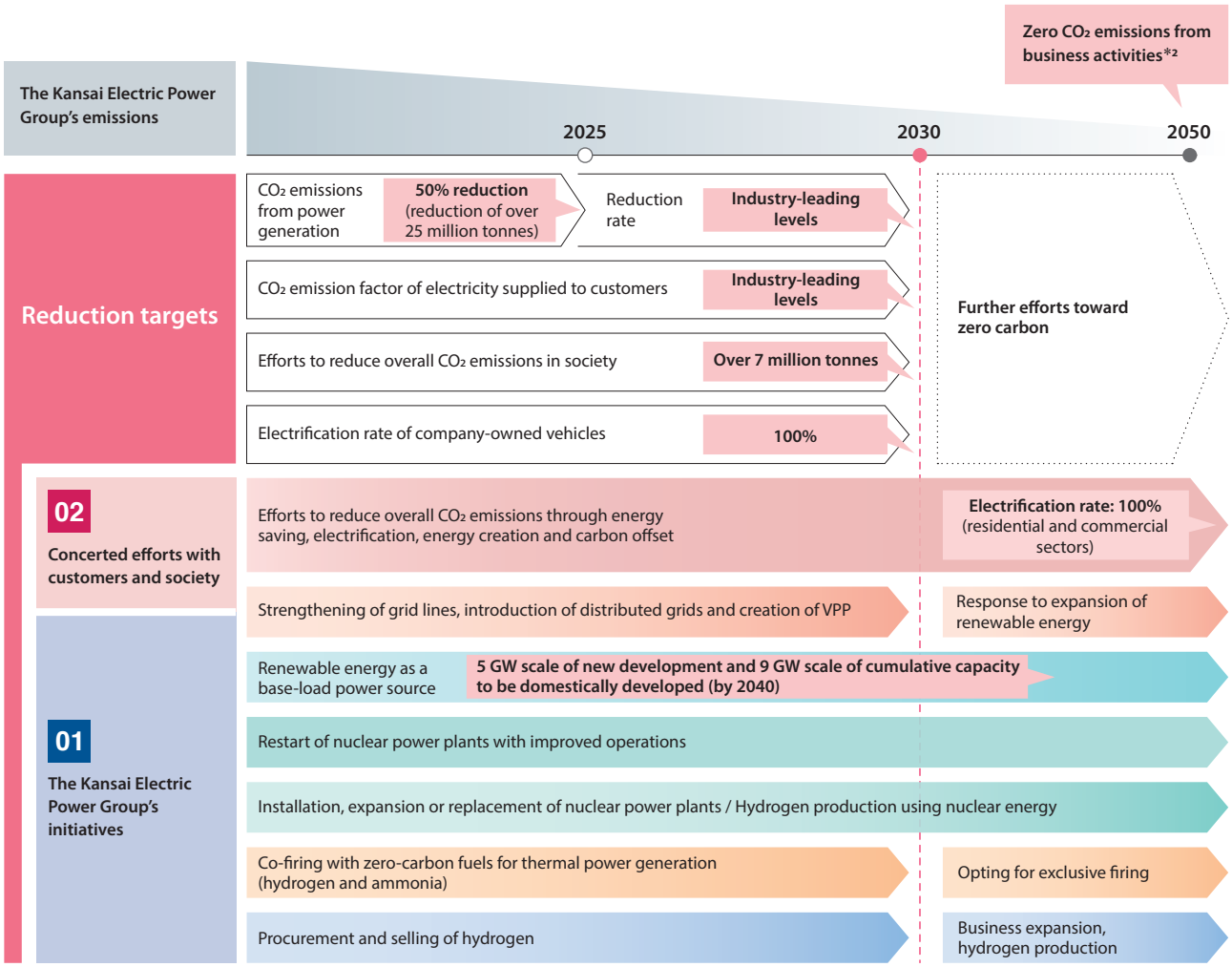
Zero Carbon Roadmap EX

Our Group is committed to helping society achieve zero carbon in addition to making its operations carbon-free. This involves cooperation with all stakeholders, including customers, business partners and municipalities. We, therefore, have developed the Zero Carbon Roadmap with our commitment represented in the slogan "Take action together toward zero carbon." We, as a leading company in zero-carbon energy, are committed to taking initiatives for realizing a decarbonized society by 2050.

Roadmap overview, and initiatives and reduction targets toward fiscal 2030

The Zero Carbon Roadmap sets the course toward Zero Carbon Vision 2050*1. Toward fiscal 2030, we will steadily reduce CO_2 emissions from the power generation by our Group.

Based on the above, we will help customers and society reduce CO_2 emissions. Accordingly, we will strengthen the resilience of power grid networks while modernizing them in the transmission and distribution business.

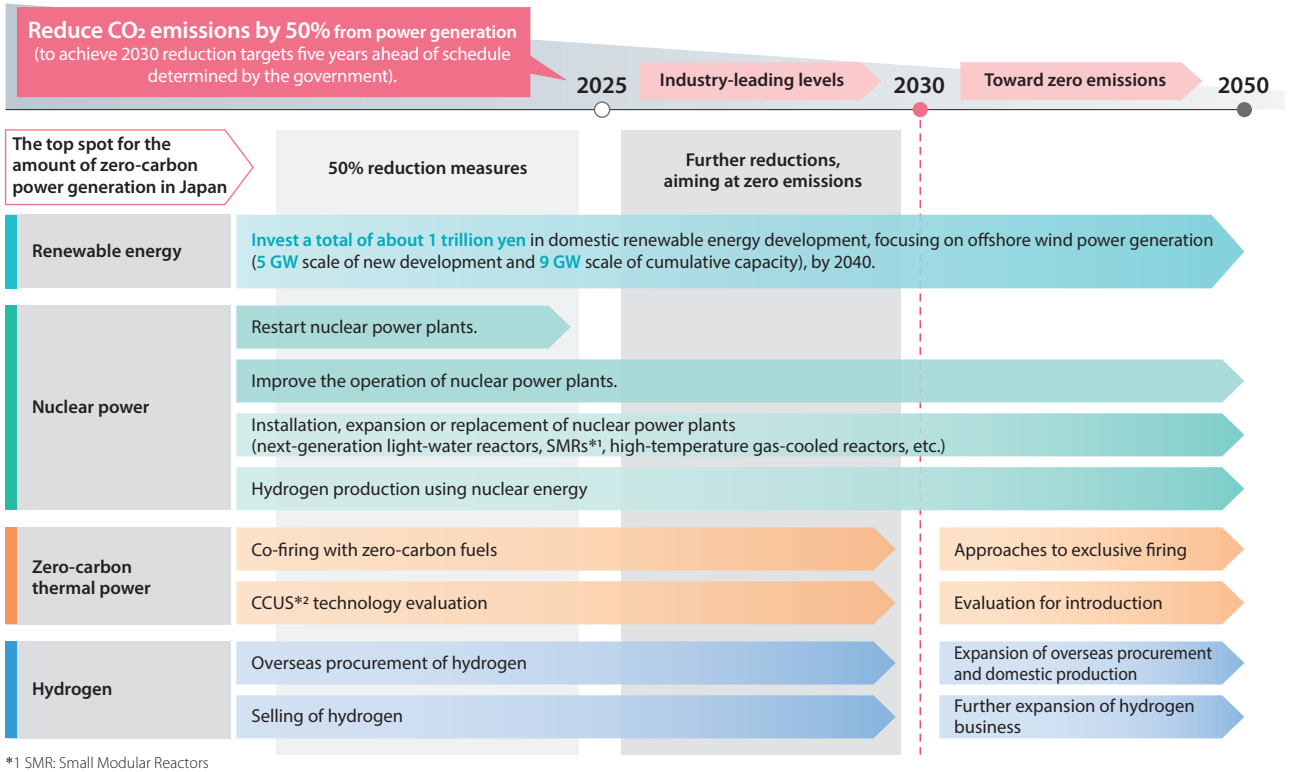


*1 The vision's three key approaches (on the demand, supply and hydrogen sides) are divided into two categories: concerted efforts with customers and society, and the Kansai Electric Power Group's initiatives (including on hydrogen).

*2 The roadmap will be revised in response to technological advancement and changes in policies and regulations to ultimately eliminate CO_2 emissions from business activities (including those of affiliates).

01 The Kansai Electric Power Group's initiatives

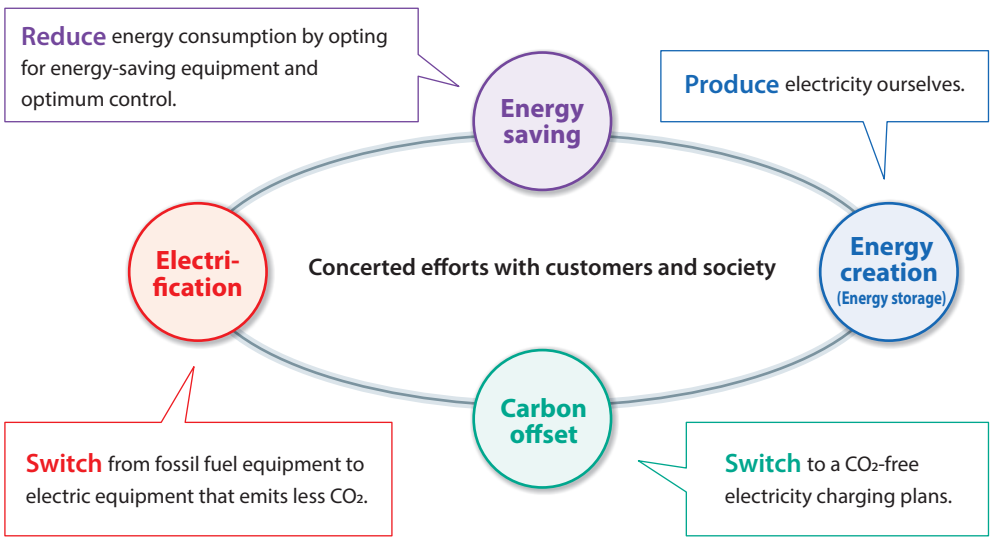
- Operate nuclear power plants in a safe, stable manner and reduce CO_2 emissions from power generation by 50% by fiscal 2025 (reduction of over 25 million tonnes).
- Achieve further reductions for fiscal 2030 with a focus on nuclear and renewable energy while maintaining industry-leading reduction levels.



*1 SMR: Small Modular Reactors
*2 CCUS: Carbon dioxide Capture, Utilization and Storage, where CO_2 is recovered from exhaust gases for utilization or storage underground.

02 Concerted efforts with customers and society

Our Group is committed to making concerted efforts with customers and society, focusing on energy saving, electrification, energy creation (energy storage) and carbon offset, for a reduction of over 7 million tonnes of CO_2 emissions by fiscal 2030.



Zero Carbon Roadmap*EX*

01 The Kansai Electric Power Group's initiatives

Renewable energy

- The Kansai Electric Power Group, as a leading company in zero-carbon energy, is committed to proactively developing renewable energy based on its improved development promotion system, focusing on offshore wind power generation, which has great development potential.
- Through investment of a total 1 trillion yen in domestic projects, we aim to develop 5 GW scale of new development and to achieve 9 GW scale of cumulative capacity by 2040.

Toward the goal

Accelerate development of renewable energy by leveraging our technological prowess in power generation, as well as knowledge and know-how originating from domestic and overseas offshore wind power projects, while enhancing cooperation with other companies.

New development **5 GW scale**

Cumulative capacity **9 GW scale**

to be domestically developed by 2040

Accelerate development toward 2050

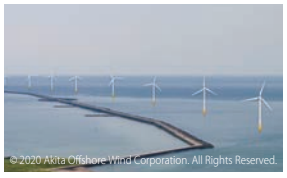
Development efforts made so far

We have developed and own one of the largest domestic hydropower plants and are developing various renewable energy resources
(leveraging expertise gained from overseas projects to develop and promote domestic projects).

Domestic

*Completed project rendering

Biomass:
Kanda Biomass Power Plant



Offshore wind:
Port of Akita and Port of Noshiro Project*
(Source: Akita Offshore Wind Corporation)

Overseas

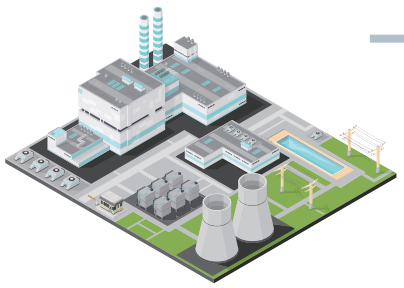
Offshore wind: Triton Knoll Project

Hydropower: Nam Ngiep 1 Project

Nuclear power

- Giving top priority to safety, the Kansai Electric Power Group will leverage nuclear energy as much as possible.
- Efforts are underway to improve the operation of nuclear power plants and develop and promote next-generation options such as light-water reactors, with replacement in mind, while extracting the full potential of nuclear power for hydrogen production.

Extracting the full potential of nuclear power



Approach **1**

Improving the operation of nuclear power plants

- Referencing measures at nuclear power plants overseas, discuss our initiatives to improve the operation rate (flexible operation period, optimization of the timing, period of inspections, and more).

Approach **2**

Installation, expansion and replacement

- Work with plant manufacturers to design next-generation light-water reactors that outperform existing reactors in safety and cost efficiency.
- Gather knowledge on next-generation reactors being developed at home and abroad (such as SMRs and high-temperature gas-cooled reactors with great potential) to study technical feasibility.

Approach **3**

Hydrogen production using nuclear energy

- Extract the full potential of nuclear energy, which constantly produces a massive amount of zero-carbon electricity, to use the electricity and heat it produces for hydrogen production in the future.

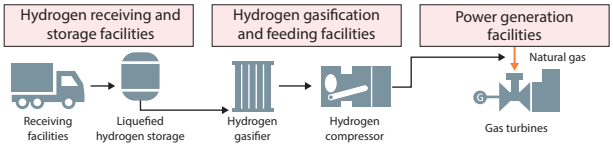
Zero-carbon thermal power

- As for LNG thermal power generation, we will study co-firing with zero-carbon fuels for realization in around 2030 by modifying and replacing existing plants, targeting exclusive firing by 2050.
- As for coal-fired thermal power generation, we will study co-firing with zero-carbon fuels for realization in around 2030, and proceed to evaluate CCUS technology for future introduction.

Demonstration of power generation by co-firing and exclusive firing of hydrogen at our existing thermal power plant

Using our existing thermal power plant (gas turbine power generation facilities), we will establish operational techniques for hydrogen power generation (including operation, maintenance and safety measures) to realize power generation by co-firing and exclusive firing of hydrogen (adopted by NEDO's Green Innovation Fund Project).

Process flow from receipt of hydrogen to co-firing and exclusive firing



Schedule and implementation flow

Fiscal 2022	Fiscal 2023–2024	Fiscal 2025–2026
Feasibility study	**Design and manufacture**	**Demonstration**

Contribution to realizing CCUS

Cooperation in the demonstration project of CO_2 Capture System using solid sorbents*1

- An agreement was signed with Kawasaki Heavy Industries, Ltd. to manage a part of construction work for demonstration plant of CO_2 capture system with low energy consumption which is under construction at Maizuru Power Station as part of the NEDO project.
- The commissioning run will start in fiscal 2022, to be followed by demonstration from fiscal 2023.

*1 "Applied research on coal combustion waste gas and advanced carbon dioxide solid absorption materials"

Cooperation in the technology development and demonstration of ship transportation of liquefied CO_2*2

- An agreement was signed with Japan CCS Co., Ltd. to assist construction of a liquefied CO_2 shipping base which will be constructed at Maizuru Power Station as part of the NEDO project.

*2 "CCUS research and development/demonstration project / Large-scale CCS demonstration project in Tomakomai / Demonstration test related to CO_2 transport"

Perspective drawing of demonstration plant

Hydrogen

- In terms of procurement of zero-carbon fuels, we are making efforts to prepare for establishment of fuel hydrogen supply chain including participation in feasibility studies and demonstration projects extensively.
- We plan to begin procurement of hydrogen from overseas mainly for demonstration projects around 2025 in a gradual manner. With regard to the large-scale and commercial procurement of cost competitive hydrogen, we are targeting the year of 2030.
- We will provide the above-mentioned hydrogen to the thermal power plants with zero carbon target and make efforts to produce hydrogen as well as start selling our procured hydrogen to our transport and industrial customers step by step around 2025 and aim for expanding our hydrogen business in and after 2030.

Hydrogen supply chain

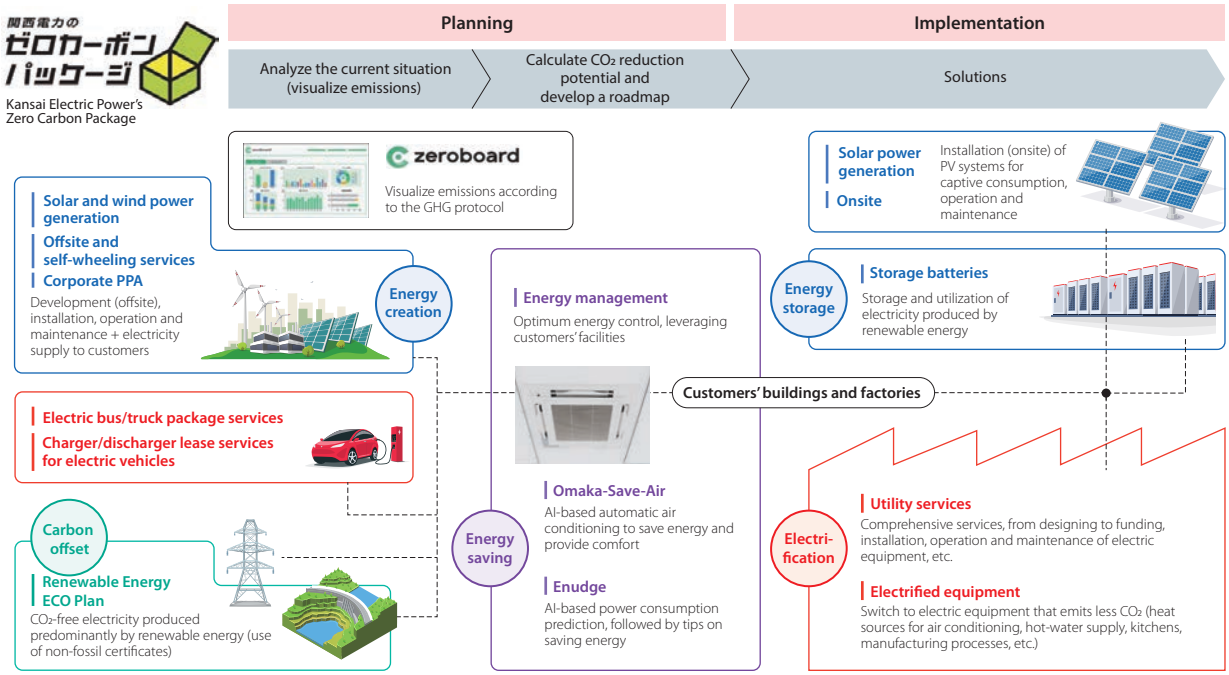
Production	Storage and transportation	Utilization
Overseas procurement We will begin hydrogen import around 2025 and will increase imported hydrogen around 2030.	**Receiving and supply base** Conduct research and feasibility studies to start and expand operation of base infrastructure for fuel hydrogen utilization targeting around 2030.	**Our thermal power plants** Aim for realization in co-firing with zero-carbon fuels in around 2030 and exclusive firing by 2050.
Domestic production Aim for commercial production by renewables in and after 2030. Make steady efforts to produce hydrogen using nuclear power.		**Selling** Phased selling will begin around 2025 aiming for business expansion around 2030.

Target 30% share of nationwide market in 2050

02 Concerted efforts with customers and society

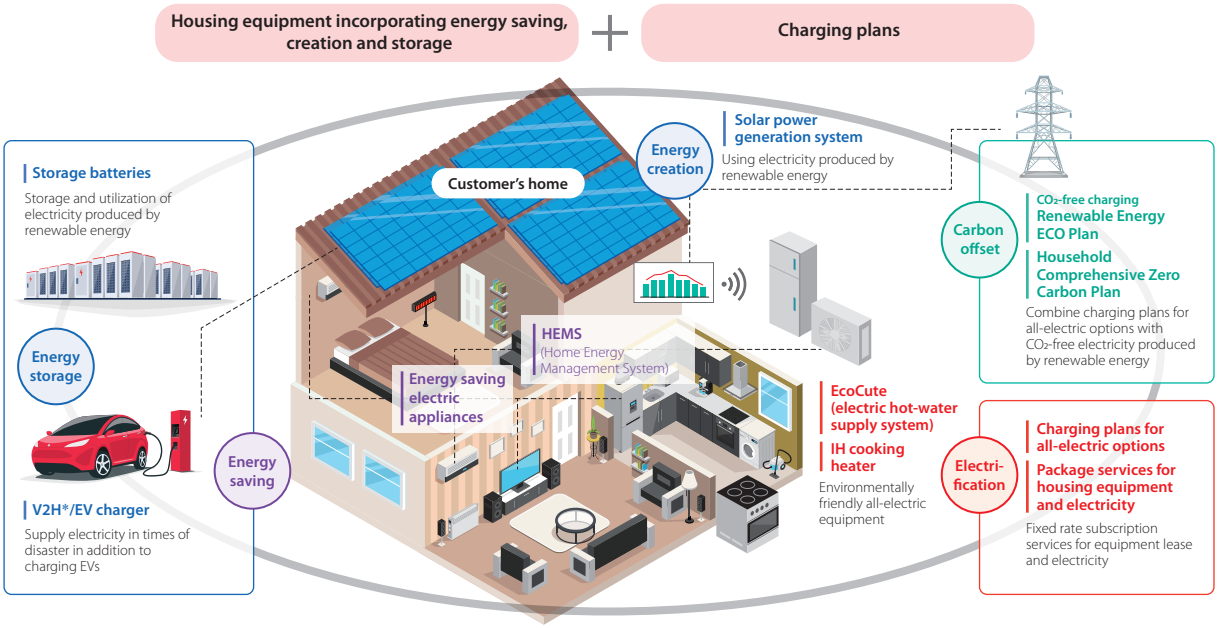
Commercial and industrial sectors

- We offer a variety of services from planning to implementation of zero carbon measures (Zero Carbon Package), with solutions customized according to customers' needs, to jointly reduce overall CO_2 emissions from the commercial and industrial sectors.



Residential sector

- With focus on electrification through promotion of charging plans for housing equipment incorporating energy saving, creation and storage and for all-electric homes, we offer solutions such as flat-rate package options for housing equipment and electric bills, and the Household Comprehensive Zero Carbon Plan, which combines CO_2-free electricity charging plans.
- Accordingly, we cooperate with customers in reducing CO_2 emissions from the residential sector.



*V2H: Vehicle to Home, where the electricity stored is used to power housing equipment in addition to charging EVs.

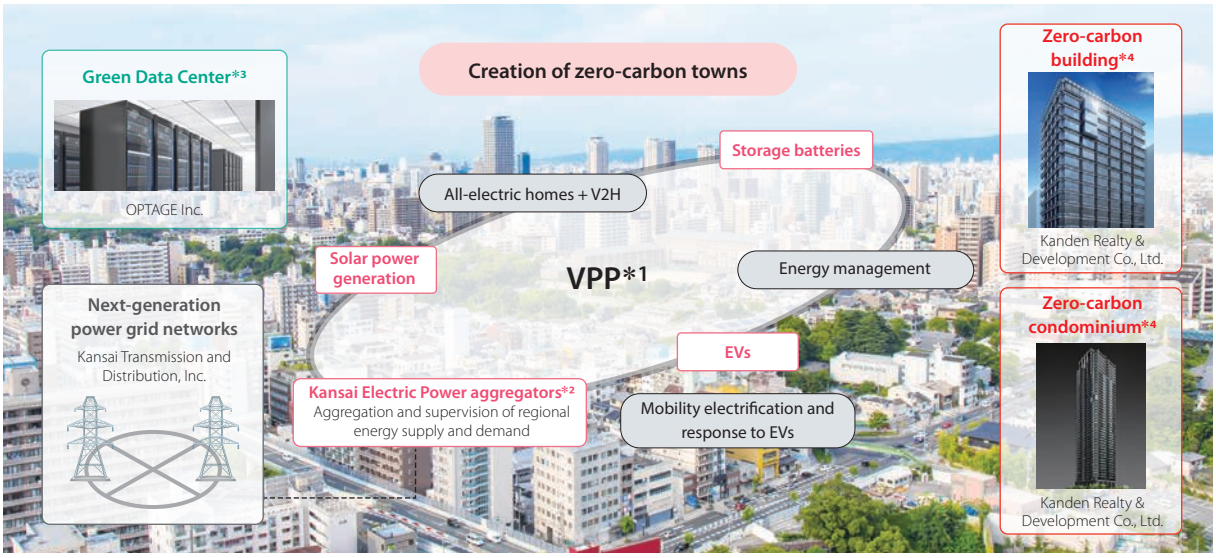
Transportation sector

- We offer one-package services (charging services coupled with EV introduction, energy management, etc.) to jointly reduce overall CO_2 emissions from the transportation sector.
- We help introduce electric vessels and flying vehicles to electrify land, sea and air mobility, thereby contributing to achieving a zero-carbon society.

*1 Versatile, eco-friendly land/air/sea mobility provides seamless and comfortable transportation inside and outside the Expo venues. *2 BCP: Business Continuity Planning

Community sector

- Taking into account various community challenges (regional economic revitalization, resilience improvements, etc.), we cooperate with stakeholders such as municipalities and developers and provide wide-ranging services incorporating the Group's various solutions and new technologies, thereby contributing to achieving a zero-carbon society.



*1 VPP (Virtual Power Plant): A system to integrate and control distributed energy sources for electricity supply/demand management, designed to simulate the function of a power plant.
*2 Aggregators: Business operators who aggregate power demand from single or multiple customers to create VPPs.
*3 Green data center: An energy-efficient, eco-friendly data center that uses renewable energy and incorporates high-efficiency equipment and air-conditioning systems.
*4 Zero-carbon buildings and condominiums: Energy-efficient, all-electric buildings and condominiums (ZEB oriented/ZEH-M oriented or greater) powered by decarbonized energy sources to achieve zero carbon.