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Facilitation of Financing for Power Grid Development and the Establishment of a Public Financing Framework

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In order to expand the introduction of renewable energy and ensure a stable supply of electricity in Japan, it is essential to steadily advance the proactive and planned development of large-scale power systems, including inter-regional interconnection lines and intra-regional grids. As a prerequisite for this, it is important to facilitate smooth financing and cost recovery. To this end, measures are required to enhance the certainty of cost recovery by expanding pre-operation financing methods, such as allowing more flexible treatment of congestion rent revenues and promoting loans for grid development based on GX (Green Transformation) policies, as well as by introducing measures such as the advance recovery of wheeling charges, developing guidelines on how to recover increased construction costs for inter-regional interconnection lines, and revising the treatment of construction work in progress in the calculation of business returns. Furthermore, in order to enable continued long-term and large-scale investment in decarbonized power sources such as renewable energy and nuclear power, as well as in power grids, consideration is being given to concretizing financing facilitation measures, including public credit enhancement and loans utilizing the government's creditworthiness.

1. Facilitation of Financing and Cost Recovery for Planned Power Grid Development

In order to simultaneously expand the introduction of renewable energy and ensure a stable supply of electricity, it is indispensable to steadily promote the proactive and planned development of large-scale power systems, such as inter-regional interconnection lines and intra-regional grids. Large-scale grid development requires a long period from construction to cost recovery and involves enormous investment amounts. Therefore, uncertainties in financing and delays in cost recovery significantly hinder the investment decisions of project operators. As a result, if necessary, grid development is delayed, it may become difficult to respond to regional imbalances in electricity supply and demand and fluctuations associated with increased renewable energy penetration, potentially leading to increased output curtailment and shortages in supply capacity. For this reason, enhancing the predictability of financing and cost recovery and reducing

investment risks are essential to securing a stable electricity supply.

The approach to financing and cost recovery has been discussed in the “Subcommittee on Next-Generation Electricity and Gas Business Infrastructure Development” and the “Working Group on Institutional Design Based on the Verification of Electricity System Reform” under the Agency for Natural Resources and Energy. These discussions have focused on facilitating financing for large-scale grid development and on the overall approach to financing investments in power sources and transmission systems.

At present, the reinforcement of interconnection lines between Hokkaido and Honshu, between Tohoku and Tokyo, and the frequency conversion facilities between Tokyo and Chubu are being promoted in order to enable wide-area supply-demand adjustment amid increasing regional concentration of power sources. In particular, in the Hokkaido and Tohoku areas, where renewable energy introduction is expanding, it is essential to secure sufficient transmission capacity to smoothly deliver surplus electricity to the Tokyo area, a major demand center. In addition, strengthening the frequency converter stations between Tokyo and Chubu enhances backup functions in the event of disasters or large-scale power source outages, thereby contributing to improved overall system stability and resilience.

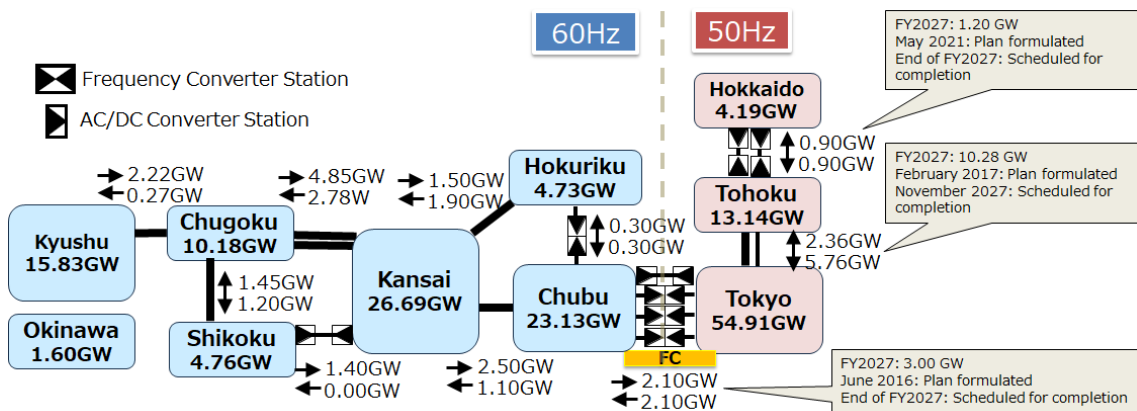


Figure 1: Current Status of Inter-Regional Interconnection Development

[Source] Prepared by The Institute of Energy Economics, Japan, based on materials from the Agency for Natural Resources and Energy

Furthermore, in the Second Long-Term Cross-Regional Grid Development Policy (Master Plan), the base scenario indicates the development of HVDC interconnection lines with capacities of approximately 6 GW between the Hokkaido and Tohoku areas and approximately 8 GW between the Tohoku and Tokyo areas in the eastern region (50 Hz area). In the central and western region (60 Hz area), key measures include reinforcing the Kanmon interconnection line connecting the

Chugoku and Kyushu areas to a capacity of about 2.8 GW, constructing a second interconnection line between the Chubu and Kansai areas, and further strengthening intra-regional grid connections.

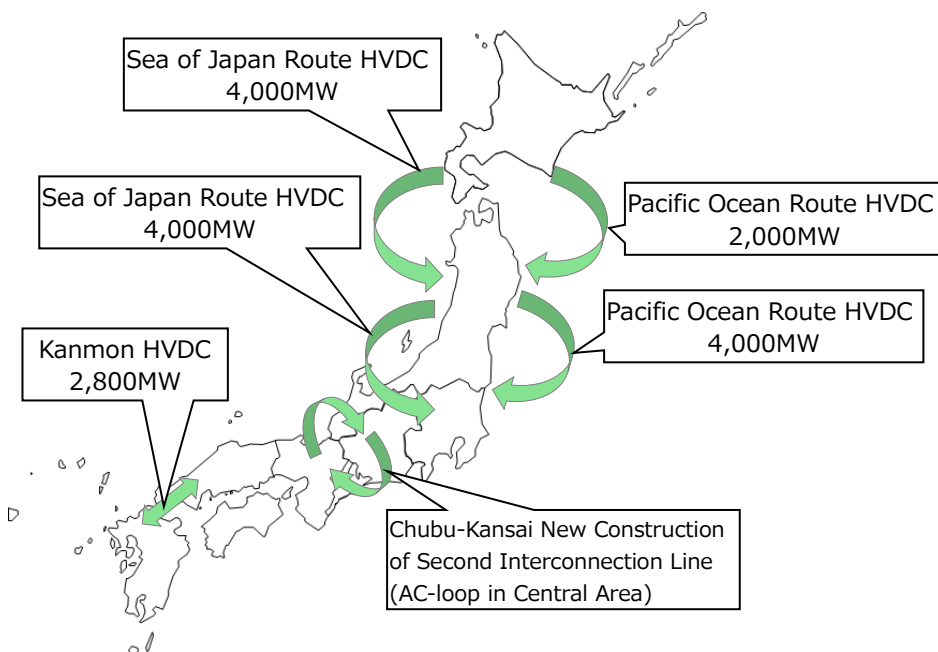


Figure 2: Overview of the Second Long-Term Cross-Regional Grid Development Policy (Master Plan)

[Source] Prepared by The Institute of Energy Economics, Japan

2. Facilitation of Financing for Large-Scale Grid Development, etc.

In order to steadily advance such large-scale development, it is essential to establish mechanisms for financing and cost recovery. As an institutional measure, consideration is being given to making the treatment of congestion rent revenues—arising from price differences caused by congestion in inter-regional interconnection lines—more flexible. In particular, during the grid development period, prioritizing loans over grants is being examined in order to facilitate the repayment of private financing. In the future, the use of such mechanisms is also expected to be extended to intra-regional grid development and measures to secure supply capacity.

Furthermore, within the GX policy framework, the establishment of a new scheme is being considered to provide loans prior to the commencement of operations for grid facilities required to form industrial clusters in GX strategic regions, such as petrochemical complex revitalization models and data center aggregation models. In addition, for grid development projects that meet certain criteria, the introduction of a system is also envisaged that would allow a portion of wheeling charges—normally recovered after the start of operations—to be collected in advance.

Moreover, from the perspective of enhancing the certainty of cost recovery in cases where construction costs of inter-regional interconnection lines increase, it is being considered to establish guidelines outlining the verification approach by the Organization for Cross-regional Coordination of Transmission Operators (OCCTO). Under this framework, cost recovery through wheeling charges would be permitted upon application by the project entity and approval by the Minister of Economy, Trade and Industry.

In addition, as part of a review of the method for incorporating assets into the rate base for calculating business returns, a policy direction has been indicated to facilitate financing by increasing the inclusion ratio of assets under construction from the conventional 50 percent to 100 percent. Furthermore, with regard to subsidies for designated grid facilities, if they are treated as deductible revenue in the tariff cost base at the time of grant, this would lead to a reduction in wheeling charges; therefore, ensuring institutional consistency requires that such subsidies be deducted from the tariff cost base after the commencement of operations.

Table 1: Proposed Measures for Facilitating Financing for Large-Scale Grid Development, etc.

Items	Specific Measures
(a) Flexible Treatment of Congestion Rent Revenues	<u>Revise the mechanism for congestion rent revenues (revenues arising from price differences due to congestion in inter-regional interconnection lines) so that grants and loans can be flexibly determined depending on circumstances.</u> In particular, during large-scale interconnection development, <u>loans will be prioritized.</u> Consideration will also be given to prioritizing repayment of private financing. In the future, applications to intra-regional grid development and supply capacity measures will also be considered.
(b) Loans for Grid Development under GX Policy	Establish a new framework within the GX policy system to <u>provide loans prior to the start of operation for grid development necessary to achieve GX.</u> Targeted facilities include <u>those required for forming “petrochemical complex revitalization-type” and “data center aggregation-type” clusters in GX strategic regions.</u> A mechanism will also be considered to prioritize repayment of private financing.
(c) Advance Recovery of Wheeling Charges, etc.	For grid development projects that meet certain criteria, a system will be established to <u>allow a portion of wheeling charges—normally recovered after the start of operations—to be collected from before the commencement of operations.</u>
(d) Guidelines and Verification for Cost Increases in Inter-Regional Interconnection Lines	<u>Establish guidelines for OCCTO’s verification approach to enhance the certainty of cost recovery when construction costs of inter-regional interconnection lines increase.</u> After application by the project entity and confirmation by OCCTO, approval by the Minister of Economy, Trade and Industry will allow recovery through wheeling charges.

(e) Treatment of Construction Work in Progress in Return Calculation	Review the method of incorporating assets into the rate base for calculating business returns by <u>increasing the inclusion ratio of construction-in-progress assets from 50% to 100% to facilitate financing</u> . Regarding subsidies for designated grid installation, to avoid reducing wheeling charges, they will not be treated as deductible revenue at the time of grant but will instead be <u>deducted from the tariff cost base after the start of operation</u> .
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[Source] Prepared by The Institute of Energy Economics, Japan

3. Grid Investment Finance

In the future, in order to advance decarbonization while ensuring a stable power supply in response to increasing electricity demand, continuous long-term and large-scale investment will be required in decarbonized power sources such as renewable energy and nuclear power, as well as in power grids. However, such investments require a long period before cost recovery, creating a gap between the timing of investment and recovery, which makes it challenging to implement them while suppressing impacts on electricity tariffs. Therefore, from the perspective of enabling smooth investment in decarbonized power infrastructure, in addition to market and institutional development, consideration is being given to establishing financing systems that utilize public credit enhancement and the government’s creditworthiness. The policy objective is to address the potential difficulty of raising sufficient funds solely through private capital due to rising interest rates and the increasing short-term orientation of investors.

This system is intended to support long-term and large-scale investments in power sources and grid infrastructure through co-financing with private financial institutions, with the Organization for Cross-regional Coordination of Transmission Operators (OCCTO) serving as the implementing body. In principle, the system is expected to target projects that require an investment recovery period of 10 years or more, including power generation facilities above a certain scale—particularly decarbonized power sources—as well as inter-regional interconnection lines and core intra-regional grid developments such as extra-high voltage transmission systems. Based on funds procured through fiscal investment and loan programs, loans will be provided up to a certain proportion of the total financing amount. By ensuring repayment certainty and complementarity with private-sector finance—through measures such as the collection of risk premiums, limiting eligibility to projects with long-term PPAs or auction-awarded projects, and introducing a ministerial confirmation process—the aim is to establish a financing foundation that supports the simultaneous realization of decarbonization and stable electricity supply in the power sector.

Table 2: Proposed Measures for Grid Investment Finance

Item	Method of Provision
Background and Policy Objectives of the System	In the power sector, <u>achieving decarbonization and ensuring a stable supply simultaneously requires large-scale and long-term investments in the short term</u> . However, due to rising interest rates and the increasing short-term orientation of investors, there is a possibility that <u>financing cannot be secured through private funds alone</u> .
Overview and Basic Scheme of the System	<u>Establish a public financing system that utilizes the government's creditworthiness, and provide co-financing with private financial institutions</u> for long-term, large-scale investments in power sources and grid infrastructure.
Roles of Implementing Body and Related Entities	<u>The implementing body of the system will be OCCTO</u> , which will provide financing in cooperation with private financial institutions. <u>Eligible entities include power generation operators above a certain scale and general transmission and distribution operators responsible for core grid development</u> .
Application Requirements and Activation Conditions	To respond to expected increases in demand and the advancement of DX and GX, the system will be applied at the necessary timing to secure supply capacity and grid infrastructure, in principle <u>targeting projects with an investment recovery period of 10 years or more</u> .
Target Sectors and Scope of Projects	The system will cover <u>power generation facilities above a certain scale</u> (particularly decarbonized power sources), as well as <u>inter-regional interconnection lines and core intra-regional grid development, such as extra-high voltage transmission systems</u> .
Implementation Method: Financing and Risk Management Framework	<u>Funds will be raised through fiscal investment and loan programs</u> , and loans will be provided up to a certain proportion of the total financing amount based on co-financing with private financial institutions. Repayment certainty and complementarity with private-sector finance will be ensured through measures such as the collection of risk premiums, limiting eligibility to projects with long-term PPAs or auction-awarded projects, and introducing a ministerial confirmation process.

[Source] Prepared by The Institute of Energy Economics, Japan

As described above, it is important to establish a financing framework that reduces investment risks and enables the sustainable implementation of long-term, large-scale investments in power sources and grid infrastructure through measures such as greater flexibility in institutional operations and the introduction of financing systems that utilize public creditworthiness. Through these efforts, improving the predictability and feasibility of investments in large-scale power systems is expected to make it possible, in the future, to achieve both the expansion of renewable energy deployment and the stable supply of electricity in Japan.

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