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More than the simple addition of "Internet+ energy" or a business model for energy transactions, the Energy Internet means universal connectivity for the entire industry chain. >>

Energy Internet — Not a Simple Equation

By Yu Liao, Chairman of the Chinese Association for Renewable Energy in Germany

With the inception of the Internet+ era, circa 2015, debate over defining the Energy Internet has begun. So far, even the clearest definition of the concept, using the most accurate technical language, has not delivered a single, clear specification that encapsulates the full scope of technical innovations and business models the industry aspires to achieve.

Persistent digitalization and the evolution of "Smart Grids" are the first, most critical factors contributing to the birth of the Energy Internet. European Union (EU) members have been privatizing power utilities for more than 10 years following Germany's lead as the electricity transmission hub of Europe. In 2005, the EU established the *European Technology Platform for the Electricity Networks of the Future*. With the number of new energy carriers expected to double between 2007 and 2029, the requirements calling for existing grids to install more intelligent power transmission and distribution networks is rising.

To reduce power consumption without adversely impacting industrial capacity or consumer lifestyles, the Energy Internet proposes to bring alternative energy sources into primary power grids through the use of incentives to encourage greater efficiency.

A Smart Project

The core component of an Energy Internet demonstration project in Austria features a central thermal control room that is connected remotely to a "household energy processing unit" that adjusts the energy output of the entire system. The functional components of the system include a geothermal heat pump powered by biological liquefied gas and a municipal heat supply. A thermal buffer pool containing ninety liters of water provides heating for the entire six-story building, and the thermal control system adjusts room temperatures, humidity, and carbon dioxide levels in each individual unit.

The user management center factors the projected electricity price curve for the next twenty-four hours. When the price is reasonable, the center notifies customers to turn on their heat pumps remotely — electricity that is used to heat the thermal buffer pool; that alone, when full, will satisfy the heating requirements of the entire building for two days.

A monitoring application on each resident's mobile phone exchanges data processing results with the grid dispatching center that then presents estimated electricity prices over the next twelve hours using a color-coded clock interface that displays price fluctuations. Residents can control their electrical appliances remotely via smart phone. This real-time consumer interaction, in turn, affects the market price because the central power utilities are connected — and in constant negotiation — with the national grid networks. The supervising mechanism is a policy-driven usage management resource whose goal is price-consumption optimization.

The user management center runs on a virtual platform hosted by the power generation plant. The collection and unification of management data from the meta-grid allows geographic and time-limited microgrids to optimize the services provided to individual customers. For example, a German Energy Internet company developed an online energy transactions service that is accessible through mobile phone and tablet applications for real-time news, reports, and analysis.

"Energy plus Internet" will be achieved by ICT-enabled information exchanges and distribution platforms that allow power resources to be accessed and managed through the universe of mobile, PC, and Internet connected appliance-based applications.

Energy Internet Connectivity Across the Ecosystem

As the Energy Internet gains momentum, the ecosystem of transactions will shift from the current Business-to-Consumer (B2C) model to include and then be dominated by Consumer-to-Business (C2B) and even Consumer-to-Consumer (C2C) models.

Huawei estimates that, by 2025, the number of IoT-connected devices serving business and industry will reach approximately 100 billion. "Huawei will apply its cloud-pipe-device architecture to develop innovative ICT technologies and solutions that will include a cloud data center, Big Data, agile networks, LTE, an IoT gateway, and the 'LiteOS' open source IoT operating system," said Jerry Ji, Huawei President of Energy Sector sales for the Enterprise Business Group at the company's *Global Energy Industry Summit 2015* in Almaty, Kazakhstan.

As more IoT services become commercially available, consumers will find multiple options tailored to suit individual cases. In practice, "Energy plus Internet" will be achieved by ICT-enabled information exchanges and distribution platforms that allow power resources to be accessed and managed through the universe of mobile, PC, and Internet connected appliance-based applications.▲