KT-MEG: Korea's Smart Energy System

About the GSMA

The GSMA represents the interests of mobile operators worldwide, uniting nearly 800 operators with more than 250 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and Internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces industry-leading events such as Mobile World Congress, Mobile World Congress Shanghai, Mobile World Congress Americas and the Mobile 360 Series conferences.

About Korea Telecom

Expanding 4.5 million fixed lines to 20 million in just 12 years, kt introduced universal telephone service to every citizen of Korea, leading the development and advancement of communications services. More recently, kt established an advanced broadband network for the first time in Asia, and launched Korea's first communication satellite 'Mugunghwa (Sharon's Rose)', contributing to making Korea one of the most advanced countries in information and communications.

About the GSMA Internet of Things programme

The GSMA Internet of Things programme is an initiative to help operators add value and accelerate the delivery of new connected devices and services in the Internet of Things (IoT). This is to be achieved by industry collaboration, appropriate regulation, optimising networks as well as developing key enablers to support the growth of the IoT in the longer term. Our vision is to enable the IoT, a world in which consumers and businesses enjoy rich new services, connected by an intelligent and secure mobile network.

Summary

In 2015, Korea Telecom, working with the Government of South Korea, made the decision to fundamentally transform the country's energy system. Rather than meet the growing energy demand by building power plants, they resolved to introduce a system that could both reduce waste and cut energy prices.

That system is KT-MEG, the Internet of Things (IoT) demand response platform that uses micro grids, cloud-based analytics and variety of mobile networks and communication mediums to manage the supply and consumption of energy throughout Korea. Powering more than 18,000 sites, each with disparate energy requirements, the Korean mobile network operator has enabled more efficient energy use for power plants, vehicle charging points and a variety of other businesses.

The demand for smart energy

Across the globe, governments and energy suppliers are increasingly recognising the advantages of renewable and smart energy systems. However, according to the Korea Energy Agency, as of May 2017, only 6.61% of South Korea's electricity is generated by renewable energy sources.

Compounding this issue was Korea's tightly controlled energy market. Until 2015, the generation and supply of Korea's energy was the exclusive responsibility of KEPCO, Korea's dedicated utility company. Recognising the need for stimulation in this sector, the government introduced phased liberalisation of the country's energy market, which eventually enabled competitors to enter the market. At the same time, the government-sponsored R&D project 'Korea Micro Energy Grid' was launched, allowing KT to develop a smart grid solution that would form the basis of KT-MEG.

South Korea's electricty generated by renewable sources

Korea Energy Agency, May 2017

The modernisation of Korea's energy policy allowed KT the opportunity to apply much of its traditional strengths to the utilities sector. The operator found that its extensive experience of managing secure and reliable connected solutions, billing platform capabilities, nationwide networks and investment in new technologies such as artificial intelligence (AI) and Mobile IoT (LPWA in licensed spectrum), could all be used to help support sustained development of the country's energy market. According to KT's Smart Energy Business Unit Senior Vice President Young-Myoung Kim, the company's move into the energy market was a logical extension of its capabilities in network management "as a mobile network operator, our expertise in network monitoring and maintenance makes us ideally suited to understand and improve the modern energy market."

How it works

Available to both energy consumers and suppliers, customers can connect to KT-MEG through LTE-M, 3G/LTE, RFID, fixed-line communications and, as of next year, the Korean operator will add NB-IoT to its portfolio of network technologies. With its range of connectivity mediums, KT-MEG has very few restrictions on where it operates and what type and size of business it can serve. With the operator's commercial launch of Mobile IoT (licensed spectrum low power wide area technologies), the solution will be able to expand the number of businesses it can serve due to the technologies' ability to operate in very hard-to-reach or extremely remote locations, such as underground, or areas with minimal coverage.

Energy use is relayed to the network control centre in Gwacheon, where experts monitor site usage and micro grid demand to inform them of how to ensure optimal grid balancing and power distribution. Supporting this task is KT's cloud-based analytics platform, the 'e-Brain', which analyses usage trends and performs diagnostics in real time. Capable of machine learning, KT's e-Brain is able to factor weather, usage patterns and profitability to generate its own prediction models that enable efficient management of energy generation, energy consumption, energy trading and vehicle charging.

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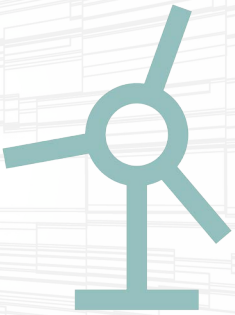
>
> - Young-Myoung Kim, Smart Energy Business Unit Senior Vice President

Energy generation

KT-MEG has been integrated into many of the nation's power stations, including 247 renewable energy sites. It aids energy producers by providing real time remote monitoring, diagnostics and, for solar energy sites, consolidated PV-ESS management (GiGA energy gen). Power stations using KT-MEG, have been able to make significant savings. For example, solar power sites in Yeoju and Jeonnam have significantly increased the number of hours in which they generate power per day, respectively producing 3.98 hours and 3.88 hours compared to the national average of 3.5 hours.

The Korean operator estimates that these efficiencies add up to colossal savings. They calculate that, if adopted by all the nation's power plants, with proper management and distribution of power demands, KT-MEG could make an energy saving equivalent to 5 new nuclear plants operating in peak demand – 10% of the country's electricity usage. Delaying or eliminating the construction of additional power plants would result in vast savings for the Government and help the country meet its national carbon reduction goal.



Integrated into

257

renewable energy sites

Could save

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Energy consumption & trading

The KT GiGA energy manager allows a wide range of businesses the means to reduce their consumption, principally by enabling more efficient use of heating, ventilation and air conditioning (HVAC) and lighting facilities. Business customers connected to KT-MEG have the opportunity to observe real time consumption and adjust their energy use through the GiGA energy manager dashboard. Additionally, businesses can also make use of KT's remote monitoring and analysis to provide forecasts, peak management and optimisation guides.

Complementing this is KT's GiGA energy Demand Response, which allows businesses the opportunity to profit from reducing their consumption during periods of high demand and increase their consumption at times when there is less demand. By monitoring energy use in real time, KT are also able to advise customers when to make these trades and reduce the risk of outages at times of high demand.

Businesses that have adopted KT-MEG have seen their power energy consumption drop dramatically. For example, the Bupyeong hospital has reduced its energy consumption by 54%, while a sports complex in Gwangju has experienced a 75% reduction in its energy use since using KT-MEG.

Vehicle charging

A key pillar of KT-MEG, the electric vehicle (EV) charging service (GiGA energy charge) allows electric car drivers a simple way to access over 16,000 charging points scattered across Korea.

At times of low car battery, the EV charging service automatically alerts registered drivers to the nearest charging points and notifies them each station's availability and status. From here, drivers can then make reservations at a charging station of their choice. Similar to other sites that use KT-MEG, the energy use of each charging point is monitored, allowing KT to ensure that the optimum amount of power is supplied to each site.

KT-MEG: future deployments

Having achieved significant commercial success, KT have already announced plans to develop KT-MEG into a more sophisticated smart energy efficiency service by 2018. This will underpin the operator's smart city strategy, in which they hope KT-MEG can incentivise the connection of new devices and services.

Central to this is operator's ambition to improve Korea's urban infrastructure. Adding to the nationwide deployment of the EV charging points, KT have stated their goal to establish widespread monitored smart parking and intelligent transportation, of which LTE-M or NB-IoT could play a key role. The operator has also confirmed their plans to replace existing streetlights with multipurpose LED lamps that connect to a central management system, and is working with various regional governments to reach this goal.

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