The Kansai Electric Power Co., Inc.
Using Artificial Intelligence to analyze smart meter data and detect lifestyle rhythm changes

Deregulation of Japan's electricity market is causing the competition between power companies to intensify. The key to becoming a 'provider of choice' for customers is to create value-added services that match their electric power needs. The Kansai Electric Power Co., Inc. (KEPCO) uses data from smart meters to identify the lifestyle patterns of individual residents. When the resident's electricity use deviates from normal behavior, a message is sent to inform his or her family, who may be living elsewhere. This is the concept behind KEPCO's "Lifestyle Rhythm Notification Service." Following field tests undertaken with Fujitsu, KEPCO has started providing this service, which incorporates Artificial Intelligence (AI)-based technologies.

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> *Customer HQ*
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Remaining the 'provider of choice' in the midst of electricity market deregulation

The electricity market deregulation in Japan began from April 1, 2016, and this allowed regular households, stores, and other general consumers to select their own electricity providers, services, and fee structures.

Prior to market deregulation, KEPCO was promoting a shift from analog electricity meters to smart meters, with information and communication functions that collect usage status data every 30

minutes. Smart meters enable providers to capture electricity usage data via their networks in real time, making monthly meter-reading visits a thing of the past. This has provided a huge benefit.

KEPCO has been pushing data visualization using smart meters for some time, and developed services accordingly. These include "Hapi e-Miruden," a web-based membership service that allows customers to verify their current electricity use and charges. Kazutaka Yamamoto, Living Sales Planning Group, Customer HQ of KEPCO says, "Using the features of smart meters, which can collect usage data of each household every 30 minutes, we pondered the possibility of delivering services that are even closer to our customers' lives. This prompted us to launch our 'Lifestyle Rhythm Notification Service' concept in 2016. Through this service, we monitor the electricity usage status of elderly or other people living alone, and notify their families living far away when the pattern deviates from normal behavior."

Using Artificial Intelligence to address decision-making logic, which is difficult to create patterns

Chronological changes in electricity usage closely reflect the lifestyles of each household. Identifying the usage patterns of each household, therefore, should enable providers to capture changes in lifestyle rhythms with greater accuracy. According to Mr.

Yamamoto, "A look at the actual usage curves reveals numerous variations according to family. Even within the same household, we noticed major variations depending on the day of the week and the season. So we concluded that we could not simply create patterns to reflect changes in electricity usage, and we chose Fujitsu as our partner to help us incorporate high-precision analytical logic without deviating from real-life situations."

There were 2 main reasons for choosing Fujitsu. The first was the excellent analytical track record of Fujitsu's Data Curation Service. Fujitsu and KEPCO have also conducted joint research into the use of smart meters since KEPCO introduced its "Hapi e-Miruden" membership service, allowing customers to verify their electricity use in real time. The other reason was Fujitsu's Marketing AI Container (a provisional name), a platform for efficiently realizing high-precision analytical logic using AI. Kazutaka Yamamoto explains, "Our 'Lifestyle Rhythm Notification Service' is for all homes that use smart meters. The fact that we can access Fujitsu's highly reliable cloud, which enables the flexible scaling of data that comes in increasing volume with the spread of smart meters, was a major selling point." Reijiro Matsui adds, "We noticed the presence in Fujitsu of dedicated data scientists with extremely high levels of expertise, and we were very encouraged by Fujitsu's development of AI algorithms for analyzing specific patterns in each household."

Forging ahead to improve change-forecasting accuracy and diversify services

KEPCO then started field-testing its "Lifestyle Rhythm Notification Service." KEPCO realized that the electricity usage status of each household was more complicated than expected. To address this, KEPCO used Fujitsu's Data Curation Service to analyze the data. This revealed various patterns, such as (1) extremely low electricity charges, (2) the prominence of certain trends, (3) large variations between users, (4) high early-morning and daytime use, and (5) plenty of use at night. Using high-precision analytical technologies based on machine learning, KEPCO conducted ongoing analysis of data gathered and compiled over a one-year period. This enabled KEPCO to refine high-precision AI algorithms that can be applied to numerous patterns, as well as to enhance the accuracy of forecasts. During the field tests, KEPCO conducted regular questionnaire- and telephone-based surveys of the residents and their families. According to Kazutaka Yamamoto, "As a result, we confirmed our ability to issue AI-based alerts in a timely manner reflecting real-life situations. Several residents commented that they could live their lives naturally, without the feeling of being watched. And their families said they felt peace of mind knowing that their loved ones had a normal day, not just when irregularities occurred."

The "Lifestyle Rhythm Notification Service" was launched in July 2017 for all households with smart meters installed. All you need is a smart meter and you can access the service free of charge, so there's no added installation costs compared with regular monitoring services. And the increasing use of AI-based decision-
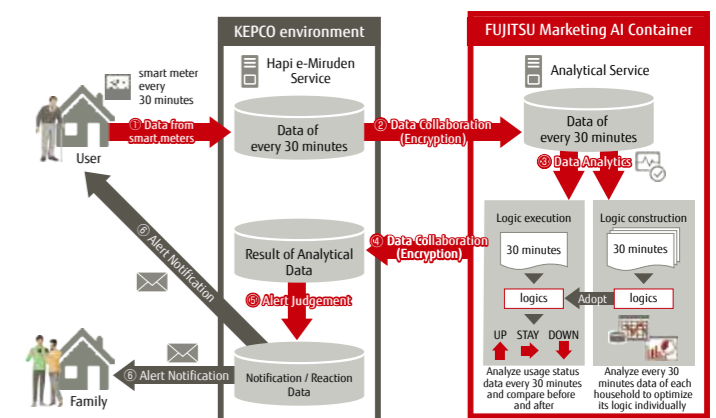
Mechanism of Lifestyle Rhythm Notification Service

making logic leads to better optimization tailored to each household, which is another big plus. "When utilizing AI and other advanced technologies, it is more important than ever to strengthen collaboration with partners who have specialist expertise. We wish to provide increasingly high-value-added services, based on alliances with companies in sectors that serve individual households directly, such as social issues which are home delivery and home-visit nursing care," concludes Reijiro Matsui.

In addition to forecasting lifestyle rhythms, information provided via smart meters can be used in other ways, such as the management of vacant residential properties. We believe that the measures taken by KEPCO can be expanded to promote interactions with people, maintain security in local communities, and otherwise address issues caused by Japan's ageing population and urbanization.