Industry

Smart Grid: Key to the Creative Economy

Korea is pursuing a smart grid strategy that would contribute to its economic growth.

With a global effort to reduce greenhouse gas emissions to prevent global warming, countries worldwide are actively implementing various programs to research, develop, verify and distribute smart grid technologies.

Smart grids have caught the attention of the incumbent administration as key for a creative economy – not only to solve environmental problems, but also to cultivate small- and medium-sized enterprises (SMEs), reduce energy consumption and create a new future growth engine through technology convergence (power + information technology). Thus, vitalization of the industry is considered very important.

Concept and Benefits of Smart Grid

A smart grid can be defined as a next-generation power network that combines information and communication technology (ICT) with a supplier-centered power supply to optimize energy production and consumption through real-time data interchanges between suppliers and consumers.

In other words, it is a smart concept that applies information and communications technology (ICT) to the power network to manage power production and consumption data and efficiently use distributed resources.

It was difficult to respond to power peaks, etc., in the existing power system, since it was practically impossible to store surplus power or predict power demand in real time. A smart grid increases the efficiency of power consumption by properly distributing power usage.

Domestic Implementation Status and Prediction

Korea constructed a test site in Jeju Island in 2009, and it has invested KRW 249.5 billion (USD 246.9 million), (KRW 76.6 billion from the government and KRW 172.9 billion from the private sector) to verify and commercialize related technologies. In January of 2010, the government announced the National Roadmap for Smart Grid with a plan to develop the smart grid in three phases by 2030. The roadmap presented the goal of constructing a nationwide smart grid network by investing KRW 27.5 trillion (KRW 7.1 trillion for technology development and KRW 20.5 trillion for infrastructure development) by 2030. In May of 2011, it enacted the Act on the Creation and Facilitation of Use of Smart Grids as a special law for creating the world’s first nationwide smart grid. To implement the smart grid diffusion project, it selected potential contractors to participate in the diffusion project (October 2013), which will be kicked off in 2015 after undergoing necessary procedures, including a feasibility study (April 2014) by the Ministry of Strategy and Finance. The project will be performed by a consortium made up of eight companies (Hyundai Heavy Industries, POSCO ICT, GIMCO, KEPCO, LS IN, SKT, Hyundai AutoEver and KT) as well as 27 municipalities in 16 metropolitan regions and about 90 SMEs with a total budget of KRW 876.5 billion (KRW 316.5 billion from the government, KRW 89.4 billion from municipalities and KRW 470.6 billion from the private sector).

The expected economic and other benefits of the diffusion project include savings of KRW 178.5 billion in power plant construction, KRW 152.3 billion in the construction of power transmission and distribution and KRW 365.2 billion in power generation energy, not to mention KRW 28.1 billion for the reduction of carbon emissions (6 percent reduction). Moreover, it is expected to translate into KRW 77.5 billion in economic growth, KRW 22.5 billion in tax revenue increases, 19,478 new jobs (for 10 years) and the creation of KRW 1,172 trillion in added value.

Standardization

As described above, a smart grid is a convergence industry linking many devices and systems. Developing and operating such a complex system requires the correct connection of various products and systems for that, a standard is needed. Standardization is a very important factor for dominating a market. As the saying goes, “The person who troubles the standard dominates the market.”

The Korea Smart Grid Association is contracted to develop the standard for smart grids in Korea through the Smart Grid Standardization Forum considering the Framework 1.0 as well as the direction of government policies. It is trying to develop a market-based standard by identifying the standards needed by the market through demand surveys.

Currently, 40 national and organizational smart grid standards in areas including AMI (smart power meter, security, etc.), electric vehicle recharging infrastructure (recharger, connector, etc.), distributed power source and electric energy storage system and demand reaction have been established and distributed. Moreover, the association is actively participating in international standardization efforts to seize early leadership in markets such as electric energy storage systems and electric vehicles.

Smart Grid Market Forecast

According to GTM Research, the accumulated value of the smart grid market will exceed USD 401.6 billion, and CAGR will be 8.4 percent in 2020. China will be the largest market, with a global market share of 24 percent or more, followed closely by North America (23.9 percent), Asia-Pacific (21.2 percent) and Europe (20.6 percent). Although investment in smart grids in Latin America, which has a 10.2 percent share of the global market, is expected to be the lowest, it is forecast to record the greatest growth in the next 10 years.

Regional Growth Forecast of Smart Grid, 2013–2020

New Business Creation and Forecast

Experts predict that various business opportunities will appear in areas of efficient energy utilization and high-quality power through smart grids. As bidirectional information interchanges between power suppliers and consumers spread, the power supply-demand status and price information are seen to emerge as the key factors of new business.

As such, new businesses are likely to be created as devices such as AMI, demand-sensitive smart appliances and electric energy storage are introduced and connected to the information network.

The market is being created in the smart meter area first. In the global AMI industry, China is expected to record the largest growth, with its market estimated to grow from USD 45 million in 2013 to USD 270 million in 2020. Europe is also forecast to grow from USD 52 million in 2013 to USD 186 million in 2020.

Demand for electric energy storage is also likely to increase, sharply due to increasing demand to store power from the distributed power system or nighttime surplus power as well as growing demand for the storage system needed to control power as the portion of new and recycled energy generation increases. The market size is expected to grow from KRW 10.6 trillion in 2011 to KRW 58.6 trillion in 2020.

Export by Korean Companies

As shown by the overseas demonstration of the K-MEG project and entry into the U.S. and European markets by Korea’s leading battery manufacturers (LG Chemical, Samsung SDI, etc.), Korean companies are performing well in global markets in areas including micro grids, electric energy storage systems, electric vehicles and AMI.

They are aggressively penetrating overseas markets, with KEPCO signing a memorandum of understanding with Dubai Water and Electric Authority (DEWA) for the first grid-connected 60MW smart grid technology and LS IS signing the largest smart grid contract in Iraq.

Moreover, SMEs with outstanding technology are making their presence felt in overseas markets with KOKAM’s entry into the United States’ EES market, Nuri Telecom’s export of AMI to Europe and PNE Solution’s supply of electric vehicle chargers in Japan. As such, exports in the smart grid area are forecast to continue growing.

Conclusion

The smart grid development project led by the government is expected to decrease greenhouse gas emissions by a total of 230 million tons, create approximately 50,000 jobs and induce KRW 74 trillion worth of domestic consumption. Moreover, international competitiveness will improve to reduce energy imports by KRW 47 trillion and increase exports to KRW 49 trillion.

Korea is actively implementing the smart grid strategy to expand the export of smart grid products and services so as to contribute to national economic growth. Increasing exports facilitates the continuous growth of related industries, which is expected to accelerate the convergence industry of energy and ICT.

In Korea, an energy importing country, finding the solution to the energy problem is a must, not a choice. Similarly, the smart grid industry has become a new opportunity. Just as the Internet changed the world, smart grids will surely change our lives once more.