

Support electricity now, look to the future of electricity

The Organization for Cross-Regional Coordination of Transmission Operators, JAPAN (OCCTO) has been performing its duties from a neutral and impartial standpoint since its establishment in April 2015 in accordance with its establishment purposes: namely, to maintain a stable electricity supply and streamline the power supply system as far as possible.

These duties are wide-ranging, including (i) compiling supply plans of electric utility companies, (ii) monitoring nationwide supply-demand conditions and addressing supply and demand constraints, (iii) operating the capacity market to promote the ensuring of supply capacity, (iv) formulating cross-regional network development plans, and (v) developing rules on the enhancement of network utilization.

Also, to achieve carbon neutrality, OCCTO promotes the following operations: (i) operations for cost-sharing coordination and bidding under the Renewable Energy Special Measures Act, (ii) promotion of the planning process based on the master plan intended as the future network plan, (iii) addressing technical challenges in network operation associated with the mass introduction of renewable energy, and (iv) operation of the long-term decarbonized power supply auction.

As the expected role of OCCTO is greater than ever before, all officers and employees of OCCTO will work together to strive to support Japan's electric power system today and fulfill its important role for tomorrow.

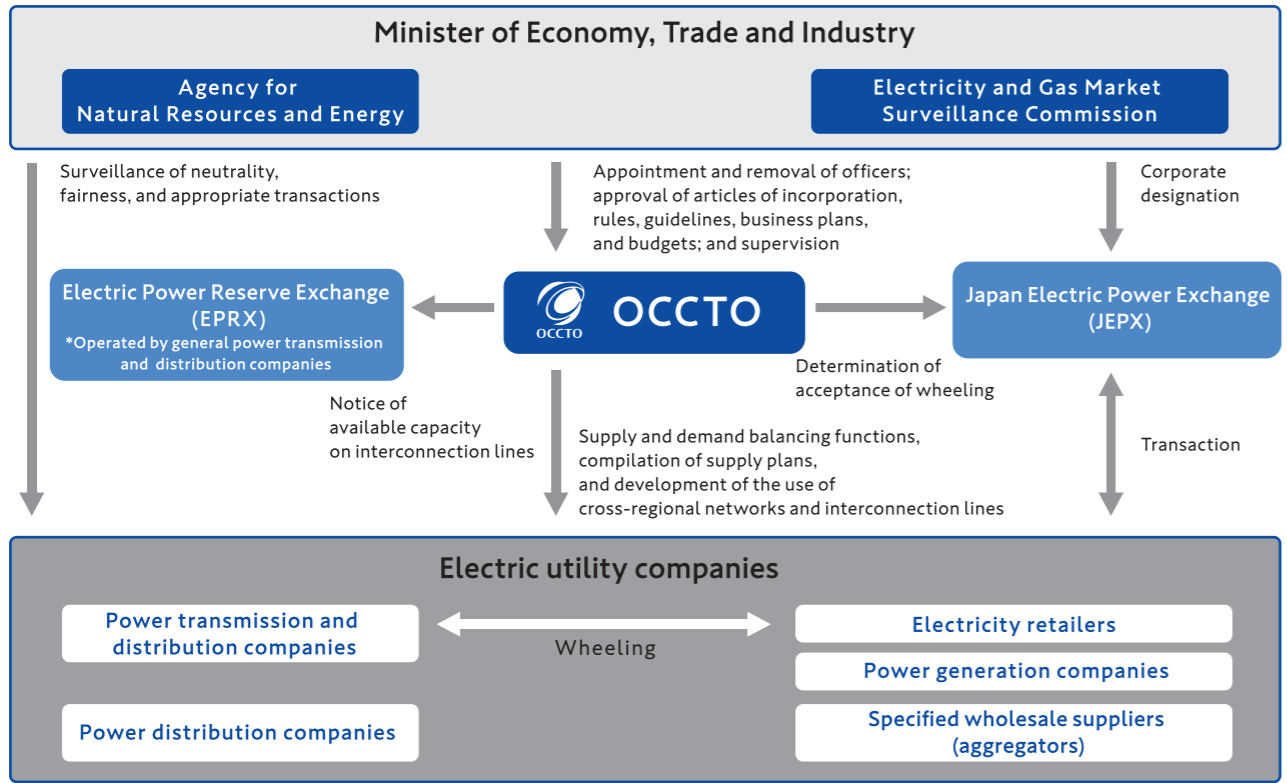
I respectfully ask for your continued support and encouragement.

September 2023
Tsutomu Oyama, President



About the Organization for Cross-Regional Coordination of Transmission Operators (OCCTO)




The Organization for Cross-Regional Coordination of Transmission Operators (OCCTO) was established in April 2015 as an organization with expertise and strong inter-operator coordination functions with the aim of promoting the development of power transmission and distribution grids necessary for cross-regional utilization of power sources and improving supply and demand balancing functions in normal and emergency situations throughout the country. As an authorized corporation under the Electricity Business Act, OCCTO conducts its business operations in a neutral and impartial manner.



New role of OCCTO Added under the Energy Supply Resilience Act

Against a backdrop of more severe and wider-area disasters and a shift to renewable energy as the main power source, the Energy Supply Resilience Act was enacted, and the Electricity Business Act and the Renewable Energy Special Measures Act were amended to include the new OCCTO duties described below from FY 2022.

In addition, in response to the decarbonization trend, OCCTO is required to address a variety of future issues, such as ensuring a stable supply, supply and demand balancing, and the development of power transmission and distribution grids, toward the achievement of future carbon neutrality.

Disaster response	Enhancement of measures to facilitate faster recovery in the event of a power outage, as well as measures for electricity supply and demand in emergencies • Check of the details of disaster coordination plans • Operation of mutual assistance systems for disaster recovery costs	 Only in Japanese
Formulation of the master plan for the development of cross-regional networks	Push-type network development based on cost-benefit analysis as well • Expansion of cross-regional operations in the main power transmission network • Smooth connection of renewable energy and distributed energy resources to the network	 Only in Japanese
Renewable Energy Special Measures Act	Responding to increased operations under the Renewable Energy Special Measures Act • Efficient and integrated execution of operations for FIT/FIP auction, cost-sharing coordination, reserve fund for disposal costs, and grant of subsidies for network installation	 Only in Japanese

Major initiatives and achievements, and future initiatives and challenges

Scan this code to see an overview of OCCTO.



Major initiatives and achievements	Future initiatives and challenges
Shift to next-generation networks to use renewable energy as the main power source and strengthen electric power resilience	
<ul style="list-style-type: none"> Formulation of a long-term cross-regional network policy (master plan for cross-regional interconnection networks) Formulation of a development plan of inter-regional interconnection lines New start of the planning process for interconnection lines in east and middle-west regions 	<ul style="list-style-type: none"> Promotion of the planning process based on the master plan for cross-regional interconnection networks Embodiment and progress check of cross-regional network development plans Operation of subsidy and loan schemes to promote the development of cross-regional networks
<ul style="list-style-type: none"> Formulation of rules for using inter-regional interconnection lines (introduction of indirect auction) Study and implementation of the Japanese version of Connect & Manage 	<ul style="list-style-type: none"> Further improvement and establishment of the Japanese version of Connect & Manage
<ul style="list-style-type: none"> Acceptance of connection studies Publication of network information (information on available network capacity) Acceptance of complaints, consultations, and dispute resolution from electricity suppliers Introduction of the collective study process for power connection projects 	<ul style="list-style-type: none"> Acceptance of connection studies Expanded publication of network information Acceptance of complaints, consultations, and dispute resolution from electricity suppliers Introduction of a new reinforcement process to local networks
<ul style="list-style-type: none"> Check of the details of disaster coordination plans Operation of mutual assistance systems for disaster recovery costs 	<ul style="list-style-type: none"> Enhanced check of extension of disaster coordination plans Long-term stable operation of mutual assistance systems for disaster recovery costs
Supply-demand management through supply-demand balancing assessment by supply planning and supply-demand verification	
<ul style="list-style-type: none"> Supply plan compilation Development of national demand estimates Verification of electricity supply-demand in summer and winter 	<ul style="list-style-type: none"> Enhanced understanding of information through supply planning Study of future supply-demand scenarios over a decade Study of the reflection of structural changes in demand estimates
<ul style="list-style-type: none"> Planning and management of power generation and demand through the OCCTO system Monitoring of the national supply-demand situation and network operation status Verification of output curtailment Electricity supply-demand monitoring for early detection of signs of supply-demand imbalance deterioration 	<ul style="list-style-type: none"> Planning and management of power generation and demand through the OCCTO system Monitoring of the national supply-demand situation and network operation status Verification of output curtailment Promotion of measures to mitigate increased output curtailment Continued electricity supply-demand monitoring, enhanced information provision
<ul style="list-style-type: none"> Electric power interchange instruction in the event of supply-demand constraints Review of the operation of inter-regional interconnection lines Enhanced communication to mass media and general consumers 	<ul style="list-style-type: none"> Enforced response in the event of supply-demand constraints (promotion of readiness to provide supply capacity based on cross-regional reserve margin) Promotion of the efficient use of inter-regional interconnection lines Enhanced communication to mass media and general consumers
Ensuring supply capacity for a stable electricity supply	
<ul style="list-style-type: none"> Establishment of capacity market Preparation for the introduction of long-term decarbonized power supply auction Introduction of supply-demand balancing market 	<ul style="list-style-type: none"> Stable operation of the capacity market, introduction of long-term decarbonized power supply auction Embodiment and validation of a market that can simultaneously trade supply capacity and balancing capacity Study of the introduction of backup power system Support for the full-scale operation of the supply-demand balancing market
Implementation of FIT/FIP subsidy operation and reserve fund management for solar panel disposal costs	
<ul style="list-style-type: none"> Operation of FIT and FIP schemes Operation of a reserve system for disposal costs of solar power generation facilities Conduct of fund management operations 	<ul style="list-style-type: none"> Improvements to FIT and FIP schemes Operation of a reserve system for disposal costs of solar power generation facilities Improvement of fund management operations

Ensuring a stable electricity supply on a short

Compiling supply plans to ensure a stable electricity supply on a short-term to a medium- or long-term basis

A supply plan outlines the supply and demand projection and the development of new power plants and power grids for the next decade, which is required to be submitted by all utility companies to the national government under the Electricity Business Act. OCCTO compiles supply plans to centrally understand and assess the supply and demand balance both nationwide and for each supply area individually on a short-term to a medium- or long-term basis. A stable electricity supply is also ensured by using power supply auctions as required.

Study of future supply-demand scenarios

Possible scenarios of future electricity supply and demand beyond the current supply plan (for a decade) are shared for study purposes among the national government, OCCTO, electric utility companies, and other stakeholders as a reference for the smooth implementation of measures and the systematic promotion of power supply development.

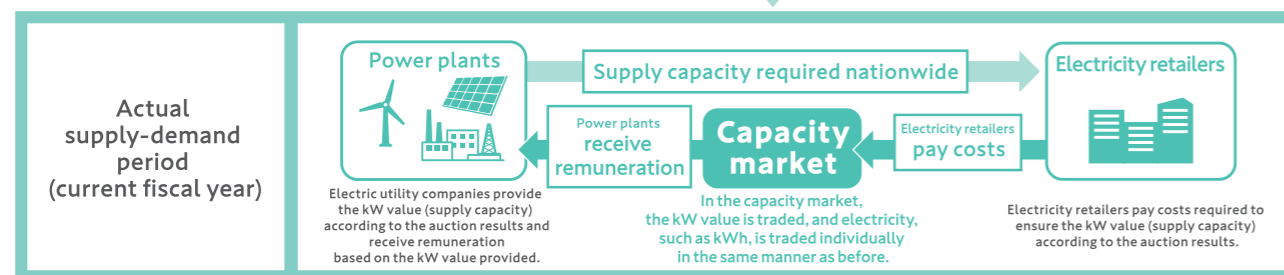
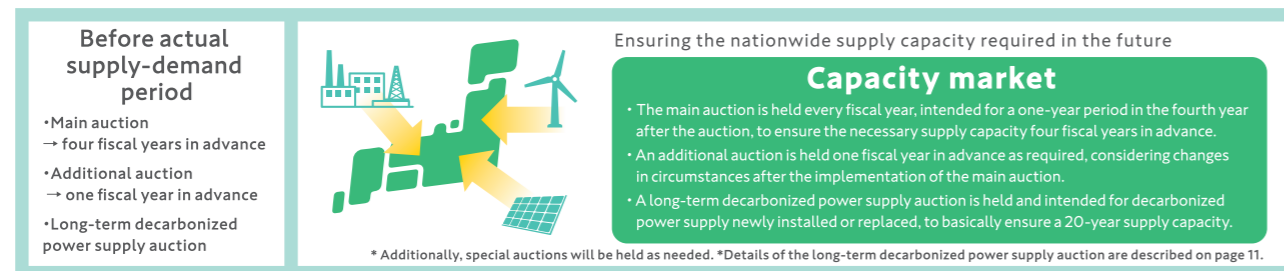
Contributing to streamlining and activating electricity market while keeping up with the times

With the separation of power generation and power transmission in 2020 and the increasing introduction of renewable energy, OCCTO continues to study, design in detail, and operate a new market for trading the value of electricity to create a mechanism to ensure and utilize the supply capacity and the balancing capacity necessary for a medium- to long-term stable supply at the lowest possible cost.

Value to be traded		Trading market
Amount of electricity [kWh value]	Actual electricity generated	Wholesale electricity market
Supply capacity [kW value]	Capacity to generate electricity	Capacity market
Balancing capacity [ΔkW value]	Capacity to balance supply-demand in a short time	Supply-demand balancing market

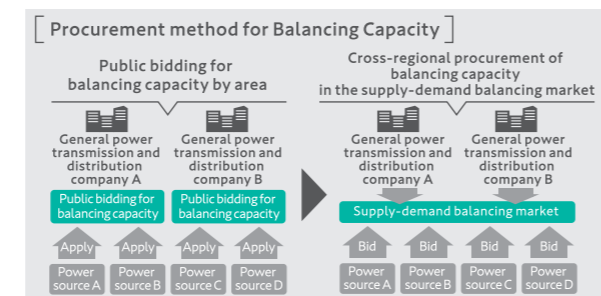
Study, detailed design, and operation of Capacity Market

With electricity deregulation and the increasing introduction of renewable energy, the predictability of the return on electricity investment is considered to be circumstantially decreased, but a shortfall in investment in electricity sources could lead to electricity shortages in the future. The capacity market evaluates the supply capacity of power sources (capacity to generate electricity) to efficiently ensure the necessary supply capacity in advance for the future, which is an important mechanism that increases the predictability of investment returns by power generating companies and contributes to ensuring the supply capacity on a medium- to long-term basis. OCCTO is a market administrator for the capacity market by studying, designing in detail, and operating the system.



Study and detailed design of Supply-demand Balancing Market

As renewable energy becomes the primary power source, currently, public procurement is conducted by general power transmission and distribution companies to ensure the balancing capacity required to allow general power transmission and distribution companies to provide a stable supply of electricity, but more efficient procurement and operation can be achieved by realizing a cross-regional procurement and cross-regional operation in a supply-demand balancing market. OCCTO is studying and designing this supply-demand balancing market in detail.



*Market trading of balancing capacity starts partially in FY 2021 and fully in FY 2024.

-term to a medium- or long-term basis

Formulating a long-term cross-regional network policy and taking the initiative for necessary equipment reinforcement

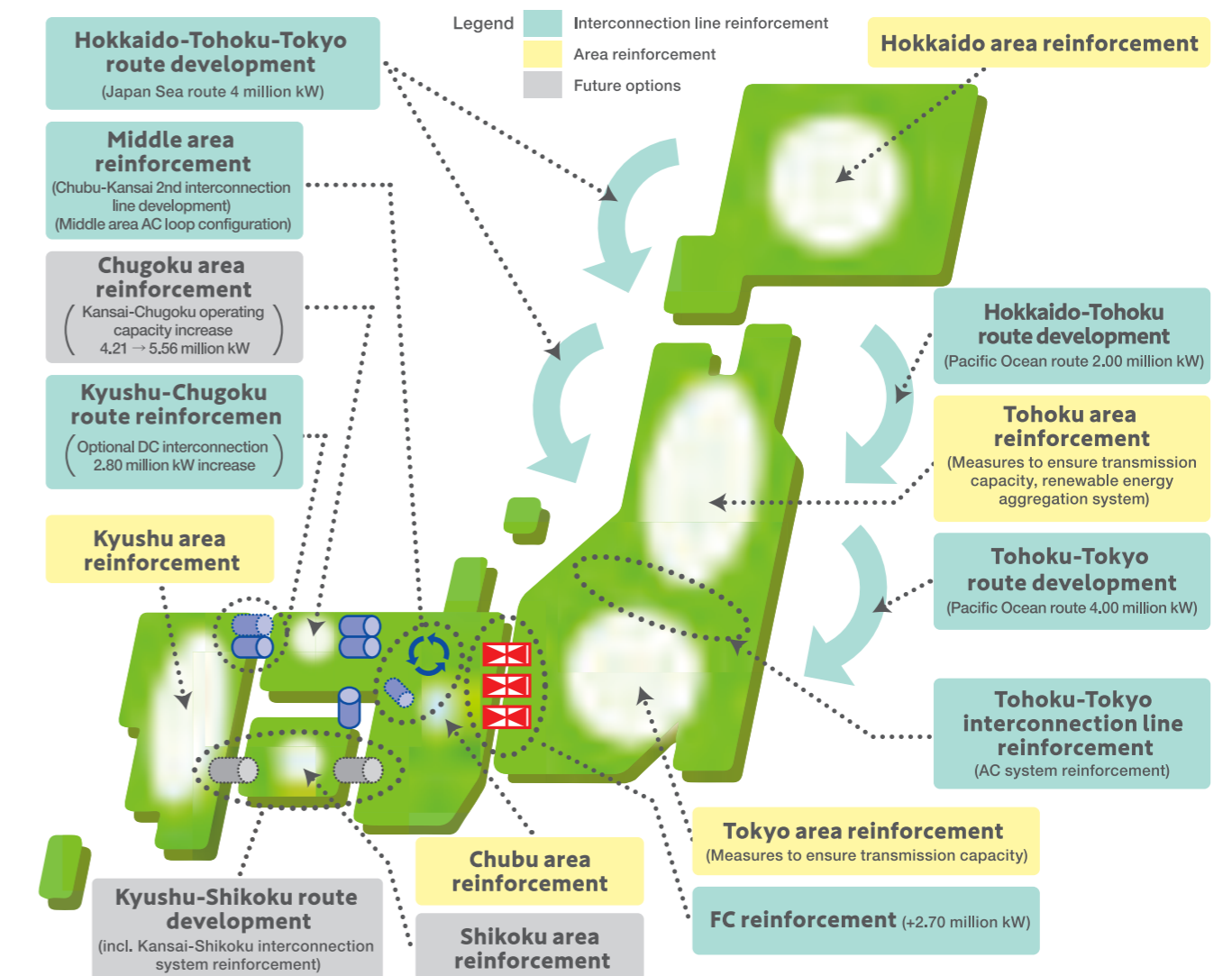
OCCTO formulated a long-term cross-regional network policy that provides direction for the development and renewal of nationwide cross-regional interconnection networks and a cross-regional network development plan in accordance with this policy. Specifically, OCCTO formulated a cross-regional network development plan for the Tokyo-Chubu interconnection system, the Tohoku-Tokyo interconnection line, and the Hokkaido-Honshu interconnection system, which is scheduled for completion in fiscal year 2027.

In addition, legislation was developed under the Energy Supply Resilience Act to systematically address a cross-regional interconnection development in a push-type manner, taking into consideration the future power potential.

In response to this legislation, in March 2023, OCCTO reflected the long-term perspective for the development of cross-regional networks that ensure consistency with the energy policy toward achieving carbon neutrality by 2050 and the direction of efforts toward the achievement in the long-term cross-regional network policy (master plan for cross-regional interconnection networks).



Long-term perspective for the development of cross-regional interconnections



□ Necessary investment^{*1} Approx. 6.0 to 7.0 trillion yen □ Cost-benefit ratio (B/C) ^{*1} 0.7 to 1.5

□ Annual cost^{*1, *2} Approx. 550 to 640 billion yen per year

Renewable energy ratio: 47% (50%) after reinforcement/43% before reinforcement; Output control rate: 12% (7%) after reinforcement/22% before reinforcement
Figures in parentheses are reference values when providing guidance on the power supply side as a measure other than the network reinforcement.

*1: Estimated considering the HVDC cost range

*2: Calculated as the annual expense ratio shown on the right based on the amount of expenses: Over transmission (7.9%), Underground transmission (9.0%), Substation (10.7%)

The Long-Term Cross-Regional Network Policy (Master Plan for Cross-Regional Interconnection Networks) was formulated with the view of achieving carbon neutrality by 2050.

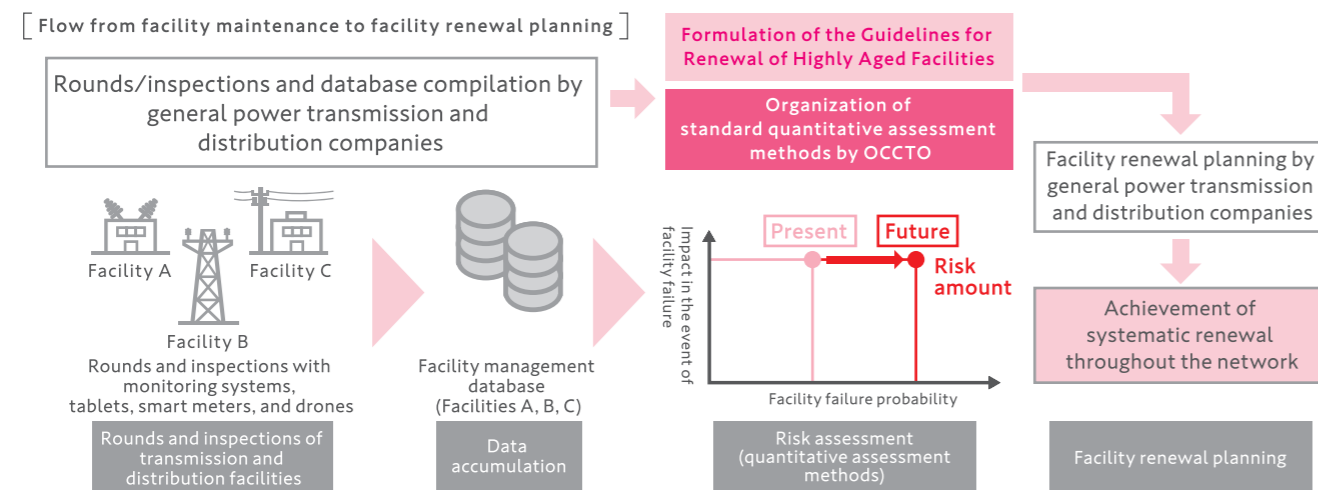
Promoting fair, equitable, and efficient use of transmission and distribution systems

Formulating rules to be followed by electric utility companies

OCCTO formulates and updates as required the Guidelines for the Services for Electricity Transmission and Distribution, which are the rules to be followed by network operators and network users under the Electricity Business Act. This ensures the proper and smooth operation of wheeling services and electricity transmission and distribution services.

Formulating rules for facility renewal

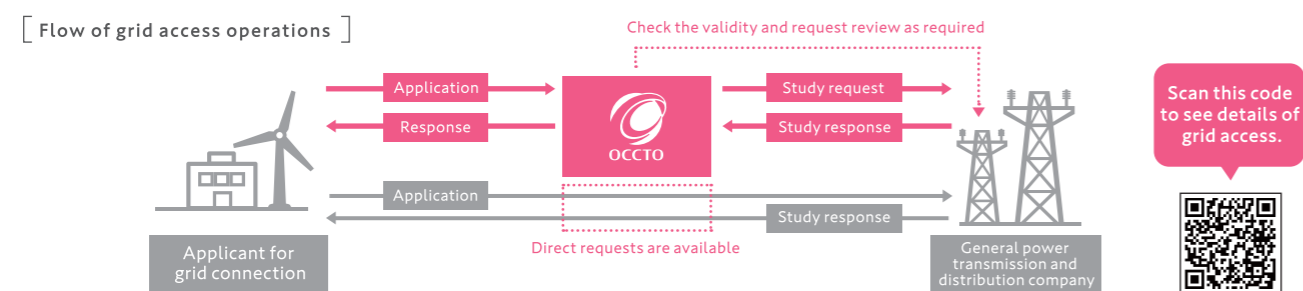
OCCTO formulated the Guidelines for Renewal of Highly Aged Facilities, which provide a standard facility risk assessment method common to 10 general power transmission and distribution companies. In accordance with these Guidelines, each general power transmission and distribution company assesses the risk amount (= facility failure probability × failure impact) for each facility, calculates the renewal amount for each facility based on the risk amount assessed and construction capability, and reflects them in the facility renewal plan.



Accepting applications for grid access study for power generation facilities

OCCTO is responsible for establishing mechanisms and rules for grid access, which are the procedures for connecting power generation facilities to a power grid; for example, OCCTO organizes a mechanism, such as a collective study process, for power connection projects in which multiple power sources jointly share the cost of reinforcing transmission and substation facilities involving connection.

Also, OCCTO is engaged in the duties of accepting applications for grid access by applicants for grid connection of their power generation facilities and verifying the results of study conducted by the general power transmission and distribution company.



Making efforts for efficient use of power grids

To promote the introduction of renewable energy, while maximizing the use of existing transmission and substation facilities, OCCTO continues with Connect & Manage (such as the N-1 Inter-trip scheme and non-firm connection), which allows flexible power supply connection on the premise of appropriate management during grid congestion, by revising the previous approach of not allowing new power supply connections until the grid is reinforced if there is no available capacity based on the maximum output of existing power generation facilities.

Furthermore, in order to extract as much value as possible from the connected power source, a repowering method is introduced into the backbone grid as a congestion management method.

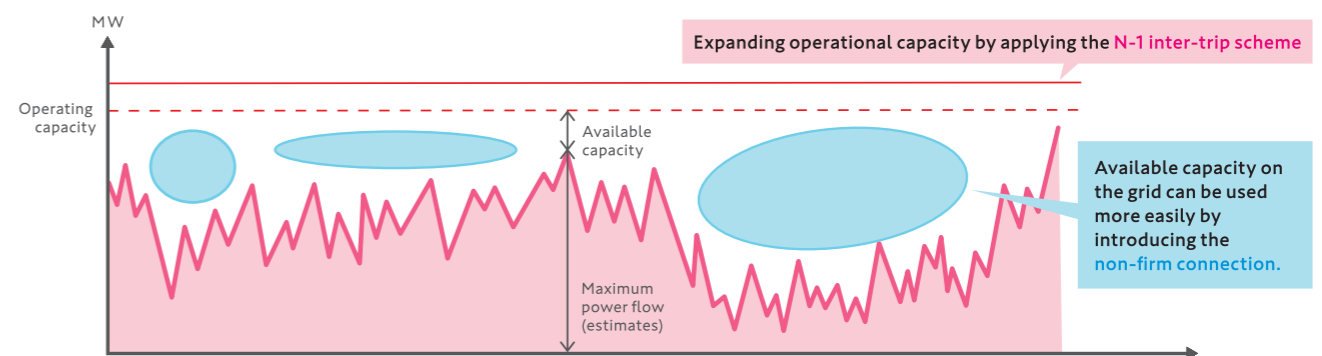
Connect & Manage

N-1 Inter-trip scheme

In Japan, in terms of grid reliability, facilities are constructed to ensure stable transmission capacity even in the event of an N-1 failure, such as a failure of one of the transmission lines that usually have two circuits. The N-1 inter-trip scheme is a system that allows the capacity to be utilized during normal situations by limiting power supply in the event of an N-1 failure.

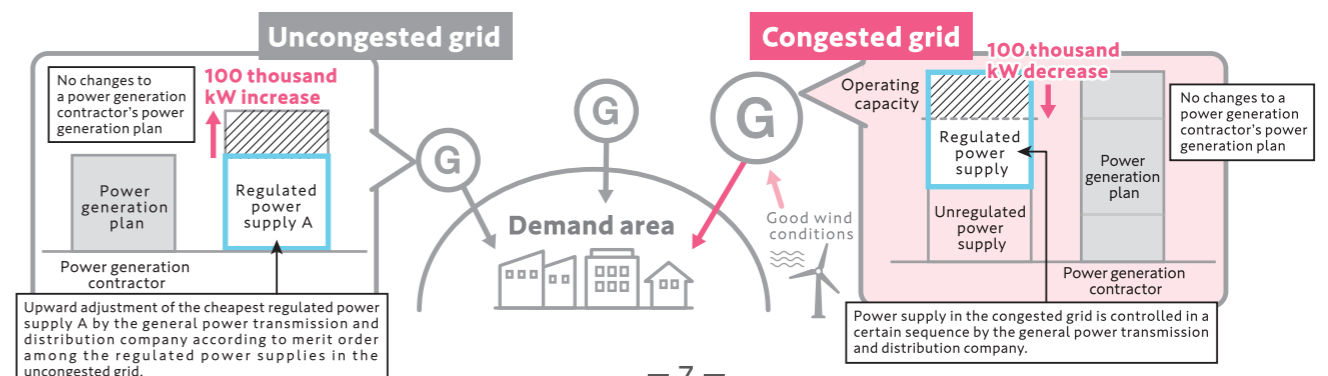
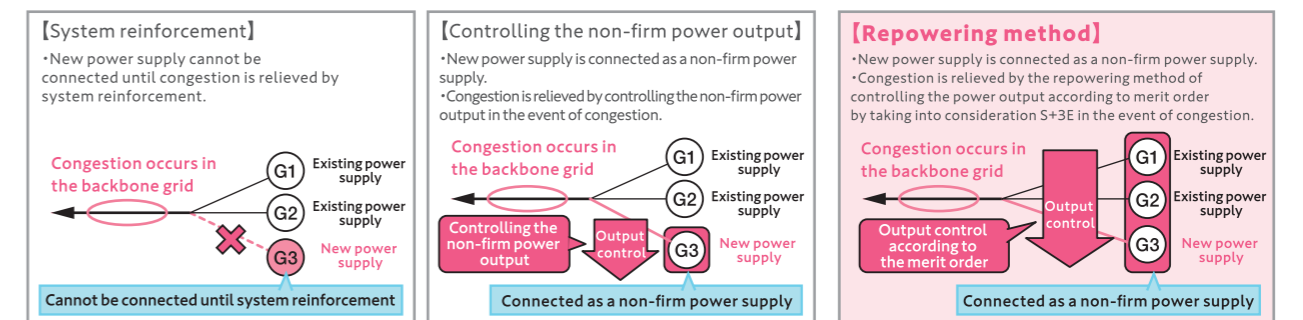
Non-firm connection

This is a new approach to power supply connection to allow operation when there is availability on the grid by connecting new power sources to the grid without system reinforcement, assuming output control during grid congestion.



Repowering method

The repowering method is a method of controlling the power output according to merit order by taking into consideration the stable supply, in contrast to the method of controlling the non-firm power output in managing grid congestion. Specifically, in order to relieve congestion in the backbone grid, the output of the power output connected to the backbone grid will be curtailed in a certain sequence, and the output of regulated power supply in the uncongested grid will be controlled based on merit order according to the amount of power shortage caused thereby to match the power supply and demand.





Realizing stable supply through formulation of rules for using interconnection lines and monitoring and operation of national supply and demand situation and network

Monitoring the supply-demand situation and network operation 24 hours a day, 365 days a year

Interconnection lines connecting regions across the country have three functions: (i) stable supply (reducing power outage), (ii) economic efficiency (transmission of cheaper electricity), and (iii) environmental performance (utilization of renewable energy).

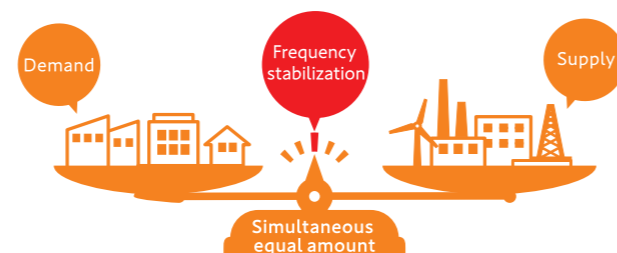
OCCTO monitors nationwide transmission line operations and supply and demand situation on a real-time basis 24 hours a day, 365 days a year, and promptly and accurately provides supply instructions in the event of power line accidents or supply-demand constraints so that interconnection lines can fulfill these functions.

In addition to monitoring the real-time supply and demand situation in each supply area, OCCTO also compiles nationwide supply and demand estimates on a short- to medium-term basis to provide an early perspective on the supply and demand situation. Supply and demand estimates are published to fully inform utility companies throughout the country.

- Monitoring of the operation and work stoppage of major generators in the country
- Monitoring of the utilization of inter-regional interconnection lines connecting supply areas through market transactions
- Monitoring and publication of the operational status of the national cross-regional interconnection networks, including inter-regional interconnection lines
- Compilation and publication of annual to daily supply and demand conditions for each supply area

Supply-demand balance

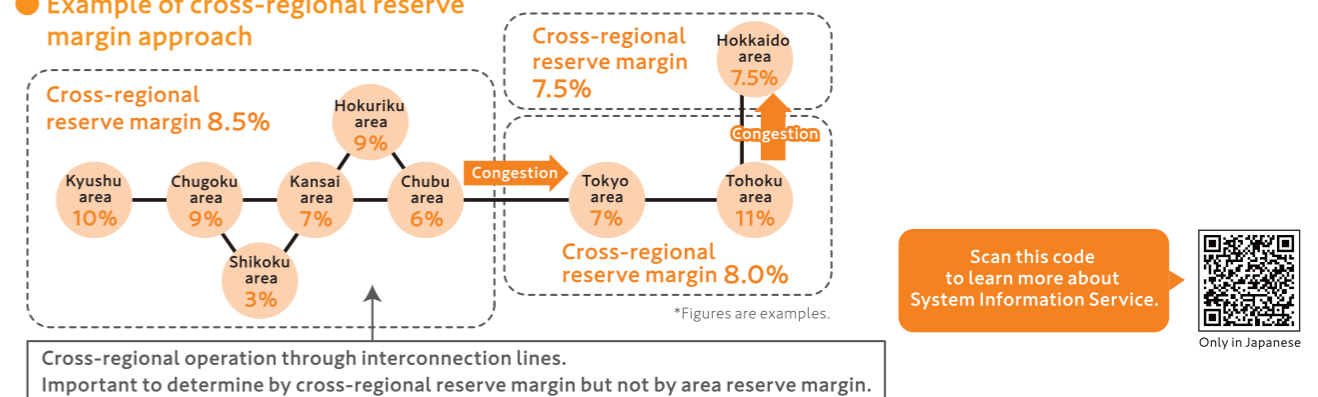
As electricity cannot be stored in large quantities, supply and demand need to always match for a stable supply. When that balance is lost, the frequency is disrupted, and in the worst cases, this could lead to a major power outage.



Supply-demand operation based on cross-regional reserve margin

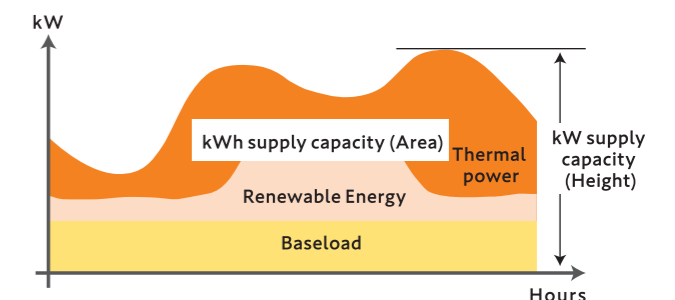
As supply capacity and balancing capacity are utilized cross-regionally, it is important to grasp the supply and demand situation with a cross-regional reserve margin. OCCTO communicates supply and demand information with the cross-regional reserve margin updated every 30 minutes based on the latest demand forecast and power generation plan of the utility companies.

Example of cross-regional reserve margin approach



Electricity supply-demand monitoring

For the purpose of early detection of signs of supply-demand imbalance deterioration, OCCTO conducts monitoring from two points: kilowatts (kW) and kilowatt-hours (kWh) during times of tight power supply and demand and publishes the data.



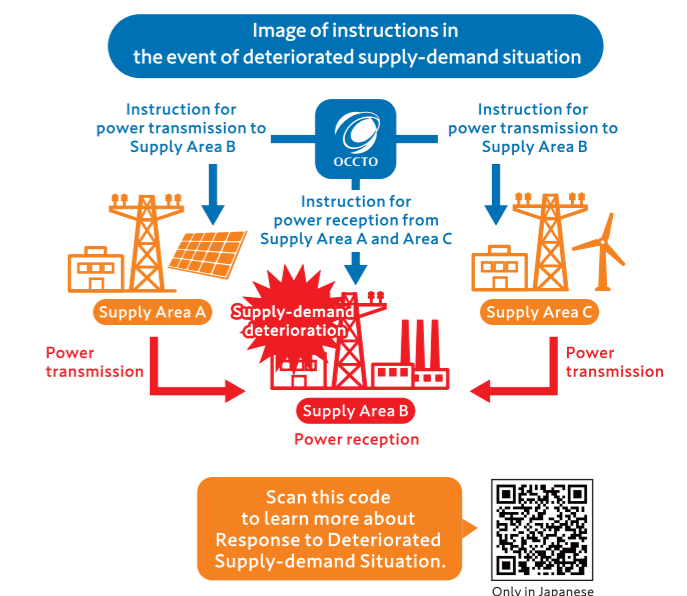
Providing instructions to utility companies in the event of deteriorated supply-demand situation

Supply instructions by OCCTO

In the event of deterioration in the supply and demand situation due to disasters or power supply problems, supply and demand stabilization can be promoted by interchanging power via interconnected lines across the country.

OCCTO acts as a command post and check and coordinate information immediately. With the aim of maintaining a stable supply across the country, OCCTO provides instructions to general power transmission and distribution companies that are members of OCCTO for transmitting and receiving power.

OCCTO provides instructions, not only in the event of supply-demand constraints but also in the event of excessive power capacity and continued difficulty in balancing supply and demand even after power output curtailment in the area.



Conducting technical studies on transmission lines throughout the country

In order for an interconnection line to fully fulfill its three functions, the area transmission line connected to the interconnection line plays an important role.

For this purpose, OCCTO addresses studies on technical aspects and operating rules of nationwide transmission lines, including interconnection lines, and reflects and publishes the study results.

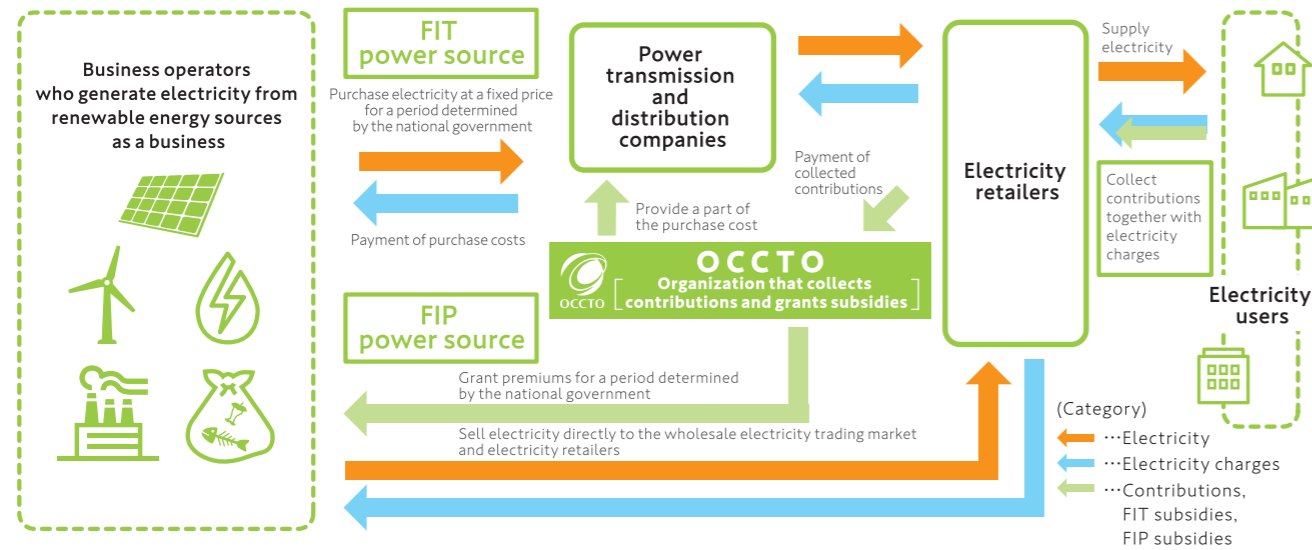
Also, in order to use transmission lines as effectively as possible, OCCTO conducts and publishes a study on the coordination of periods during which transmission lines are shut down due to repair work or other maintenance.

- Study and publication on transmission capacity of interconnection lines
- Study for reducing the risk of large-scale power outages and shortening recovery time in the event of a major power outage
- Coordination of periods of work stoppage of nationwide major transmission lines and main power plants including interconnection lines

Supporting expansion of the use of decarbonized power sources to achieve carbon neutrality

Responsible for a wide range of tasks to expand the use of renewable energy

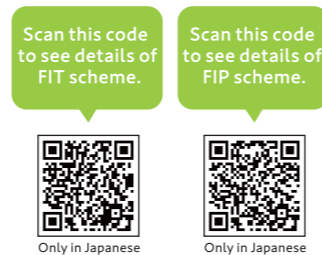
To expand the use of renewable energy, OCCTO provides the operation services for the Feed-in Tariff scheme (FIT scheme) that is a system to purchase renewable energy at a fixed price, and the Feed-in Premium scheme (FIP scheme) that is a system that grants a certain premium based on market prices.



FIT/FIP scheme

FIT is a scheme in which the national government guarantees that electric power companies will purchase electricity generated from renewable energy sources for a certain period of time at a fixed price. OCCTO provides services of calculating and determining the amount of subsidies based on the amount obtained by multiplying the procurement price by the amount of renewable energy electricity purchased and then deducting the avoidable cost (calculated from the market price) from it and granting subsidies to the respective electricity purchasing companies.

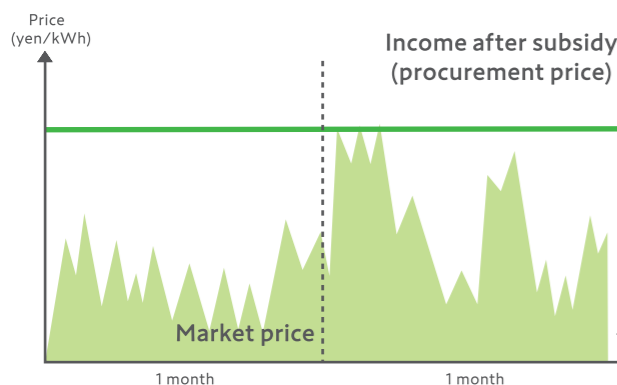
FIP is a scheme that provides support to ensure investment incentives while encouraging integration into the electricity market as a step toward the independence of renewable energy. OCCTO provides services of calculating and determining the amount of premiums based on the base price after subtracting the reference price (income expected from market transactions) by the amount of renewable energy power supply and granting premiums to the respective certified business operators.



FIT scheme

Price is constant and income is the same regardless of when power is generated.

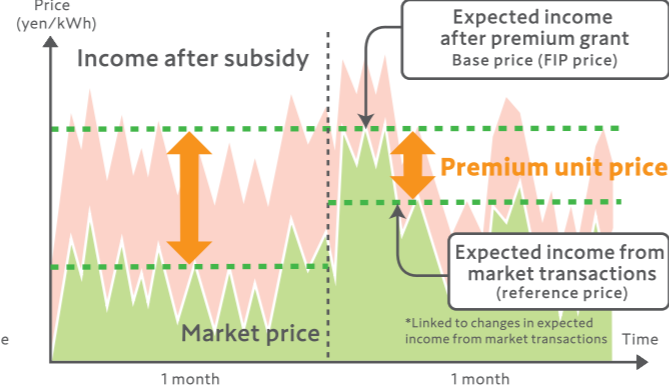
No incentive to increase supply during peak demand periods (when market prices are high)



FIP scheme

The amount of subsidy (premium) is fixed, and income is linked to market prices.

There is an incentive to increase supply through the use of storage batteries during peak demand periods (when market prices are high).
*Premiums are updated monthly in conjunction with the reference price and are not granted for electricity supply during the hours when output control would occur.

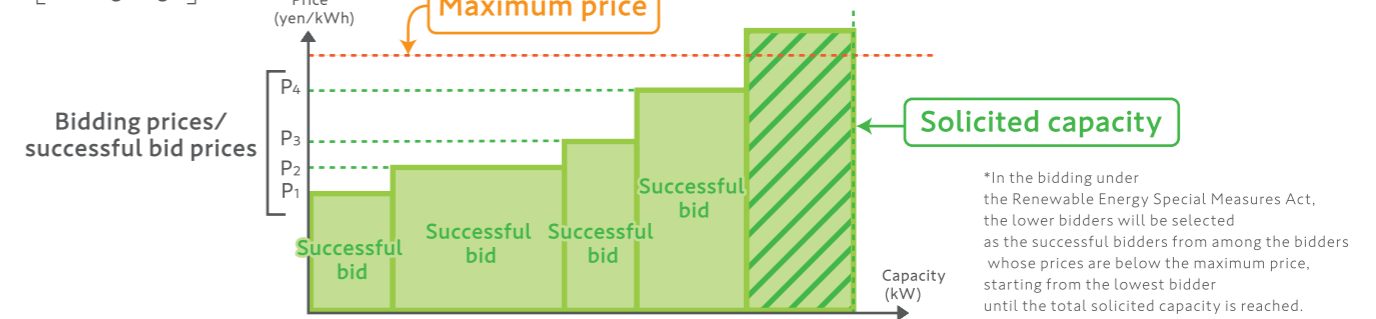


$$\text{Base price} - \text{Reference price} = \text{Premium unit price}$$

Bidding system

This is a system in which procurement prices and base prices are determined by bidding to achieve both the maximum introduction of renewable energy and a reduction in the burden on the public. OCCTO provides bidding services (including conduct of bidding, determination of successful bidders, and management of participating bidders) under FIT and FIP schemes.

[Bidding image]



Reserve system for disposal costs of solar power generation facilities

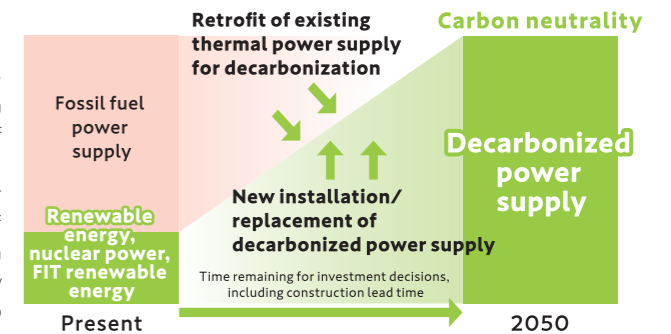
This system requires certified business operators to maintain a reserve for disposal costs (basically, an external reserve in the form of withholding tax) to ensure a reliable accumulation of disposal costs by targeting all solar power generation projects of 10 kW or more that obtained a FIT/FIP certificate. OCCTO provides services of management and response to request for withdrawal of external reserves.

Operating a long-term decarbonized power supply auction toward expansion of the use of decarbonized power sources

Aiming to achieve carbon neutrality by 2050, a long-term decarbonized power supply auction has started in FY 2023 to control the risk with stable supply and price escalation risk from a medium- to long-term perspective as well as to offer the value of decarbonized electricity to consumers.

Before the introduction of the long-term decarbonized power supply auction, provision of supply capacity and evaluation of supply capacity (kW value) were achieved by a main auction for a single year, but for utility operators who make large amounts of new investments in decarbonized power supply, it will be important to provide predictability for the long-term return on investment.

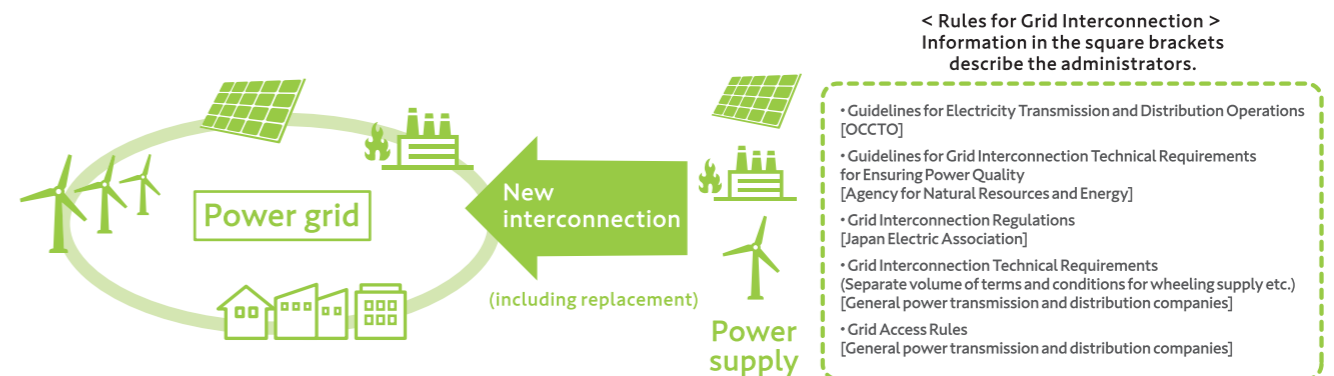
Therefore, a long-term decarbonized power supply auction was established as part of the capacity market for new investments in decarbonized power supply, and OCCTO continues operating the market.



Developing the rules (Grid Code) to be followed by power sources connected to the electric power grid

In order to achieve both carbon neutrality and stable supply of electricity, rules are needed when power sources are connected to the power grid. The rules are called the Grid Code, and OCCTO is considering rules that define the roles of different types of power sources based on their characteristics.

The Grid Code under consideration will be reflected in the relevant rules as appropriate with the aim of achieving both the mass introduction of renewable energy and stable power supply.



Promoting the power system resilience in Japan through international activities

As a global movement, we are committed to efforts toward a decarbonized society, response to the changing energy situation, and technological advancements in the electric power industry. OCCTO collaborates with relevant overseas organizations and collects information as reference for making Japan's power system more resilient and economically rational for the future.

Preparing to respond to large-scale disasters and supply and demand constraints

In the event of a disaster or a supply-demand constraint, OCCTO proposes response while maintaining close communication and coordination with the national government and establishes a response team striving to maintain a stable supply of electricity.

During normal times, OCCTO continues to conduct disaster-response drills to ensure a prompt response in the event of a disaster or supply-demand constraint and strives to improve the effectiveness of the business continuity plan (BCP) in preparation for disasters and other unforeseen circumstances.

In addition, OCCTO is engaged in services that contribute to strengthened collaboration and prompt disaster recovery of power transmission and distribution companies in the event of a disaster, such as checks of the details of disaster coordination plans prepared by general power transmission and distribution companies, acceptance of applications for mutual assistance systems for disaster recovery costs paid and collected across the country, and the grant of subsidies.

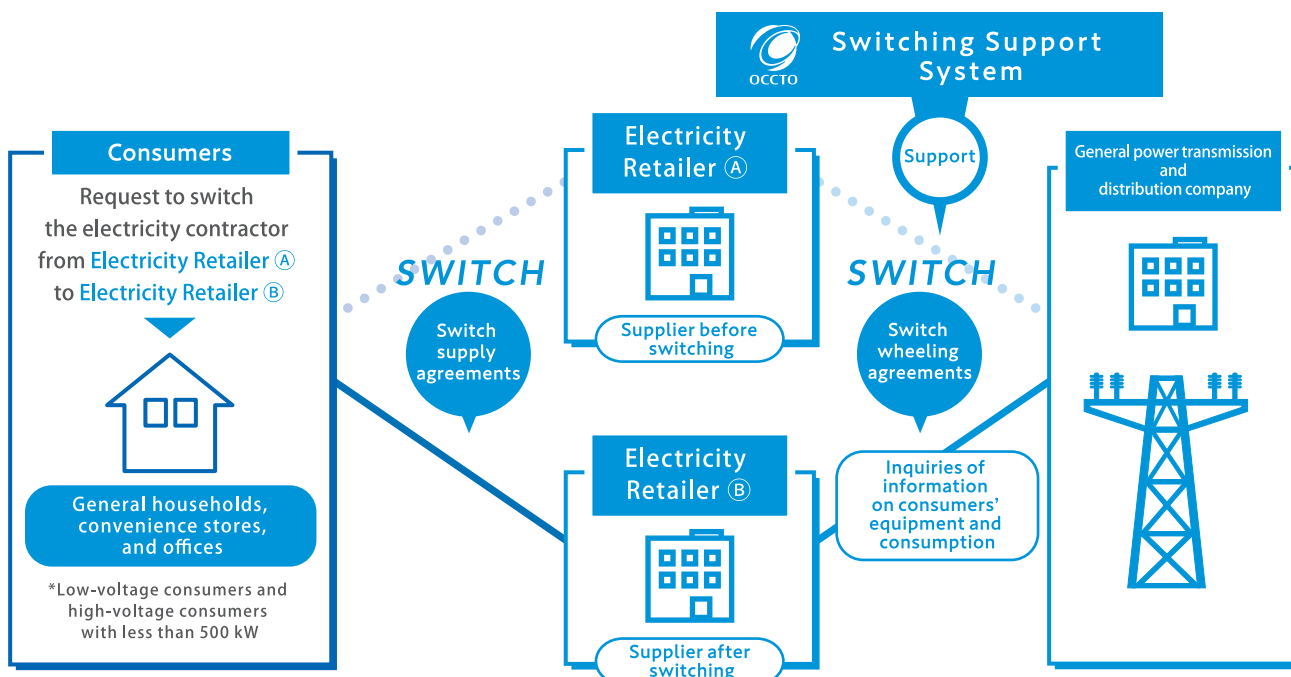


Resolving disputes between electricity suppliers

OCCTO accepts consultations and complaints about power transmission and distribution services from electricity suppliers. Also, OCCTO conducts settlement (mediation, arbitration) procedures as a certified dispute resolution business operator with certification of the Minister of Justice under the Act on Promotion of Use of Alternative Dispute Resolution.

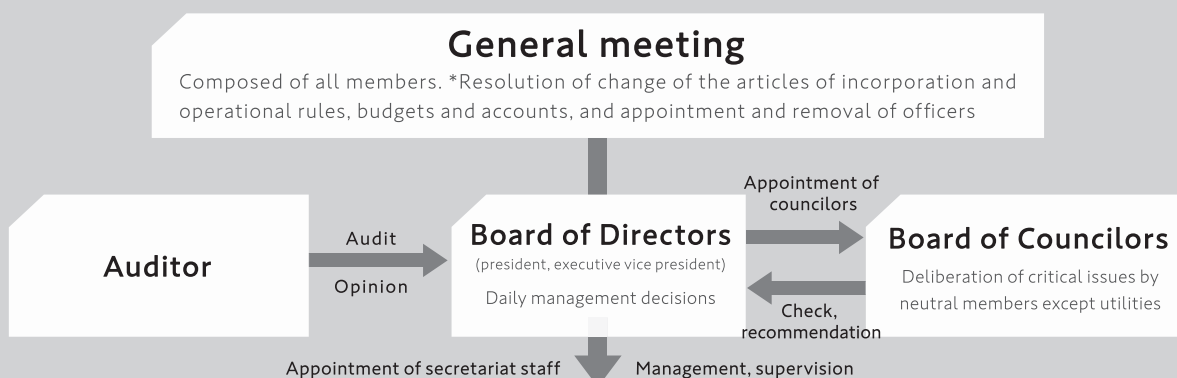
Supporting streamlining of procedures for switching

OCCTO contributes to the acceleration and facilitation of inquiries of information on consumers' equipment and consumption and switching operations of wheeling agreements between electricity retailers and general power transmission and distribution companies through the switching support system.



As an authorized corporation under the Electricity Business Act, OCCTO conducts its business operations in a neutral and impartial manner.

[Organizational Structure]



Secretariat



*All electric utility companies are obliged to become members of OCCTO.

Responsibilities of OCCTO members

- Exercise their voting rights at general meeting, ● Compliance with rules, such as following instructions and requests from OCCTO, ● Payment of membership fee, ● Submission of supply plan, ● Emergency disaster preparedness