Environmental Value Management Solusions for Energy Suppliers to Achieve Power Supply Decarbonization

Authors: *Mitsue Imahori*, Fumiya Morikawa*, Ikki Takada**

**Energy systems center*

Abstract

As society works to achieve carbon neutrality, initiatives such as the GreenHouse Gas (GHG) Protocol(1), Renewable Energy 100% (RE100)(2), and 24/7 Carbon-Free Energy (24/7 CFE)(3) are garnering attention, and there is rapidly rising demand among consumers for decarbonization. To meet this need, electricity retailers are diversifying their lineup of power plans with environmental value, and sales volumes are also increasing. As a result, electricity retailers are facing the challenge of increasingly complex operations relating to environmental value, such as linking renewable energy sources with consumers and managing non-fossil fuel energy certificates. In response to this situation, Mitsubishi Electric has developed BLEnDer CN for Supplier (hereinafter referred to as "CN for Supplier"), a cloud-based Software as a Service (SaaS) product equipped with functions to manage the environmental value of electric power. This service is part of the "BLEnDer"*1 series of products for the power market that enable comprehensive handling of electricity trading and supply and demand management. With CN for Supplier, we have begun providing services to help reduce the operational burden on electricity retailers and prevent human error, while supporting maximum utilization of the environmental value they possess.

1. Introduction

As efforts to achieve carbon neutrality accelerate globally, governments, companies, and other organizations are strengthening the steps they are taking while fulfilling their respective roles. For example, countries are strengthening regulations and introducing carbon taxes to curb greenhouse gas emissions, and in Japan too, companies are legally required to promote renewable energy adoption and reduce greenhouse gas emissions based on the Act on Sophisticated Methods of Energy Supply Structures (hereinafter referred to as the "Sophisticated Methods Act")*2 and the Act on Promotion of Global Warming Countermeasures (hereinafter referred to as the "Warming Countermeasures Act")*3. Furthermore, from an ESG management*4 perspective, the emphasis is on efforts to reduce environmental impact, and there is a need for decarbonization across the entire supply chain. Companies that fail to respond to this challenge may face not only a declining reputation among stakeholders but also risks such as loss of business opportunities and exclusion from markets. Thus, there is a growing recognition that achieving carbon neutrality is not just a responsibility to be fulfilled as a member of society, but also an imperative for companies to achieve sustainable growth.

Under these circumstances, environmental value derived from non-fossil energy is attracting attention as an important way to achieve carbon neutrality. For example, RE100 advocates the goal of "sourcing 100% of power used from renewable energy." One way to work toward this goal in Japan, where fossil fuel-based thermal power generation is the mainstream, is to claim that power is CO_2-free by adding environmental value procured from the non-fossil value trading market to the supplied power. In this way, companies can promote CO_2 emissions reduction across the entire supply chain by utilizing environmental value, and clearly demonstrate their proactive efforts toward decarbonization to stakeholders. Also, international standards and initiatives aimed at promoting adoption of renewable energy include the GHG Protocol, RE100, and

*1 Abbreviation for Bid Liaison and Energy Dispatcher.

*2 A law requiring suppliers of non-fossil energy to improve the ratio of non-fossil power sources in their supplied power.

*3 A law requiring businesses and local governments to reduce greenhouse gas emissions and promote global warming countermeasures.

*4 Management approach emphasizing the three elements of Environment, Social, and Governance.

24/7 CFE, and in the future, there is a possibility that hourly matching[*5], supply in the same area, and supply from renewable energy sources with additionality[*6] may be required. Against this backdrop, it will be important for electricity retailers to expand their lineup of power plans with environmental value and provide more flexible and diverse options to companies and environmentally-conscious low-voltage consumers.

Electricity retailers have come to play a role in providing environmental value through power plans with environmental value, and the nature of their operations is also undergoing significant changes from their previous situation. For example, to support the promotion of renewable energy use, electricity retailers need to engage in new operations such as: procuring environmental value required by companies and other consumers, appropriately allocating the procured environmental value according to factors such as consumer needs and the requirements of various environmental standards and institutional systems, managing inventory levels of environmental value to monitor continuous supply, and preparing external reports on supply results for consumers. At present, many electricity retailers do not have much data to manage, so they handle environmental value supply operations using spreadsheet software and similar tools. However, with the expansion of plans and increase in consumers, the amount of data to be handled is expected to increase rapidly in the future, making electricity retailers' operations increasingly complex and making it essential to establish systems that provide efficient operational support.

Mitsubishi Electric is deploying the BLEnDer series of products for the power market. In this paper, section 2 describes the nature of the operations of electricity retailers, and section 3 discusses CN for Supplier, an SaaS product in our BLEnDer series designed for electricity retailers that supply power plans with environmental value, including the product's development background, functions, and features.

2. Electricity Retailer Operations

Figure 1 shows the operational flow of an electricity retailer with regard to environmental value. Operations are broadly divided into: creating and managing power plans with environmental value, collecting information on power supply and demand volumes, allocating environmental value, purchasing and managing non-fossil fuel energy certificates, managing environmental value inventory, and external reporting of supply results.

(1) Creating and managing power plans with environmental value

Master data—such as sources of procured environmental value (renewable energy sources, non-fossil fuel energy certificates, etc.), power plans with environmental value, and consumers—is registered in the customer information system. This information is transcribed to spreadsheet software or a similar tool, and linkage information is created that shows the relationships between sources of environmental value and consumers for each plan.

(2) Collecting information on power supply and demand volumes

Data on planned generation, measured generation, planned demand, and measured demand is output from the supply and demand management system and transcribed to spreadsheet software or a similar tool. If we consider, in particular, the possibilities that 24/7 CFE may be realized and that the non-fossil fuel energy certificate system may follow international standards in the future, the allocation units for environmental value are likely to become finer grained, increasing the amount of data to be taken in.

(3) Allocating environmental value

Allocation targets and allocation amounts of environmental value are calculated manually based on linkage information that shows relationships between sources of environmental value and consumers, and supply and demand data. For example, to achieve 24/7 CFE, it is necessary to allocate environmental value in hourly units without excess or shortage.

(4) Purchasing and managing non-fossil fuel energy certificates

Information on non-fossil fuel energy certificates purchased from the renewable energy value trading market and the market for achieving the obligations under the Sophisticated Methods Act is manually transcribed into spreadsheet software and other applications. It is necessary to ascertain the types and required quantities of environmental value that match consumer needs and procure them with the appropriate timing.

*5 Matching renewable energy-derived power generation with consumption.
*6 Effect of promoting the addition of new renewable energy sources.

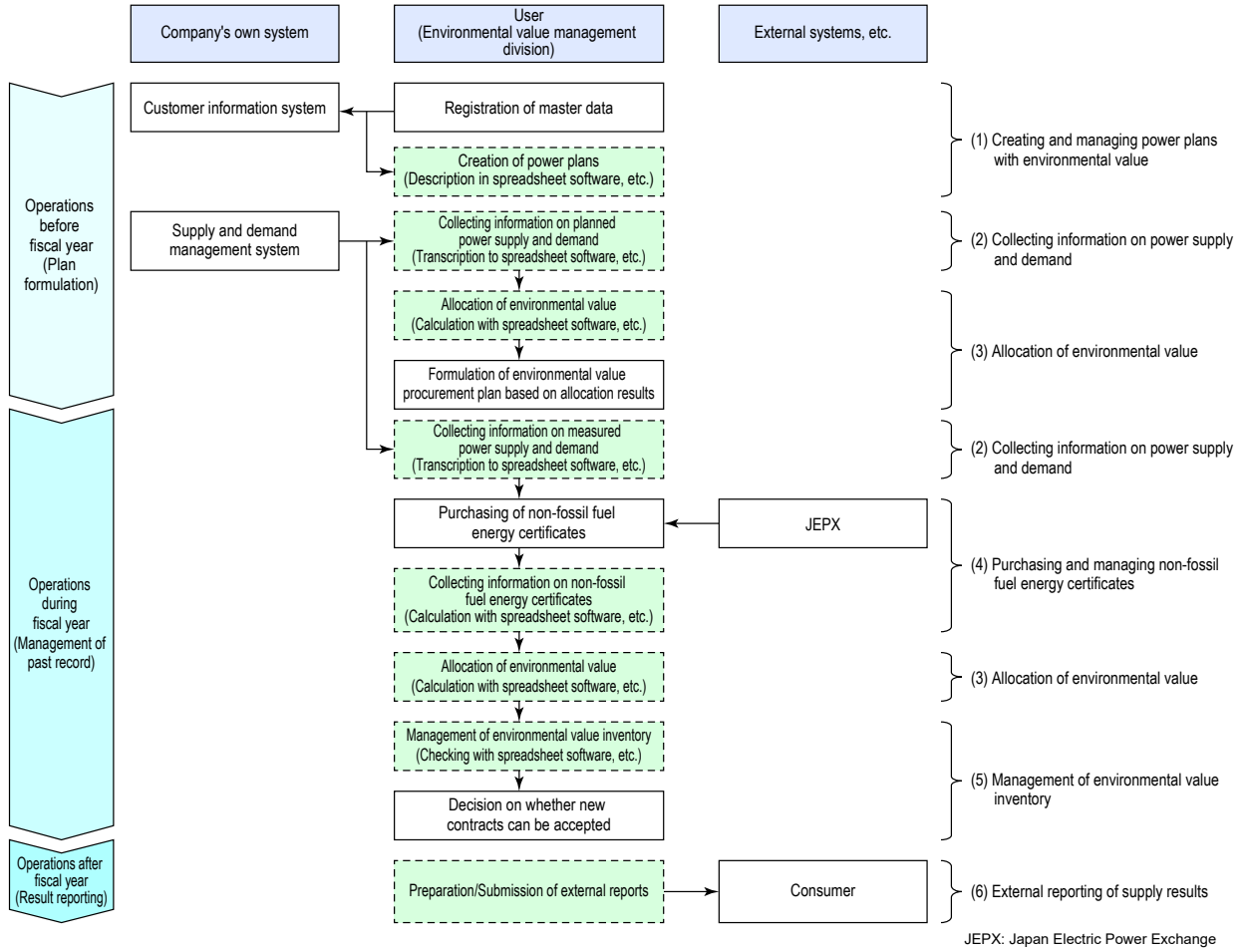

Fig. 1 Operational flow of environmental value management

(5) Managing environmental value inventory

To check for excess or shortage of procured environmental value, it is necessary to manually calculate inventory quantities using spreadsheet software and other tools.

(6) External reporting of supply results

Data necessary for external reporting is collected, and reports are prepared based on that data. Allocation results are reported to consumers. Other information is also reported, such as the non-fossil ratio of supplied power under the Sophisticated Methods Act, and greenhouse gas emissions under the Warming Countermeasures Act.

3. CN for Supplier

As interest in environmental value increases and the number of consumers grows, the types of environmental value that are in demand are also increasing. As a result, linkage information is increasing, and the burden of manually creating and managing plans is expected to increase significantly. Furthermore, manual data transcription and allocation calculations are not realistic for gathering power supply and demand data and allocating environmental value in fine-grained units.

This section describes the development background, functions, and features of CN for Supplier, developed by Mitsubishi Electric to support these electricity retailer operations.

3.1 Functions and service composition

Figure 2 shows the functions of CN for Supplier, together with related SaaS products. CN for Supplier operates in conjunction with our services for electricity utilities—BLEnDer BG (power supply and demand management service), BLEnDer DEP (Digital Energy Platform), and BLEnDer ICE (battery-powered wireless terminals for sensor networks)—and is provided as an environmental value management SaaS.

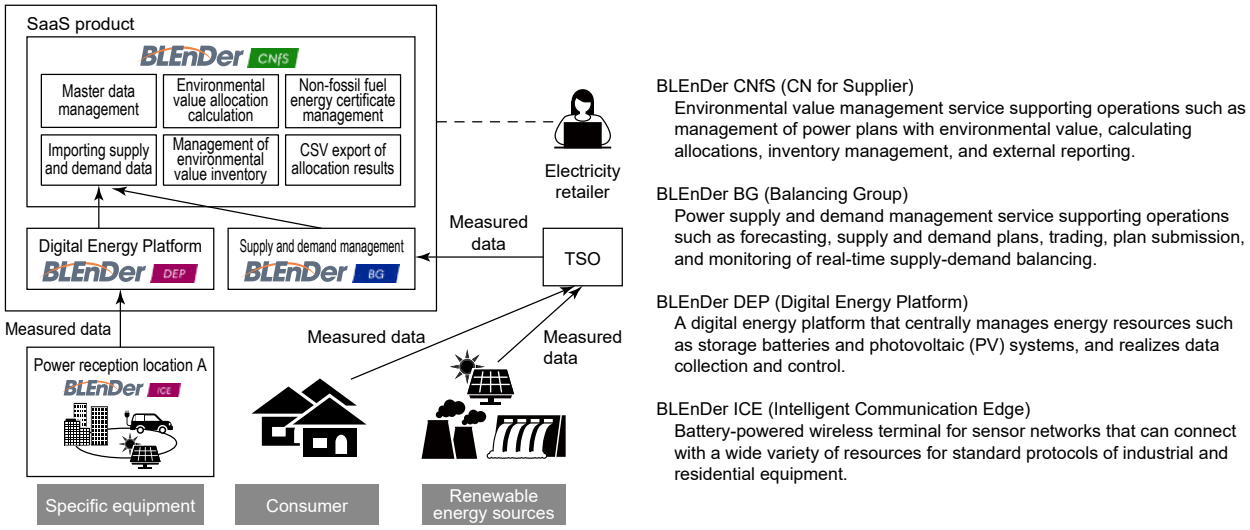

Fig. 2 Composition of environmental value management SaaS provided by Mitsubishi Electric

(1) Master data management function

This function centrally manages master data such as contracted consumer information, information on power plans with environmental value, and renewable energy sources. It also manages linkage information showing the relationship between the sources of procured environmental value and consumers for each plan. When attributes are set, such as renewable energy type, area, and additionality for plans and environmental value sources, respectively, linkage information that connects items with the same attributes is automatically created, and this can reduce the burden of manual matching work.

(2) Import function for supply and demand data

For users who have BLEnDer BG, we provide a function that automatically links planned generation, measured generation, planned demand, and measured demand in 30-minute units from BLEnDer BG. For users who do not have BLEnDer BG, on the other hand, we provide a tool that converts linked supply and demand data in CSV format from the supply and demand management system they have into the format for CN for Supplier.

(3) Function for calculating environmental value allocation

This function allocates environmental value to consumers based on CN for Supplier's proprietary logic. When allocating, the function considers the contract details of power plans with environmental value, planned and measured volumes for generation and demand, and the attributes of procured environmental value. Allocation processing can perform matching in units as short as 30 minutes.

(4) Function for management of non-fossil fuel energy certificates

This function manages information on non-fossil fuel energy certificates purchased from the renewable energy value trading market and the market for achieving the obligations under the Sophisticated Methods Act.

(5) Environmental value inventory management function

This function calculates power generation and environmental value equivalent[*7] for each Feed-In Tariff (FIT) and non-FIT power source owned by the electricity retailer's power generation division, the amount of environmental value procured by the retail division, and the environmental value allocation amount for each consumer and power source after environmental value allocation calculation. It provides screens where calculation results can be confirmed in various units such as by power source or by consumer, and in annual, monthly, or 30-minute units.

(6) Function for CSV export of allocation results

This function outputs data necessary for preparing reports for external reporting, such as environmental value allocation results, in a CSV file.

*7 The amount of environmental value derived from non-fossil power sources, calculated based on generation.

3.2 Features

Mitsubishi Electric provides various products aimed at solving challenges pertaining to the power market, and by linking these products with each other, we can achieve more effective operational support. The features of CN for Supplier are as follows.

(1) Improved operational efficiency and optimization of environmental value procurement through automatic linkage of supply and demand data

BLEnDer BG handles power management, while CN for Supplier handles environmental value management. Data linkage between these two functions enables procurement of environmental value based on demand forecast data, thus making it possible to avoid excess or shortage in environmental value procurement. Furthermore, data linkage is automated, so this can also prevent human error such as data input mistakes.

(2) Simplification of monitoring of the past record of environmental value supply by providing a screen to check allocation results

A screen is provided where environmental value allocation results for each power source and consumer can be visually confirmed. Figure 3 shows a screen that displays allocation results for consumers who have contracted for matching plans in 30-minute units. At this screen, it is easy to confirm the supply capacity type of environmental value allocated to each consumer and whether there is any excess or shortage in supply, in both annual and 30-minute units.

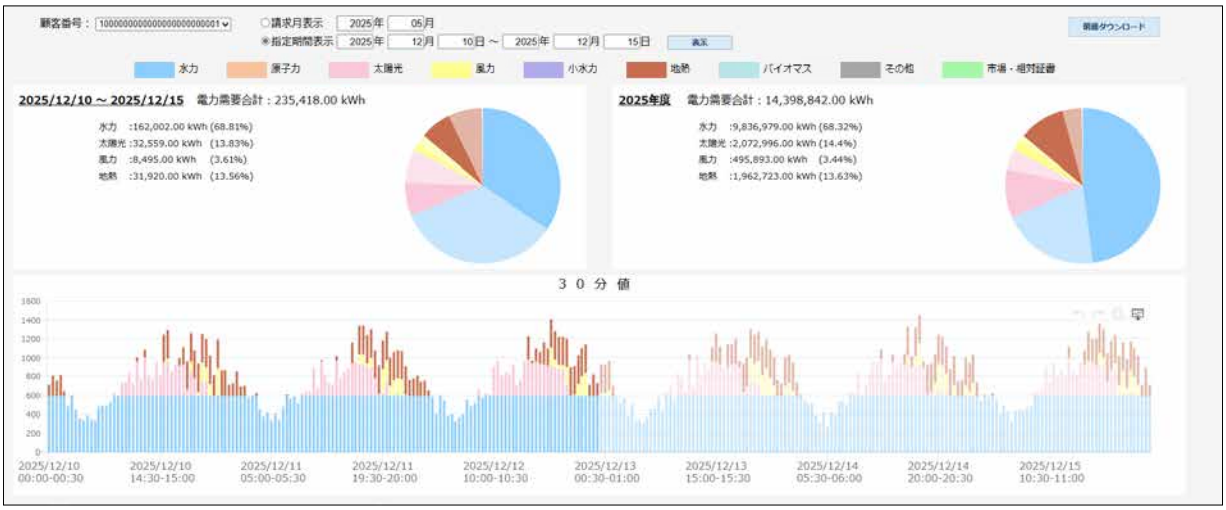

Fig. 3 Screen for checking environmental value allocation results

(3) Dealing with the requirement for realizing real-time matching

Supply and demand data is linked from BLEnDer BG in 30-minute units, and based on this data, matching is performed with environmental value equivalents in 30-minute units. Going forward, requirements of the GHG Protocol, RE100, and other initiatives may include matching in hourly units. CN for Supplier has already realized this idea. We have also introduced a system that collects consumption data for each piece of equipment via BLEnDer DEP, from BLEnDer ICE installed for each piece of power consuming equipment within a location. This enables matching in equipment units.

4. Conclusion

This paper has described CN for Supplier provided by Mitsubishi Electric. CN for Supplier is an SaaS product that supports the environmental value supply operations that electricity retailers are newly taking on. More specifically, the SaaS based on CN for Supplier provides functions to support operations such as: creating and managing power plans with environmental value, collecting information on power supply and demand, allocating environmental value, purchasing and managing non-fossil fuel energy certificates, managing environmental value inventory, and external reporting of supply results. In this way, it is expected that we can flexibly respond to diverse consumer needs while achieving greater operational efficiency and business growth for electricity retailers.

Going forward, our direction will be to aim for expansion of products that can be adopted not only by electricity retailers, but also by power generators that own renewable energy sources and all businesses that need emissions management. This will further promote decarbonization across the entire supply chain and contribute to achieving carbon neutrality.

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