

The Big Data Business Model of Smart Power Based on Information Value Theory

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Abstract. The grid now has the capacity of big data basic services, building an application system of big data electricity services is needed for data decision, data management and digital operation. First, started with information value theory, the analysis of many energy demand value information which were aggregated by the big data of distribution and utilization was made. In the meantime, the smart power service business model was proposed from different angles and directions of information value chain, and the differential energy services of enterprise users, residential users and micro-grid was summarized. Through the analysis of smart power business model, to provide support for the establishment of big data service application system, its conclusions can provide a reference for grid corporations to research multiple business opportunities and profit models in the new situation.

Introduction

In March 2013, Chinese Society for Electrical Engineering for the first time issued a "White Paper on the development of China's power big data", in that paper it pointed out that data was the energy and the important driving force of reshaping power core values and transporting power developments. The information degree of electric power system is very high, along with the rapid development of data collection, storage and transmission technology, with the rapid application of all kinds of smart meters, smart terminals in the power grid, the system has accumulated a lot of operating data.

For the grid, under the circumstance that smart phones and smart devices grow rapidly and mobile Internet traffic rapidly increase, big data technology can bring many new opportunities. Given the big data has gradually infiltrated into various modules of the power system, it is necessary to analyze and summarize the smart power services business models, to provide helpful reference for completing the big data service application system and implementing the value creation of data stream.

Big data and information value

Distribution network at the end of the power system is an important network to distribute power, and it has the obvious feature of protecting livelihood. Distribution network not only has many sorts of equipments but also a wide range of distribution, which making its topologies large and complex and its operation mode flexible. In recent years, with the continuous pursuit of national economic growth and the renovation of the urbanization, industrial and residential electricity load has continued to grow, which makes the size of the distribution network constantly expand and the technical level continuously improve. Among them, information technology and network technology become an important part of promoting distribution network upgrade, and the distribution network that has more than 1,000 feeders naturally contains big data jumped from TB level to PB level.

Now most grid corporation information center has multiple power distribution management system, and also build the data warehouse and data analysis platform, in which the data content covers a lot of business management fields including safety production, marketing, asset management and other grid operation fields including dispatching, metering automation, on-line monitoring system. Grid as a digital company, the total data is still at a high compound growth rate to

rapid expansion, and the grid corporation will more concerned with the data in the future, data has aggregated various energy demands so that making the data flow will create greater value.

The concept of information value chain originated from Michael • Porter's "competitive advantage", and the later scholar's wisdom also made the information value chain theory evaluated continuously. Information flow is the "digital nerve" of the corporation, information resources flow in the corporation internal management activities will produce a series of value chain. In this process, the information's distribution is broad and the flow direction is uncertain, information extraction and recognition of different subjects is also different, big data is available to storage, analyze, and visual present the mass of information quickly, making information into wisdom, while every link of the information value chain is also perfect control, and it can also create value in corporation value including strategic management, supporting management and operating management. Specifically, the information value chain model consists of three parts, namely information acquisition, information processing, information value, and big data technology is the supporting factor of this process.

The business mode of smart power based on information value chain

In the wave of market-oriented reforms, the grid just relying solely on low price is difficult to impress with energy users, so we should base on the data from big data collection, base on user's demands to explore various forms of commercial services on the electricity market, as shown in Figure1.

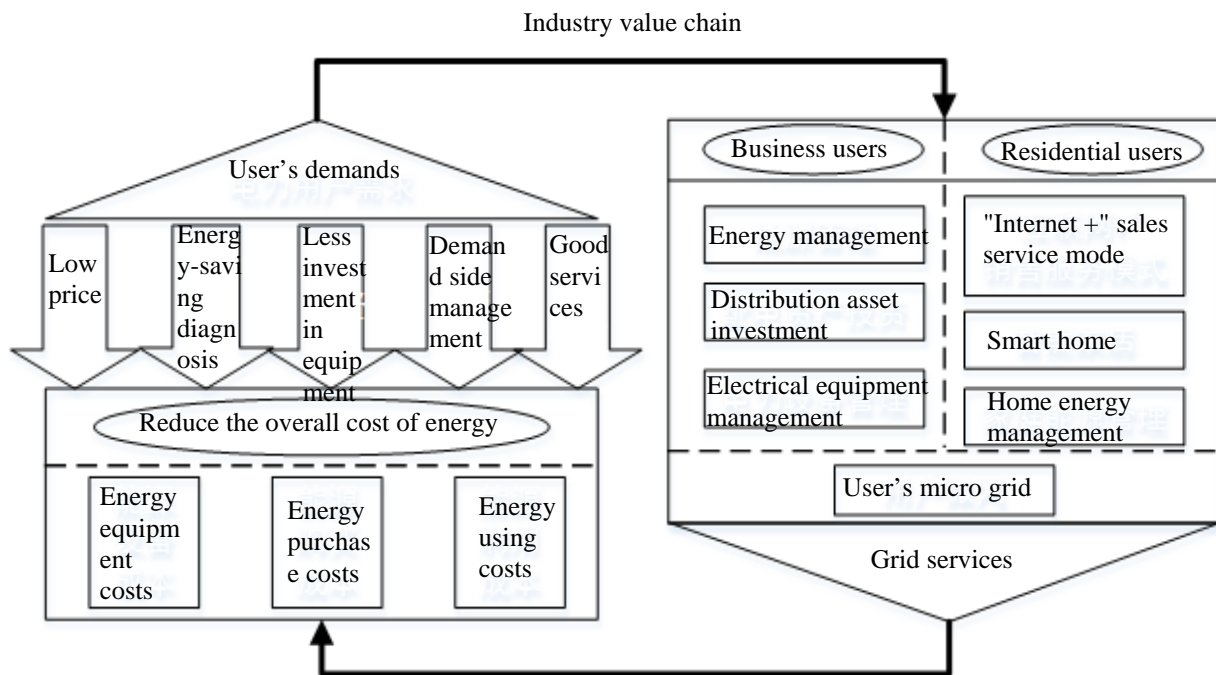


Figure 1 Grid corporation electricity services industry value chain

In order to improve the economic benefit and achieve sustainable development, user's core value proposition for electricity demand is to reduce the cost of comprehensive utilization of energy. It consists of three parts: energy equipment costs, is the cost of using and purchasing energy equipment; energy purchase costs, in addition to general energy consumption, it also includes distributed energy's cold, heat, electricity Tri consumption; energy using costs, is direct related to production costs, the rationality of energy consumption structure and the level of energy efficiency is the main measure of this costs.

Grid enterprises can get the user demands data from the data center, and then making two different electricity service modes for the business users that have less quantity but more electricity and the residential users that have more quantity but less electricity.

(1) Business users

1) Energy Efficiency Service

Grid corporation energy efficiency service can refer to the business model of the energy conservation service company. Due to the grid corporation have mastered a large number of users' consumption data, they can make effective energy management measures for the targeted user. At present, the main energy efficiency service pattern is divided into the benefit sharing type, the energy saving type and the energy-cost trust type, under the national financial incentives and preferential taxation policies, the former two patterns have accounted for 90%, among them the benefit sharing type is the main patter of the future development. Energy efficiency benefit sharing type allows customers real "zero risk, zero input" to achieve energy efficiency retrofits, and grid corporation can also obtain the full benefits of energy conservation and get higher enthusiasm in work. Although before the end of the project, the corporation has to bear almost all the risk of money, but they can choose the users with high credibility through the mastery of the users database so as to avoid risk.

2) Distribution asset investment

Grid can invest and finance the project has been carried out by supporting low-risk projects, so as to strengthen enterprise's strength and get more benefits. Distributed energy projects, for example, can be to invest in supporting distributed photovoltaic (pv). Photovoltaic power station is the popular investment now, and the National Energy Administration also clearly said that renewable energy is the focus of national development in the "Thirteen Five" plan, so the government may also take the quota system to ensure its smooth development. Grid can also invest and finance the project has been carried out, including maintenance and repair, the distribution network for users to invest in assets that will be used in the operation and maintenance of energy equipment outsourcing.

3) Electrical equipment management

Electrical equipment is the important material basis and energy security to the daily business, the process including planning and equipment selection, installation and commissioning will occupy all the important part of life cycle of business equipment, while equipment is optimal operation or not is related to product quality, raw material consumption and power cut-off losses, and it need corporation to strengthen the training of professionalism and business knowledge skills to staff, this series of things are bound to make corporation time-consuming. Grid corporation has rich experiences of theory and practical in the aspect of ensure power, they can have one-to-one electricity security service to the corporation by taking value-added service pattern, it generally have the following three categories: ①equipment rental, reducing the risk that caused by improper equipment selection that leads to site operation anomalies; ②equipment installment, reducing the pressure of corporation's capital turnover; ③" electric nanny" service, this is targeting to the agricultural corporation's power consumption, sending teams on-site service to inspect and maintain the equipments' electric shock protection service, knife switch and wiring, expanding the electric energy.

(2) Residential users

1) "Internet +" sales service mode

"Internet +" sales service model is using economic effect and efficiency as an optimal goal, to achieve the synergies between energy, equipment and the user. It can provide commercial applications: ① for the user's distributed energy, cogeneration equipment, electric vehicles and energy storage equipment, under the different devices' generating features, using user load and real-time prices as constraint to guarantee the heating, power generation and the optimal price under different times; ② Provide user services portal, interacting on big data platform through the energy flow, information flow and control flow, supporting the maintenance and the dispatching service of grid; ③ Build customer files, according to the customer's power usage, to develop different combination of electricity price, increase customer stickiness, may also guide the user to use electricity orderly, to achieve the practical significance of load shifting and easing the load fluctuation, and it is also combined with one of the means of electric power dispatching in power market.

2) Smart home and home energy management

Home energy management is through control methods like interactive terminal, set-top boxes, mobile phones, computers, voice telephones to monitor and manage home appliances, such as the family intelligent management of energy efficiency, electricity information collection, releasing the latest electricity notice, guiding users reasonable utilization, achieving the two-way interaction between grid and users. Grid corporation can carry out the following services: ① open the home energy management's official website, the user can pay fees online through the website, buy household energy management products, have remote control to smart power, download the software on client side and have other kinds of services; ② open home energy management WeChat and weibo client, adding up household appliances energy consumption for a period according to the proportion of electricity so that users will be clear about it; ③ invoke the age of the house and weather information through the big data platform, integrating the data based on behavioral science theory, building home energy file, giving users real-time energy-saving recommendations.

(3) User's micro grid

National Energy administration issued a "guidance on the promotion of new energy micro grid demonstration project construction" in July 2015, focusing on promoting renewable energy micro energy networks, micro-grid makes all kinds of distributed energy, electric storage reservoir (cold) and efficient energy technology together, through smart grid and integrated energy management system, forming the efficient distributed energy systems based on renewable energy. Since the high-tech energy penetrated into micro-grid, so the micro-grid implements generation, transmission, distribution, retail vertical integration operation, it is going to be an energy service industry value chain that collects power assets, net assets, user distribution assets, financial services, intelligent IT, market trading, marketing, energy scheduling and energy efficiency services together, through Enterprise Resource Planning (ERP) to coordinate human and financial.

Conclusion

With the continued in-depth study of big data theory, the State Grid and China Southern Power Grid has established many big data base platform, with the skills of efficient data acquisition, storage, calculating, which makes the next big data services applications possible. Through massive big data that collected from the user demand side, combined with information value theory, building a professional and personalized electricity selling market, achieving the grid corporation user service industry value chain, putting forward the big data business model of smart power based on information value theory, can provide supports for the construction of all-round customer services of grid and provide cover for access to a variety of business opportunities and profit models under the new situation of power grid.

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