JR East Group Energy Vision 2027

Connect

Energy Connects the Future

Community Energy 3E+C

2050
net-zero CO_2 emissions

0

JR-EAST GROUP

President's Message

We will continue to put ESG management into practice by improving the energy “3E’s” (Environment, Economic efficiency, and Energy security) in all phases of “Create” “Deliver & Store” and “Use”, and by linking them to C (Community development).

This year we reach the great milestone of 150 years since the start of Japan Railways' operations and 35 years since the establishment of the JR East Group. Thanks to the wisdom and efforts of our predecessors, railways have now become an important social infrastructure that is indispensable to people's lives. On the other hand, the business environment has been changing rapidly in recent years, including lifestyle changes due to the impact of COVID-19, and we need to increase the level and speed of our efforts to realize “Move Up” 2027.

Energy is a key element in the practice of ESG-oriented management, which is the main initiative of “Move Up” 2027. The acceleration of global decarbonization is inescapable as climate change continues, and the environment surrounding energy is changing dramatically both domestically and internationally, including rising fuel prices, tight power supply and demand, and energy security issues. Under such circumstances, it is necessary to improve the “3E’s” (Environment, Economic efficiency, and Energy security) by taking advantage of the JR East Group's integrated energy network of “Create” “Deliver & Store” and “Use”.

Furthermore, we must link this initiative to the sustainable development of the Community.
To realize a sustainable society and the sustainable growth of the JR East Group, we formulated our future energy strategy as “Energy Vision 2027 – Connect”.

Although railways are by nature an environment-friendly mode of transportation, they also consume a large amount of energy in trains, stations, and life-style services (station buildings and hotels). The mission of the JR East Group is to continue to be “the transportation system of choice,” to create “enriched lifestyles” by providing people-focused services, and to lead the way in realizing a sustainable society through ESG management initiatives.
In E (Environment), we are working on the “Zero Carbon Challenge 2050” to achieve net-zero CO_2 emissions in the JR East Group by fiscal 2051. Along with the introduction of new technologies, it is especially important to promote energy conservation. We will make steady and sure efforts to achieve great results.
In S (Society), we will provide new value that anticipates changes in the global environment by incorporating advanced energy technologies into urban development and various services to realize a hydrogen society.
G (Governance) is extremely important to promote these initiatives. Ensuring compliance and safety will lead to a stable supply of electric power, which is the foundation of customer service.

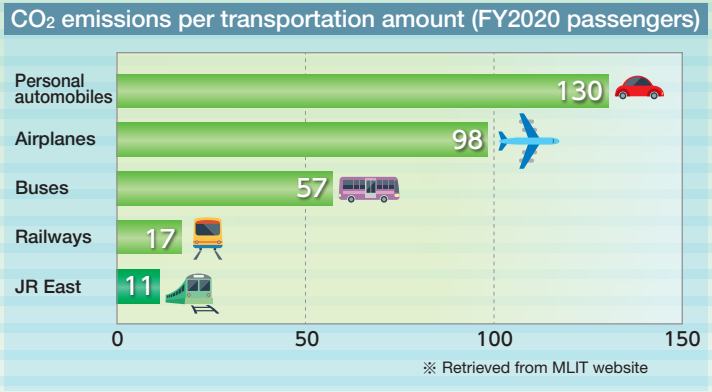
With our enthusiasm to lead and transform society, we will create a new future by promoting innovation and working together as the JR East Group to advance the “Zero Carbon Challenge 2050” and “3E+C” initiatives.

July 2022
Yuji Fukasawa
President and CEO

Our Goals

Realization of Sustainable Society

In the transportation sector, railways are a high environmental advantage mode of transportation with relatively low CO_2 emissions per transportation volume. In order for Japan to achieve a decarbonized society, promotion of public transportation is necessary. We will continue to appeal the environmental advantage of the railway, and will improve it by practicing ESG management as part of JR East Group effort in “Move Up 2027”. We strongly believe that such actions will contribute to Japan’s vision to realize a sustainable society.

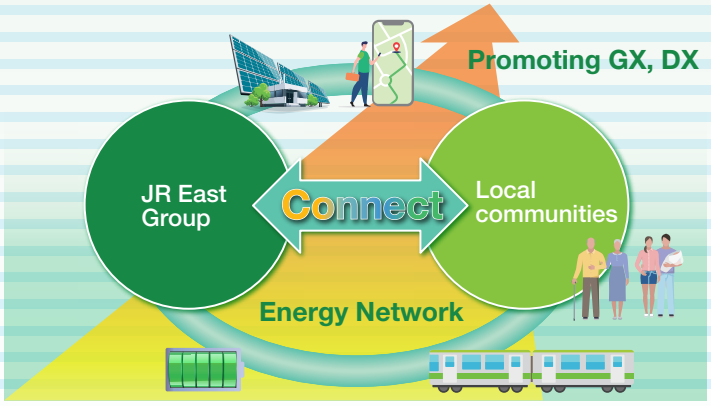


SUSTAINABLE DEVELOPMENT GOALS

Realizing a carbon-free Society	Sustainable development of regional society
Hydrogen Society Eco-led Urban Planning	Making cities more comfortable Making regional areas more affluent

Contribution to Regional Society

The JR East Group has been striving with local communities to develop environment-friendly power plants and cities that centered on stations which play an important role as a public transportation node and a community hub. Since our business is essential and deeply involved in our customers' daily lives, it is important that we work together and collaborate with local communities to achieve a decarbonized society.
By connecting our businesses and know-how along with our energy network to the regions, we will contribute to the achievement of sustainable development and decarbonization of the region.



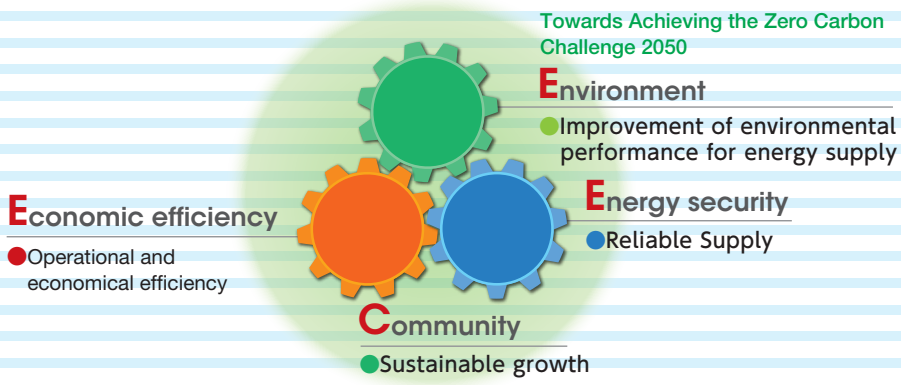
GX(Green Transformation):The aim is to transform the economy and society by switching to renewable energy and other energy and fuels that do not emit CO_2.
DX(Digital Transformation):Using data and digital technologies to transform business models.

It is the JR East Group's mission to save the planet, realize a sustainable society to achieve affluent lives for everyone and contribute to the development of regional society.

Aiming towards the “3E+C” Goals

Energy is an important factor towards realizing a sustainable society and contributing to the community and society. However, the acceleration of global decarbonization is inescapable as climate change continues, and the environment surrounding energy is changing dramatically both domestically and internationally, including rising fuel prices, tight power supply and demand, and energy security issues.

To adapt to such dynamic changes, it is important for the JR East Group to set a clear goal in our energy vision to capitalize on the strength of our one-stop energy network, “Create”, “Deliver & Store” and “Use” to improve the 3 “E” s, “Environment ”, “Economic efficiency” and “Energy security” and contribute to sustainable development of the Community.



Create

Taking on the challenge of decarbonization with the development of Hydrogen generation and renewable energy supply

Decarbonizing upstream of the energy network is necessary to achieve the “Zero Carbon Challenge 2050”. Large scale investment will be necessary to achieve the goal, and we must face the difficulties and rise to these challenges to achieve the ambitious goal towards sustainable society.

Deliver & Store

Aiming for efficient use of energy through improving maintenance quality and R&D

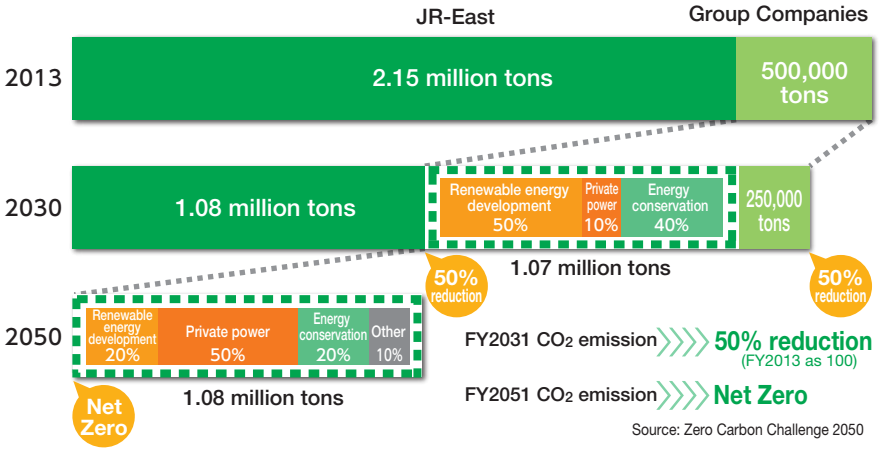
To make efficient use of energy, it must be stably and efficiently sent and stored throughout the entire energy network. The value of our energy network will be enhanced by improvement of our maintenance quality and steady promotion of R&D.

Use

Ensuring energy-saving and diversifying energy consumption towards decarbonization

To achieve a decarbonized society, it is essential to reduce the energy consumption by 1% on a year-to-year basis. To achieve this target we must actively incorporate new technologies and ideas and each individual of the Group must continuously put effort into energy-saving activities. Ultimately, such activities may be able to create new business models which could provide new value to our customers and the local communities.

CO_2 emissions reduction target



Source: Zero Carbon Challenge 2050

Energy Consumption Reduction Target

Energy Consumption in Railway Business Activities	40% reduction (FY2013 as 100)
Electricity consumption for train operation Energy consumption at branch offices, etc.	1% annual reduction (FY2020 as 100)
Reduction rate of energy consumption intensity of each JR East subsidiary	1% annual reduction (5-year average)

Target for FY2031

Other targets for reducing energy consumption by FY2031

Switching platform and concourse lighting to LEDs	Total of 415,000 units
Improving efficiency of large-scale air-conditioning systems	Total of 38 locations
Improving efficiency of small-scale air-conditioning systems	3,300 units
Developing renewable energy-based power sources	700MW

Source: JR East Group Report 2021

The Kawasaki Thermal Power Plant and the Shinanogawa Hydroelectric Power Plant, which are self-owned power plants, support the business of the JR East Group as a stable power source. We are also actively working to introduce renewable energy sources such as solar and wind power. We will continue to harmonize with nature and work with local communities to create environment-friendly power plants.

Rising to the challenge of decarbonization with the development of Hydrogen power generation and renewable energy supply

- To achieve the goals of the "Zero Carbon Challenge 2050" decarbonization of power sources will be necessary. Therefore, large investments will be required to introduce new technologies and to survive in the fierce competition in the development of renewable energy.
- The JR East Group will work with the national government, local governments, and other companies to decarbonize the Kawasaki Thermal Power Plant, ensure the maintenance and renewal of the Shinanogawa Hydroelectric Power Plant, and develop renewable energy.

Shinanogawa Hydroelectric Power Plant, advancing with the local community

Efforts in the “Create” phase

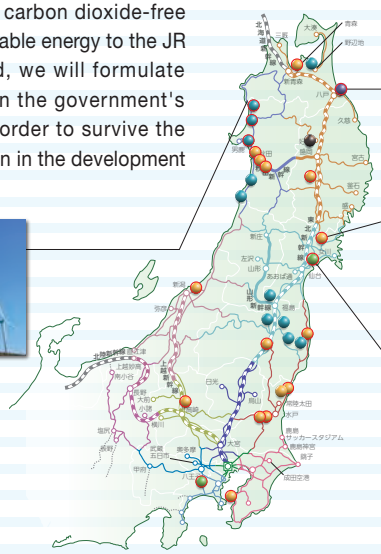
- We aim to achieve the goals of the "Zero Carbon Challenge 2050" by utilizing the power plants owned by the JR East Group.
- We aim to improve operational efficiency by promoting Smart Project Management in the power plant renewal project.

Expansion of renewable energy (solar, wind, geothermal, etc.)

Promoting the development of renewable energy sources

In order to achieve zero carbon in the Tohoku area by FY2031, we aim to develop a cumulative total of 700,000 kW and 1,000,000 kW by FY2051. Therefore, we will apply the carbon dioxide-free environmental value of renewable energy to the JR East Group. Going forward, we will formulate optimal strategies based on the government's power purchase system in order to survive the increasingly fierce competition in the development of renewable energy.

Akita Prefecture Mitane Wind Farm



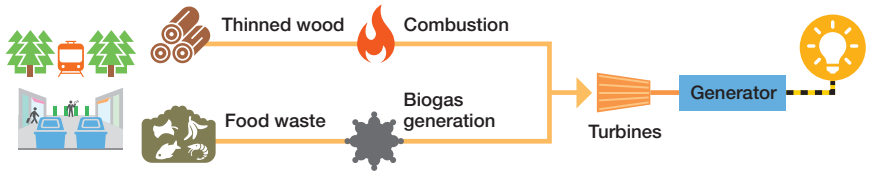
- In operation
- Wind power
- Solar power
- Geothermal power
- Wood biomass power
- Biogas power

Aomori Prefecture Hachinohe Biomass Power Plant

Miyagi Prefecture Osaki Sanbongi solar power plant

Miyagi Prefecture Tohoku Bio Food Recycle Sendai Plant

Biomass and Biogas power generation



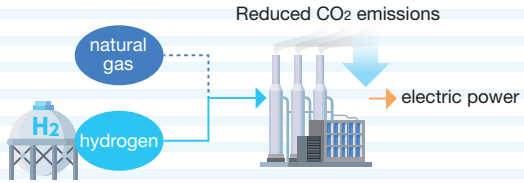
Biomass power generation and biogas power generation have similar names, but the power generation method is different. We reuse railway forests along the railway line and food waste discharged from stations.

Decarbonization of the Kawasaki Thermal Power Plant

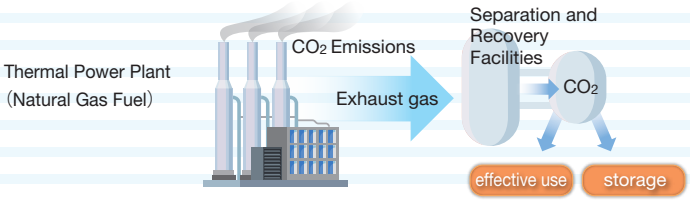
Decarbonization through hydrogen power generation and CCUS technology

- We will promote consideration toward power generation using hydrogen

Kawasaki Thermal Power Plant



- We will study CCUS* technology to effectively utilize the carbon dioxide emitted from the Kawasaki Thermal power plant



* CCUS (Carbon dioxide Capture, Utilization and Storage) : Technologies for separating, collecting, storing, and effectively utilizing carbon dioxide emitted from thermal power plants and factories.

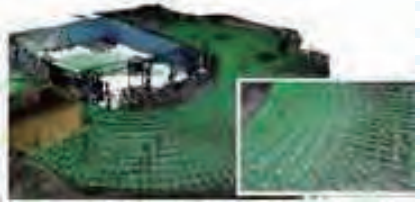
Utilization(CO_2)

Example of utilization in a vegetable garden

Promotion of smart project management

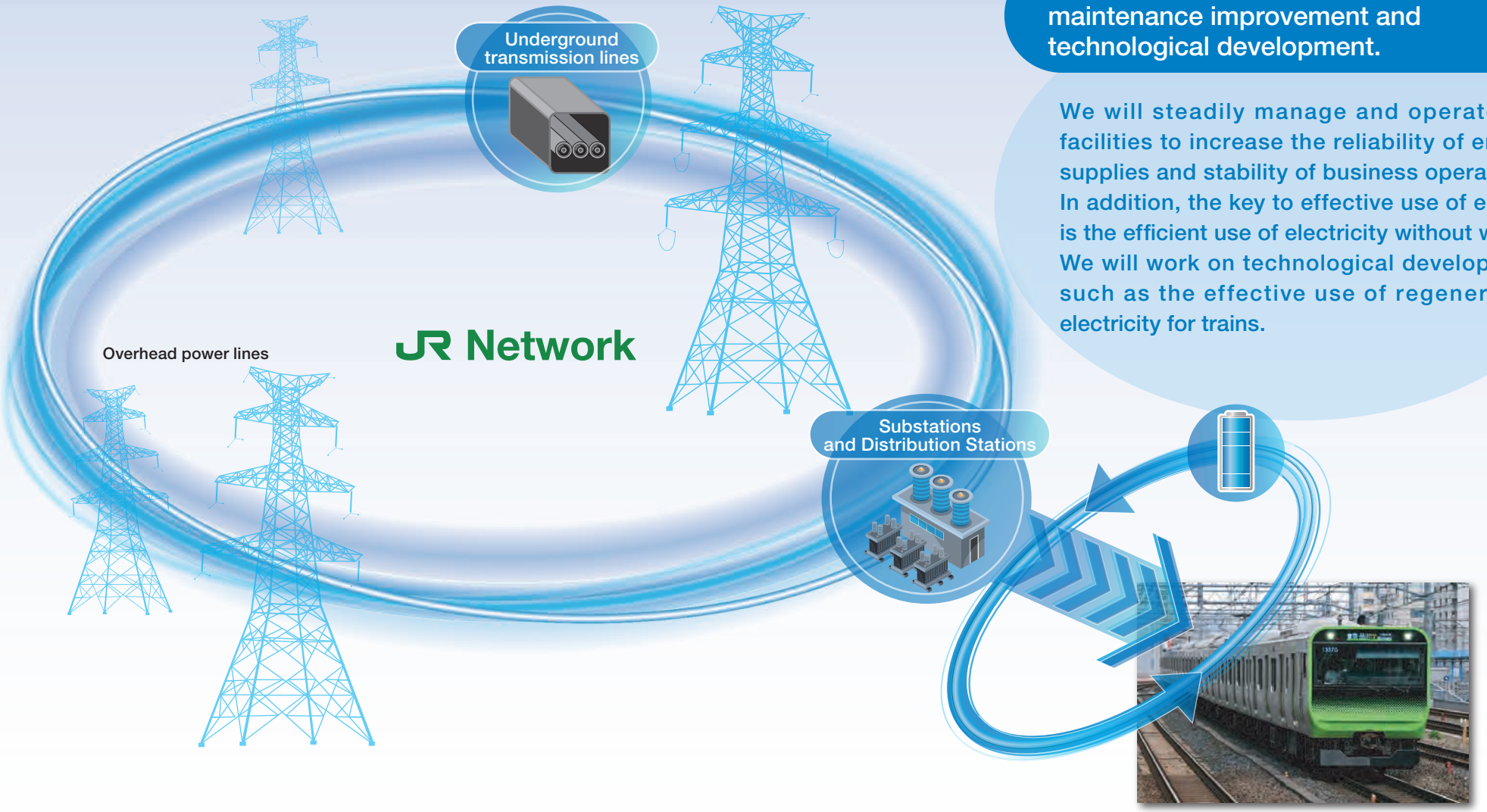
Improving operational efficiency using digital technology in construction work

In the Shinanogawa Hydroelectric Power Plant renewal project, we will realize operational efficiency by utilizing digital technology such as point cloud data acquisition by small drones.



Acquisition of point cloud data at Shinanogawa Hydroelectric Power Plant

The JR East Group owns an energy network consisting of long transmission lines and numerous substations to supply energy to trains and stations.



We aim to effectively use energy through maintenance improvement and technological development.

We will steadily manage and operate our facilities to increase the reliability of energy supplies and stability of business operations. In addition, the key to effective use of energy is the efficient use of electricity without waste. We will work on technological development such as the effective use of regenerative electricity for trains.

Efforts in the “Deliver & Store” phase

- We will promote the use of drones for power transmission equipment maintenance and realize a highly reliable energy supply.
- Further energy savings will be achieved through effective use of regenerative power.
- We aim to decarbonize by promoting the use of hydrogen derived from renewable energy.

Improvement of inspection quality for power transmission equipment maintenance

Introduction of drones for inspection of overhead power transmission equipment inspections

Expanding

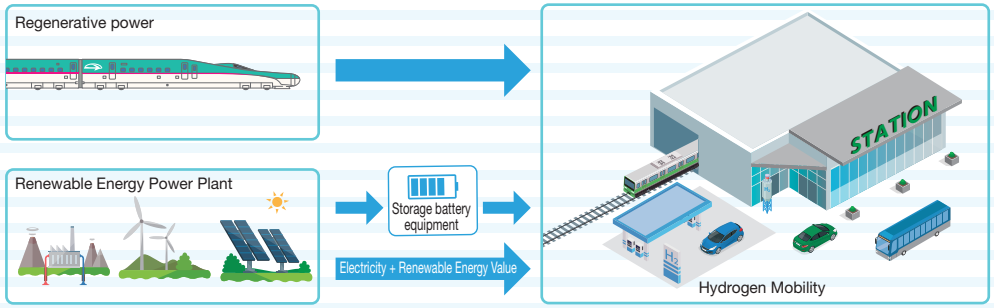
The quality of maintenance is improved by using drones that eliminate the need for workers to go up and down the steel tower and can take pictures of equipment from various angles with an onboard camera.

Utilization of hydrogen using renewable energy

Supplying clean hydrogen derived from renewable electricity to vehicles and stations

Under consideration

We will consider supplying hydrogen-fueled railway cars and hydrogen stations with clean hydrogen using renewable energy and regenerative power from the Shinkansen.

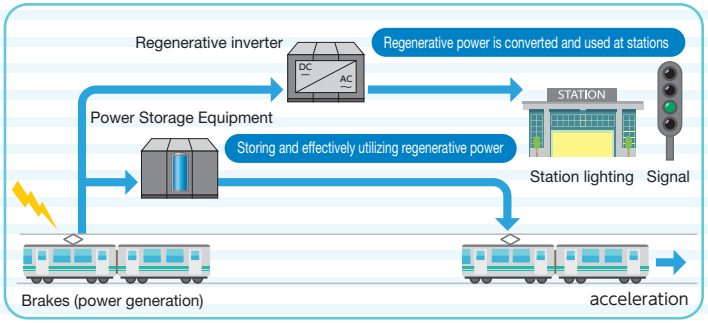


Effective use of effective regenerative power

Promoting the introduction of effective regenerative power effective utilization equipment

Expanding

We aim to improve the utilization rate of regenerative power* by introducing power storage devices that temporarily charge and supply unused regenerative power to accelerating vehicles, and regenerative inverter devices that supply power to stations and other facilities.



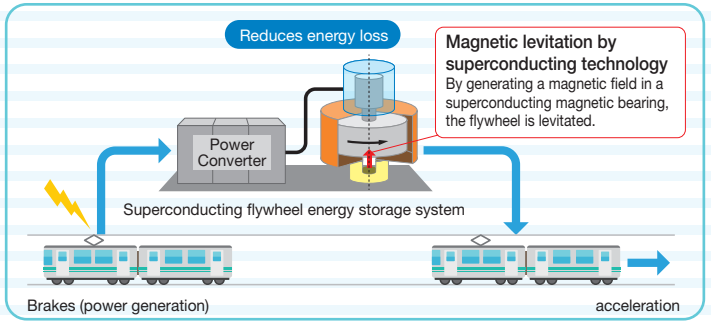
*Regenerative power: Power generated by using the energy that keeps the wheels spinning in a decelerating train.

Application of superconductivity technology

Development of superconducting flywheel energy storage system

In development

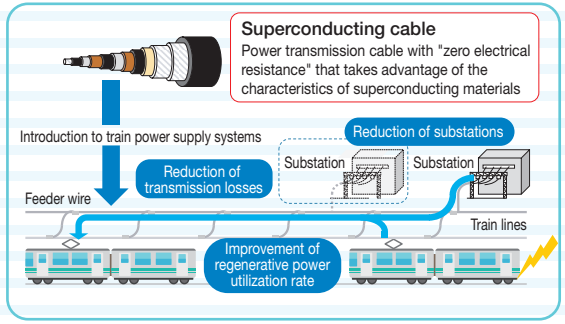
We will conduct demonstration tests, aiming for practical use, of a system that stores regenerative power as kinetic energy (charging) by rotating a large disk (flywheel) and converts kinetic energy to electrical power (discharging) when necessary.



Considering the introduction of superconducting cables

Under consideration

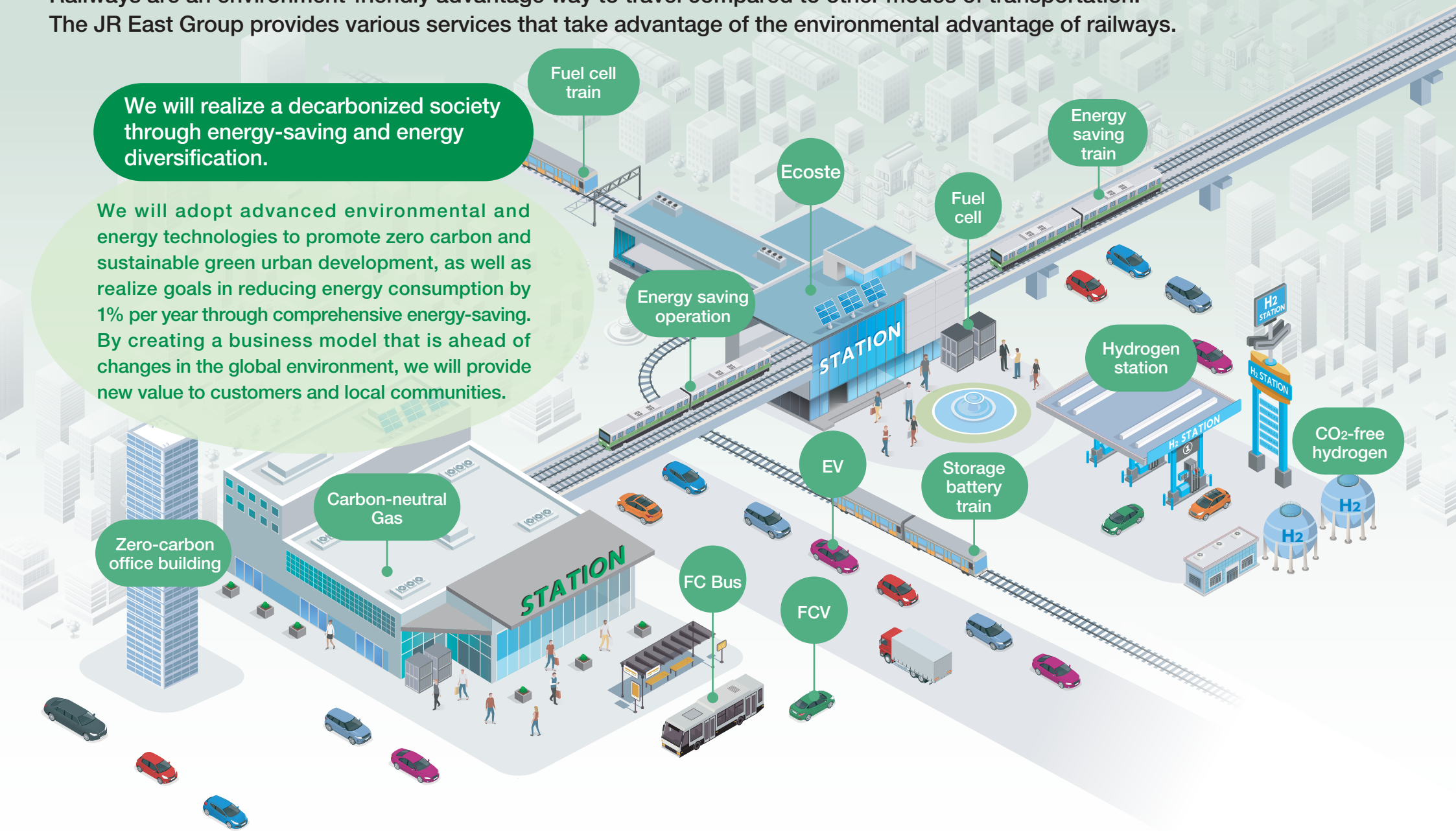
By introducing superconducting cables with zero electrical resistance, we will consider reducing transmission losses to trains, improving the utilization rate of regenerative power, and reducing substations.



Railways are an environment-friendly advantage way to travel compared to other modes of transportation.
The JR East Group provides various services that take advantage of the environmental advantage of railways.

We will realize a decarbonized society through energy-saving and energy diversification.

We will adopt advanced environmental and energy technologies to promote zero carbon and sustainable green urban development, as well as realize goals in reducing energy consumption by 1% per year through comprehensive energy-saving. By creating a business model that is ahead of changes in the global environment, we will provide new value to customers and local communities.



Efforts in the “Use” phase

We will introduce the latest technology and accelerate the improvement of environmental performance and energy-saving in rolling stock operation.

Improving environmental performance in rolling stock driving

Introducing new-model rolling stock

Expanding

Replacing the existing rolling stock will save energy and accelerate the reduction of CO_2 emissions.

Aging rolling stock

New-model rolling stock

Energy saving by introducing environment-conscious rolling stock

Expanding

Advancing energy-saving by introducing hybrid and battery-powered rolling stock.

Series EV-E801 (ACCUM)
(Oga Line, Ou Line)

Series HB-E210
(Senseki Tohoku Line)

Series HB-E300
(Kairi)

Establishment of energy-saving operation control technology for the Shinkansen Railway

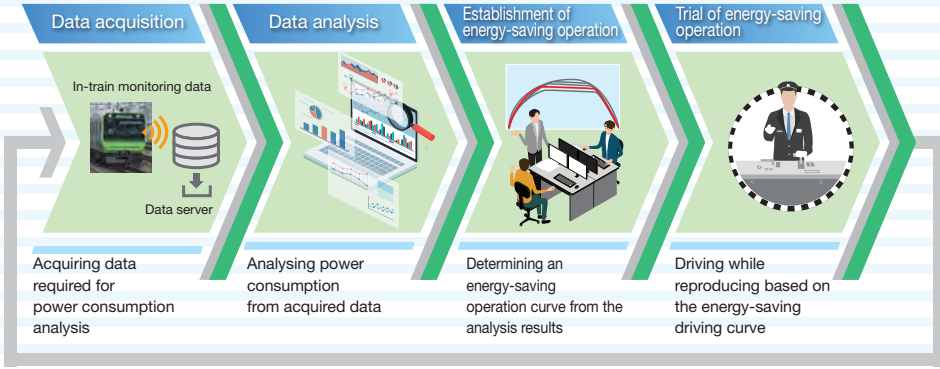
In development

Aiming to establish operation control technology that reduces energy consumption and operates according to schedule.

Reduction of rolling stock energy by driving operation

Expanding

Promoting energy-saving operation for the Yamanote Line E235 series trains based on the knowledge of effective driving methods for reducing energy.



Efforts in the “Use” phase

- We aim to promote the development of environment-friendly stations in order to realize a sustainable society.
- We will optimize the use of thermal energy and promote the reduction of environmental impact.

Developing environmentally-friendly stations

Expansion of Ecoste

Expanding

Ecoste is an initiative to introduce various environmental conservation technologies such as energy-saving and renewable energy into stations.
We are working to standardize energy-saving design of stations and reduce energy consumption.

Takanawa Gateway Station

Energy saving of electrical equipment in stations

Expanding

We aim to create an environment-friendly station by streamlining equipment through the introduction of non-illuminated signs, and promoting energy conservation in station electrical equipment by switching to LED lighting for platforms and concourses.

Switching platform lighting to LED

Introduction of non-illuminated signs

Reducing environmental load by optimizing the use of thermal energy

Optimization of thermal energy use in the railway business

Expanding

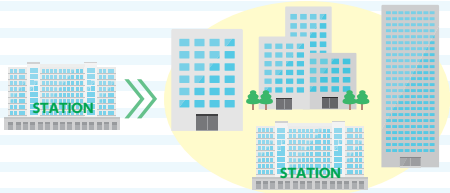
We are striving to reduce energy consumption by gradually updating air conditioning and heat source equipment used in the railway business to highly efficient equipment.
We are also aiming to optimize the thermal energy utilization of stations and surrounding facilities through station-based development.

Use of environment-friendly fuel

Under consideration

Regarding heat source equipment, we are considering switching to alternative fuels that have a lower environmental impact compared to fossil fuels.

Highly efficient heat source for snow-melting equipment for Shinkansen



Area utilization of thermal energy from individual stations (points) to surrounding facilities

Promotion of energy-saving in stations and station buildings through DX (Digital Transformation)

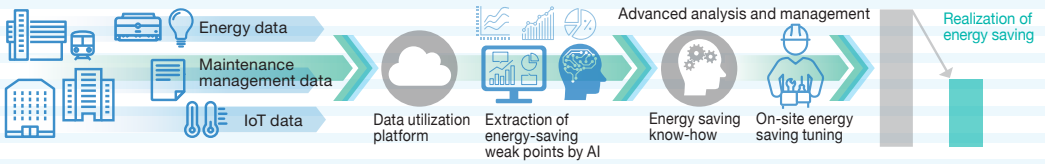
Improving energy efficiency through data analysis

Expanding

AI and other digital technologies are used to perform advanced analysis and utilization of energy data and IoT data from stations and station buildings to provide a comfortable indoor environment and to progress efficiently in precise energy-saving.

Acquire and collect data from various facilities

Promoting energy conservation through the use of digital technology



Efforts in the “Use” phase

We will expand our efforts to utilize hydrogen and boldly take on the challenge to realize a hydrogen society.

Energy diversification（Hydrogen utilization）

Development of hydrogen hybrid trains
In development

In addition to verifying the driving performance and energy management, we will study hydrogen filling methods for rolling stock and aim for practical application.

Efforts to realize a hydrogen society

Introduction of fuel cell buses
Expanding

We are considering further expanding the current service area (around Hamamatsucho) and operating within Fukushima Prefecture.

Introduction of stationary fuel cells to stations
Expanding

Station lighting and air conditioners will be powered by stationary fuel cells that do not emit CO_2 during power generation. We also aim to expand the use of waste heat.

Development of hydrogen stations
Expanding

We will promote hydrogen energy through the development of hydrogen stations.

Introduction of fuel cell vehicles (FCV)
Expanding

We will expand the introduction of fuel cell vehicles that use hydrogen as company vehicles for the JR East Group.

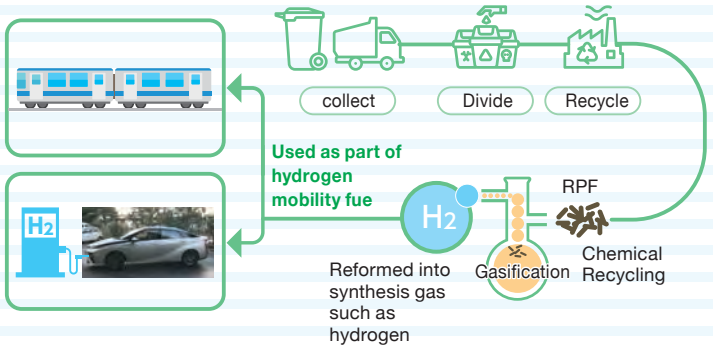
Efforts in the “Use” phase

- We will work to create a mechanism for realizing an earth-friendly resource-recycling society.
- In cooperation with local governments, we will realize comfortable and environment-friendly transportation for society as a whole.

Resource - Energy circulation

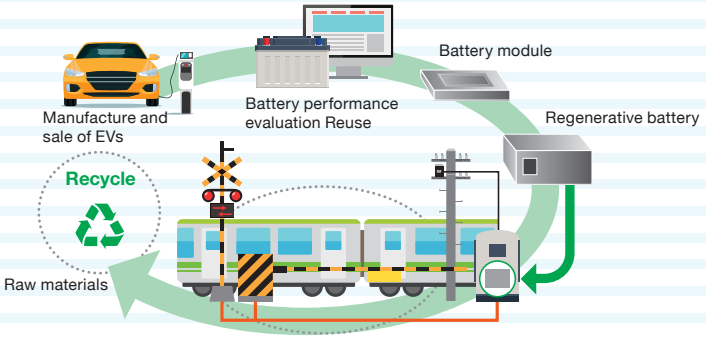
Advanced use of waste plastics
Under consideration

Waste plastic collected from stations and trains is turned into RPF (Refuse derived paper and plastics densified Fuel) and reused as energy.



Utilization of environment-friendly recycled batteries
Expanding

Recycled batteries from electric vehicles are reused as power sources for railway crossing security devices.



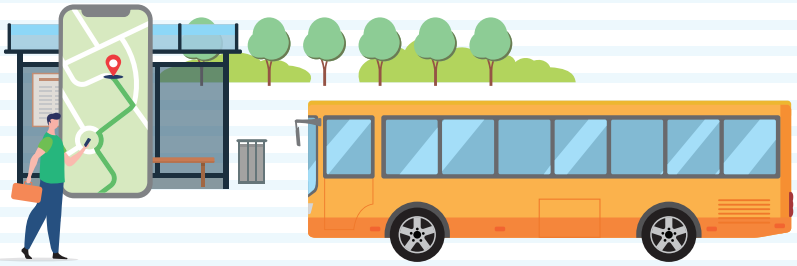
Use of carbon-neutral fuels
Expanding

We will consider introducing of carbon-neutral fuel for special vehicles that are difficult to electrify.

Promotion of comfortable and environment-friendly mobility

Promoting the use of on-demand transportation
Expanding

We will promote environment-friendly transportation by providing a MaaS-based shared transportation service (on-demand transportation) that optimizes operation with AI according to the user’s reservation status.



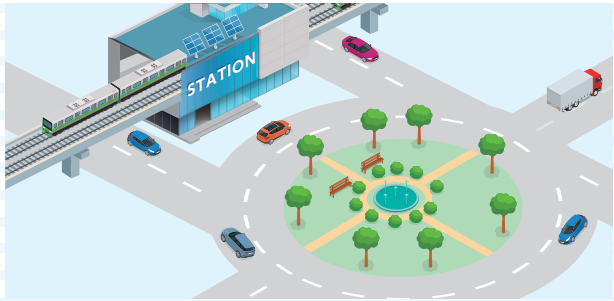
Enhanced ride-sharing transportation services as a secondary means of transportation.

New environment-friendly traveling experience
Expanding

We propose a new environment-friendly traveling experience that combines the Shinkansen with hydrogen-fueled fuel cell vehicles and electric vehicle rentals.

Development of transportation hubs in cooperation with local governments (Continuous multi-level crossings, Transportation node development)
Expanding

In addition to the elevation and undergrounding of railway tracks, we will reduce the environmental impact of society as a whole by promoting the development of transportation hubs, and alleviate traffic congestion.



Efforts in the “Use” phase (Introduction of familiar energy-saving initiatives)

We aim to realize a decarbonized society through ongoing efforts by each and every employee to save energy in their daily lives.

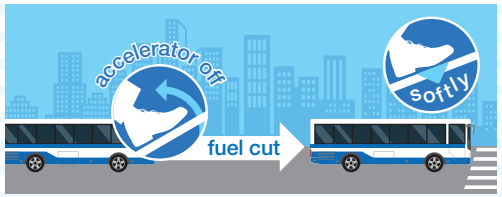
Examples of energy-saving initiatives

Fuel reduction by stopping the idling of diesel engines in winter

Parked diesel cars were always kept idle in winter to prevent freezing. By stopping idle waiting only when the temperature is above 0 degrees celsius, the system achieves a significant reduction in fuel consumption.

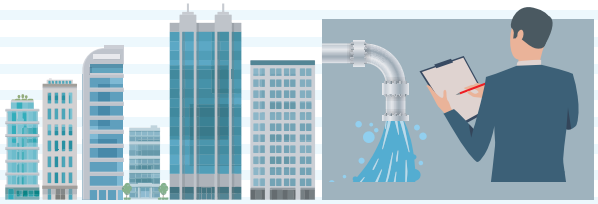
Encouraging eco-driving for buses to improve fuel efficiency

As part of our eco-driving efforts, we promote fuel-efficient driving by accelerating softly, gearing up and releasing the gas pedal quickly, and driving at a constant speed.



Adjusting blow volume of water circulating the boiler

The district heating and cooling facility operates a boiler, and by adjusting the blow volume which maintains the quality of circulating water, we are working to reduce gas consumption and water supply in order to reduce energy consumption.



Station platform lights are turned off during the daytime

We are working to save electricity by turning off platform and concourse lighting in areas where no lights are needed, mainly during the daytime on sunny days.

Air conditioner filter cleaning improves heating and cooling efficiency

We clean air conditioner filters in the office at the change of seasons to beautify the workplace environment and reduce energy consumption.

Green curtains keep indoor cool

By growing plants such as bitter gourd and morning glories outside the office building, we use them as shade from the sunlight to reduce temperature increase during the summer and reduce power consumption of air conditioning.

“Create” “Deliver & Store” “Use” Efforts across all phases

- We will adopt advanced environmental and energy technologies to promote zero carbon and sustainable urban development for a new society.
- We will introduce internal carbon pricing to accelerate our efforts toward decarbonization.

Efforts to create a zero carbon, sustainable, environmentally-leading city (Example of Takanawa Gateway City)

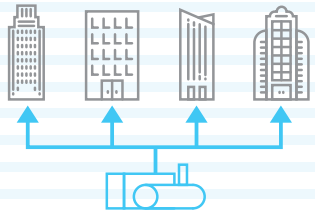
Local energy production and consumption — In development

We will create on-site energy through the use of renewable and unused energy.

Solar heat / Sunlight / Wind power / Sewage heat / Geothermal heat / Biogas

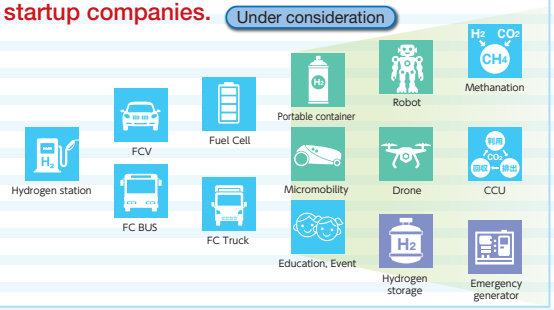
Area use of energy — In development

Energy efficiency will be improved by introducing district heating and cooling and by connecting multiple buildings with heat pipes and power lines.



District heating and cooling system

Creating hydrogen and CCU technology with startup companies. — Under consideration



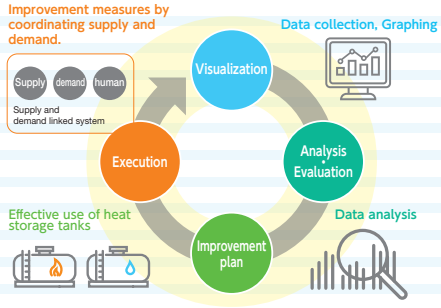
Efforts to achieve net zero CO_2 emissions — In development

We aim to achieve net zero CO_2 emissions through the use of renewable energy.
We will also expand our efforts to existing office buildings.

Energy management — In development

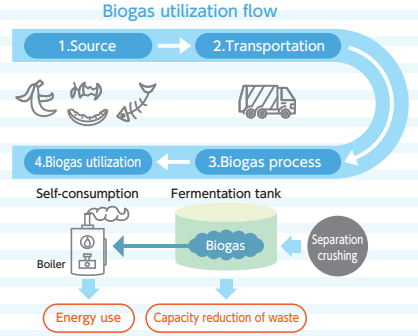
We will optimize energy utilization, operation save energy and CO_2, and use energy efficiently.

E.g. High-efficiency operation using heat storage tanks and energy-saving through demand response.



Utilization of urban biogas — In development

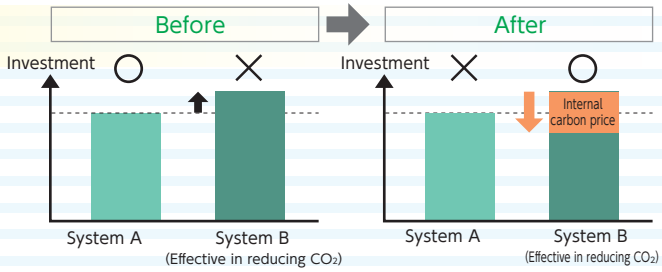
We aim to realize energy recycling and reduce garbage and CO_2.



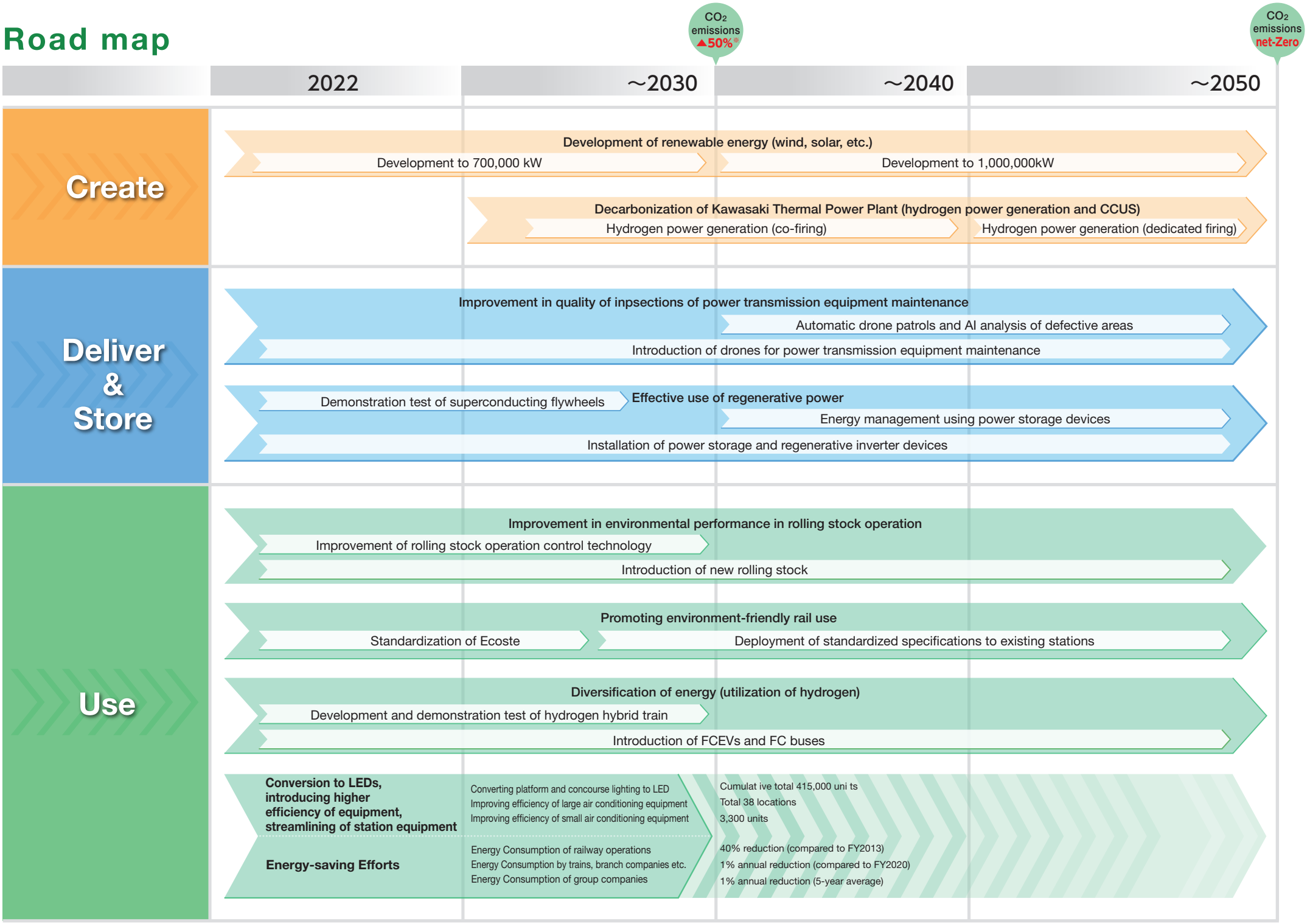
Introduction of internal carbon pricing

Adoption of internal carbon pricing (ICP) — In operation

Currently, internal carbon pricing is used for the introduction of LED lighting.
In the future, we will consider promoting further capital investment that will lead to the reduction of CO_2 emission.
Right now the internal carbon pricing is 5,000Yen/CO_2-ton, and full-scale operation started from FY2022.



Road map



※CO_2 emissions compared to FY2014

Energy Connects the Future

JR-EAST GROUP