E.ON Group: Clean Energy Leads Integrated Energy Services

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Abstract. On June 19, 2000, E.ON Group was merged and established by Germany United Power and Mining Co., Ltd. and German Union Industrial Co., Ltd. It was established as the largest power company in Germany and one of the largest energy companies in Europe. In 2016, E.ON successfully transformed itself into the first European energy company to focus on new energy. It is also an international private energy supplier, focusing on renewable energy, energy networks and customer solutions. It is responsible for the development of renewable energy, distributed energy, energy efficiency, and digital technology, and is mainly targeted at residents and commercial companies.

1. Introduction
E.ON Group is an international energy supply company. It ranked 22nd in the world's top 500 in 2017. Its main business is renewable energy, energy networks and customer solutions. Founded on June 19, 2000, it was formed by the merger of German United Power and Mining Corporation and German United Industrial Corporation. Due to the need for business transformation, on January 1st, 2016, E.ON Group split the conventional power generation and energy trading business and set up Uniper Company to independently handle this business. After the split, New E.ON Group began to focus on renewable energy related business, energy network and customer solutions, responsible for carrying out renewable energy, distributed energy, energy efficiency, digital technology and other businesses, mainly for residents and commercial companies. As of the end of 2017, E.ON Group's electricity and gas lines reached 863,000 kilometres, with 21.1 million customers and renewable energy generating capacity of 13 billion kWh.

In March 2018, the Evian Group Board of Supervisors agreed to acquire Innogy, a subsidiary of RWE, and took over 76.8% of the shares, and REW will receive 16.67% of the shares of Evian Group. At the same time, the two parties exchanged their respective businesses, and E.ON Group will take over the Innogy's power grid and power sales business. REW will retain Innogy's renewable energy power generation business and receive E.ON Group's renewable energy power generation business and nuclear power business of E.ON Group. Since then, E.ON Group will become a power grid and energy supply company, and will own 60% of the German market distribution network.
The core businesses of E.ON Group reflect the key emerging energy trends: the transformation of yesterday's power lines into tomorrow's smart energy networks, the increasing demand for innovative customer solutions, the global growth of renewables.

Fig. 1. Business situation of E.ON. Group

2. The main approach
E.ON Group complies with the overall process of German electricity reform and energy transformation, splits traditional energy business, realizes green transformation, and focuses on how to provide customers with cleaner, more convenient and more affordable integrated energy services. Combining regional and energy needs with grid and energy supply to provide differentiated energy services, the main practices are as follows:

2.1. The deployment of smart meters and build bridges for data transmission
In July 2016, the German Federal Parliament passed the "Act for the Digitalization of the Energy Transition" to support the deployment of smart meters nationwide. E.On Group seized this favorable opportunity to vigorously promote the operation and use of the smart metering system (iMSys).

The first is to provide real-time feedback of customer energy information through smart metering systems to improve work efficiency. The modern metering device provided by E.ON Group can provide customers with a large amount of energy consumption information through the display of the meter, and can access the number online through the remote system, which not only avoids the inconvenience caused by the meter reading to the customer, but also enables the customer to pass the meter. Shows more detailed information about energy consumption, which in turn reduces customer objections to electricity consumption data due to opaque electricity billing.

The second is the use of smart meters to detect user-side energy consumption and maximize the use of home energy. E.ON Group implements real-time monitoring of electricity data through smart metering systems, and integrates with the overall supply and demand of the grid, selectively accessing customers' distributed power or suggesting that customers use their own reserve power. At the same time, it is also possible to combine control terminals to realize real-time control of power-side power management and distributed power supply equipment.
The third is to provide customers with value-added services such as energy analysis to assist customers in carrying out energy-saving plans. Customers can control home energy consumption by registering intelligent inspection services on the E-Commerce Group website. The system will regularly issue energy consumption reports through the analysis of relevant data of smart meters. The report not only shows the power consumption of all consumer devices in the customer’s home, but also serves customers. And the report can provide home energy consumption comparison and power saving suggestions to enable customers to improve their electricity habits in a timely manner.

The fourth is to achieve "multi-table integration" of information collection and remote data collection and copying of important energy data. E.ON Group regards the smart meter gateway as a multi-branch measurement system. Through the data interface, it can connect and process metering data from various departments such as electricity, water, gas, and heat. Customers can check all kinds of energy consumption in real time through the same meter terminal and can "One-time" to complete the payment of a variety of energy.

2.2 Differentiated service model to enhance user experience
E.ON Group uses its energy network of more than 1 million kilometers in Europe as a strong backing for providing differentiated energy services to customers, providing customers with different energy combinations and energy services, and customers can freely choose energy plan according to the actual situation and preferences of electricity consumption.

The first is to provide personalized energy services to individual customers in response to geographical features. For example, E.ON Group offers low-priced electricity and natural gas packages to German customers. Its comprehensive offer is 50% lower than the base price; in the United Kingdom, customers can receive a £20 discount by pre-authorizing electricity bills; Czech new customers can enjoy a certain price discount; for Swedish customers, to expand their distributed photovoltaic business.

The second is to tailor energy-saving solutions for commercial customers based on energy consumption. The professional energy consulting team OF E.ON Group can analyze the customer’s current energy consumption and energy structure to assess the customers’ overall energy saving potential, and design a personalized, intelligent, and sustainable optimal energy saving plan based on the customers’ actual situation. The plan can save customers’ energy costs by an average of 20%-40%. In addition, customers can also connect with virtual power plants of E.ON Group to optimize energy consumption and generate savings or revenue.

The third is to tap the potential of customers and design production solutions based on energy demand. E.ON Group can use the new technologies such as fuel cell, photovoltaic power generation and cogeneration to meet customers' energy needs, and tailor-made integrated energy production solutions including thermal energy, steam, cooling, refrigeration, compressed air and electricity for customers. This will not only enable customers to maintain their independence in power supply and technology, but also reduce operating costs and carbon emissions. The E.ON Group also provides power plant operation outsourcing services.

The fourth is to provide digital products to help customers reduce energy consumption through smart devices. Customers can choose suitable smart home devices in combination with their energy-saving services to further increase energy efficiency. Such as switch to LED fixtures and use the "Hue" intelligent lighting system that can digitally control up to 50 lighting fixtures to
reduce energy consumption by 80%, or save up to 30% on heating costs through the Tado thermostat.

2.3 Actively respond to energy policies and develop clean service models
After divesting traditional power generation business, E.ON Group focused on the development and use of new energy. In 2017, Ion Group's solar and battery businesses in Germany grew by more than 200%, and it has become the fastest growing solar energy company in Germany, making important contributions to the success of energy transformation in Germany and Europe.

The first is to increase the proportion of distributed energy consumption on the spot and support the sustainable development of commercial customers. E.ON Group uses technologies such as cogeneration, heat pump and renewable energy storage to promote customers' internal energy ecosystem. For example, the Aon Group installed fuel cells for a hotel in Frankfurt, which enabled most of the energy needed for the operation of the hotel to be generated on-site and free from pollution. The efficient fuel cell technology enabled the hotel to reduce its carbon dioxide emissions by about 600 tons per year.

The second is to actively promote the development of electric vehicle business and promote the transformation and upgrading of energy structure. E.ON Group has made green travel more attractive by further expanding the charging infrastructure for electric vehicles in Germany to better meet customers' charging needs. Customers of E.ON Group can use 100% of their own home-made solar energy to recharge their electric vehicles. They can also use the mobile phone APP to find nearby charging stations to charge electric vehicles. In Copenhagen, the E.ON Group has built a city charging network with 2,000 charging points. Customers can use a variety of ways to pay for charging, and E.ON Group also provides shared electric vehicles for customers to rent.

The third is to promote the residents' distributed photovoltaic power generation and promote the creation of green homes. E.ON Group has launched three solar energy services for residential solar battery storage systems, solar clouds and solar roofs. The residential solar battery storage system enables customers to produce solar energy and store it for future use. It can meet about 70% of home energy needs. The solar cloud enables customers to use solar energy more freely. Customers can store excess energy in a virtual account, and ready to use as required. Sunshine Roof Services allows customers to easily assess the solar energy potential of their home roof using satellite imagery and weather data.

3. Reviews and Inspiration
With the deepening of the power system reform, the rapid evolution of the energy Internet, the boundaries of the traditional business areas of power grid companies have been continuously melting, and the transition to integrated energy service companies has become a trend. E.ON Group starts from its own advantages, and exploration in the field of integrated energy services has great significance for Chinese enterprises.

3.1. Deeply promote the application of big data analysis in the field of integrated energy services
In the “Internet +" era, the intrinsic value of big data is gradually being released. In 2016, the National Development and Reform Commission, the Energy Bureau, and the Ministry of Industry and Information Technology jointly issued “Guiding Opinions on Promoting the “Internet + Smart Energy Development” to promote the deep integration of energy and information, promote the development of new technologies, new models, and new formats for the energy internet.
Enterprises should further play the role of data center of smart electricity meters, fully tap the value of big data, accurately analyze customer energy data, accurately grasp customer reality, deeply understand customer needs, gradually segment customer groups, and carry out targeted, customized and personalized Service.

3.2 Increase the flexibility of strong power systems and increase energy efficiency
The report of the 19th Party Congress proposed that we must promote the revolution in energy production and energy consumption and build a clean, low-carbon, safe, and efficient energy system. However, whether it is a large-scale renewable energy or distributed generation, it has the characteristics of unstable power generation and weak controllability. It requires the power grid to have a strong peak-shaving capability. Through the addition of energy storage devices, the construction of virtual power plants, the strengthening of power grid interconnection, and the implementation of demand-side responses, etc., the flexibility of the power system is enhanced, and efforts are made to solve the problem of clean energy consumption, which maximizes energy efficiency.

3.3 Highlight customer-centric philosophy and extend the perspective of comprehensive energy services from multiple perspectives
Integrated energy services are still a new concept in China. Many companies equate integrated energy services with energy-saving services when they conduct business, failing to form a complete business chain. Excluding the extension to the user side, integrated energy can also be extended to the energy supply side, or horizontally associated with relevant equipment manufacturers, etc., to provide customers with a package of energy services.

4. Main modes of domestic integrated energy services

4.1 Supply-side extended integrated energy services
Enterprises that provide electricity, oil and gas, gas, and thermal energy to the society are at the supply end of the energy ecological chain. In the past, the industry structure was basically only responsible for production, not participating in the business of circulation and consumption, and of course energy. Different segments of the industry, some of the energy supply is the integration of production, supply and marketing. New energy system reforms and changes in new technologies such as the regional energy internet have provided policies, systems, and technical guarantees for the supply side to implement industrial chain extensions, thus making it possible for diversified integrated energy service companies.

4.2 Upgrading integrated energy service on the network transmission side
According to the new electricity reform policy on separation of network transportation, grid companies have changed from being core businesses of investing, constructing, and operating power grids in the past to being responsible for the transmission and distribution business. Their profit model has also changed from the price of receiving on-grid tariffs to the price of selling electricity to the government. The approved transmission and distribution tariffs are charged over the network. While allowing the power grid companies to liberalize the sale of electricity, they are allowed to participate in the competitive power-selling business of the power selling side. The
major pressure for power grid companies to transition to integrated energy services is not only the changes in the profit model, but more importantly, the energy consumption patterns at the consumer end, energy substitution, and service competition.

4.3 Consumer integrated energy services

After the release of the power-supply side, more than 1,500 power sales companies have been established in China. Most of the power sales companies have not yet commenced substantive business operations. Among these power sales companies, the one most likely to develop into an integrated energy service provider is a power sales company with incremental distribution network investment and power distribution network operation rights. The positioning of such companies is a profit model for integrated energy services. Apart from the basic electricity sales business, more value-added services are being developed. That is, the difference between purchases and sales of electricity is not the main source of profits. It is to expand value-added services. Value-added services include providing users with services such as optimizing power consumption strategies and contract energy management, and tying the power sales business with other water supply, heating, and gas supply businesses, providing integrated energy services to users, and at the same time taking on behalf of the users, operation and maintenance of electricity and other diverse services.

5. Conclusion

Integrated energy services will bring new models of energy services, new forms of commercial ecology, and new market development momentum, which will surely become an important market force for realizing the national energy revolution. It will bring to all traditional large-scale energy companies, new small and micro energy companies, and numerous equipment suppliers, will bring more economical, efficient, clean and reliable, convenient and personalized, intelligent and interactive services to the entire society.

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