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A REVIEW OF SMART ENERGY AND INTEGRATED ENERGY SERVICE BUSINESS MODEL

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ABSTRACT

Based on the high-potential 5G network and ubiquitous power Internet of things, the concept of smart energy has been proposed to solve the problem of optimal utilization of the power system's generation, transmission, distribution, consumption, and the related services. Therefore, innovation and reformation will be doomed and embraced by smart energy in China's energy system, which includes technological progress and system mechanism reform. In the meanwhile, new solutions and challenges would be provided by smart energy for the State Grid Corporation of China's business model. Focused on the analysis of smart energy marketing strategy and profit model, this paper lists the business model and scenarios under the developing tendency of smart energy and provides a detailed sorting and analysis for the smart operation and management of user service and ecological platform. This article aims to analyze the value of smart energy and provides possible business model choices for integrated energy suppliers.

Keywords: smart energy, integrated energy, business model, ubiquitous power Internet of things

1. INTRODUCTION

In order to supply clean and low carbon energy, high efficiency and smart energy are oriented by human actual demand and based on integrated energy network. Advanced technology, i.e. internet technology, internet of things technology, big data technology, and artificial intelligence technology, is applied for organic connection and coordination optimization in integrated energy [1-5]. Smart energy also makes valuable contributions to energy-saving and effective market competition and coordination.

China is at a critical stage, which shifts from a stage of rapid growth to a stage of high-quality development. The demand for energy, especially oil, gas, and electricity, is growing strongly. According to China's revolution strategy in energy production and consumption (2016-2030), it is estimated that the proportion of non-fossil energy in primary energy consumption in China will reach about 20% in 2030 and 50% in 2050. New energy sources, i.e. wind power and solar power, will continue to grow rapidly [1-5]. At the same time, interactive energy facilities, i.e. distributed energy, energy storage, and electric vehicles, are developing rapidly, and various new forms of energy, i.e. multi-power supply, integrated services, and smart use of energy, are emerging. The central role of electricity in energy transformation is becoming more prominent. The level of electrification in economic and social development is improving [6-8]. All these put forward higher requirements for accelerating the development of the power grid and strengthening its function.

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According to enterprise characteristics, the business model is a business logic that describes how enterprises create value, transfer value and obtain value. Business model design is a systematic project, which explains the process from a strategic decision to tactical execution. Based on its own strategy and matching resource capability, the enterprise aims to solve the market demand, obtain profit value and achieve sustainable development. The successful business model is usually based on scientific design and is constantly verified, iterated and perfected in the process of practice [2-6].

As shown in Fig. 1, the business model is divided into three levels: enterprise-level, business level, and project level.

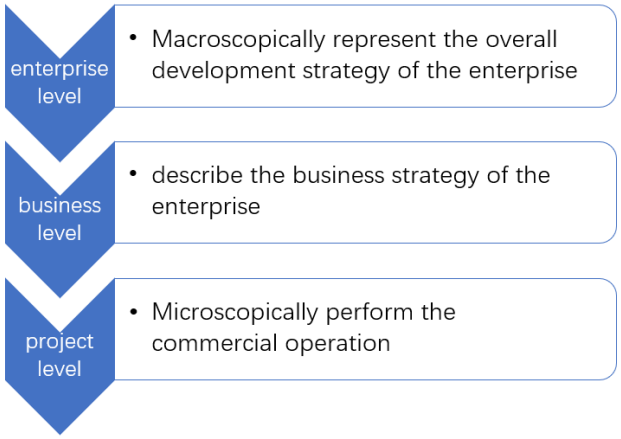

Fig 1 Classification of business models.

At present, the business model of the company has been determined, which is based on the traditional power supply services and ubiquitous power Internet of things. Business level and project level are the current breakthroughs in business models, which will determine the success of the company's smart energy construction and operation. The business level is the basis of the project level in the business model, which is the key to the company's extensive power Internet of things construction. Smart energy emphasizes user-centered and value-oriented [6-9]. Consequently, new businesses emerge and business models need to be formed to match them at the business level and project level.

2. THE VALUE REALIZATION MODE OF SMART ENERGY

Under the background of smart energy, energy supply enterprises directly connect to the selling end, which is bound to form an energy market with multiple buyers and multiple sellers. The role positioning of traditional energy enterprises will be reformed and adjusted [10]. The single purchase will be changed to play the role of an energy transmission channel and intelligent dispatching control, which is responsible for energy investment and operation, energy transmission and distribution and energy system security. After redefining the role of the market, the biggest impact on traditional energy enterprises will be the change of their profit model [11]. Therefore, it is necessary to analyze users' relevant demands and realize new value creation points and profit points.

2.1 Smart energy marketing strategy

The marketing strategy of smart energy is to connect products with users. The establishment of friendly user interaction can enhance users' stickiness, improve product popularity and seize the smart energy-related market [12]. Under the age of the Internet, because of the media environment, the migration of consumer behavior and the business ecological upheaval, traditional energy service is faced with the challenge of marketing environment change [13]. To design a reasonable marketing strategy for the smart energy system, it is necessary to adopt a scientific and reasonable theoretical system, which combined with the core competitiveness of traditional energy enterprises and concluded a marketing strategy system with smart energy.

2.1.1 Smart energy marketing strategy based on diversification

Technological advances, especially the development of the Internet, have changed the nature of communication between companies and customers [14]. In the past, advertising content was designed by traditional advertisers, while online information was selected by consumers [14-15]. Traditional advertising focuses on delivering information to businesses. The flow of information is clearly one-way from the seller to the buyer. In the country, the Internet makes information flow in the opposite direction. Because the first thing customers do is to go to the marketing communication sites, customers have a great deal of control over the content of the information they receive [16]. Therefore, the diversified intelligent energy marketing strategy aims to provide a platform with diversified information, which displays various products with different characteristics and forms a strong competitive advantage through the establishment of the two-way trading platform.

2.1.2 Smart energy marketing strategy based on functionalization

The delivery direction of functions provided by products and services has been fundamentally changed in today's Internet environment. In the traditional business model, the transfer of the function is passed by the seller to the buyer [17-18]. The demand of consumer is more and more diversified, and consumers can more easily to get what they need. Therefore, the features of the product are reversely transferred by the buyer to the seller. Function-based marketing strategy aims to meet consumer needs, improve user experience, and provide users with more modern intelligent services.

2.1.3 Smart energy marketing strategy based on added value

Value is an important link between enterprises and consumers [19-20]. Therefore, the improvement of value is a very important subject in marketing in the Internet era. The level of product value determines the extent of its promotion to some extent. In addition to the improvement of the product itself, numerous Internet marketing means also provide many emerging methods for value promotion in the Internet environment. Based on added value, smart energy marketing strategy aims to provide additional added value to consumers through additional packaging or integration of different products.

2.1.4 Smart energy marketing strategy based on user resonance

The resonance of users is the core of marketing. The Internet is a comprehensive and interactive communication medium with various stakeholders [20]. The importance of the resonance between enterprises and consumers is getting more prominent under the background of the Internet. Nowadays, major Internet enterprises attach great importance to Customer Relationship Management (CRM). User-centered marketing strategies can win a wider range of customer loyalty and build up their Customer circle and core competitiveness. Based on user resonance, intelligent energy marketing strategy aims to establish a good user experience and interact with users.

The summary of the smart energy marketing strategy is shown in Table.1.

2.2 Smart energy profit model

Compared with the marketing strategy of smart energy, the profit model of smart energy pays more attention to the ultimate realization of the value of smart energy products [21]. Through the sales and trading methods in the power and energy fields, the profit model not only provides users with high-quality services but also makes relevant products win profits for enterprises. Therefore, the establishment of a smart energy system business model must be forward-looking. Firstly, creating a good market environment takes the long-term sustainable development of the enterprise as the goal. Secondly, improving the ability to create profits innovates market-oriented development. Thirdly, paying attention to the needs of energy consumers takes customer satisfaction as an important indicator to obtain long-term customer value. Finally, taking competitors seriously increases market share.

2.2.1 Smart energy profit model based on product competition

Taking product competition as the orientation is conducive to improving the company's core competitiveness and resource allocation ability [17, 21]. Creating differences in the competition with similar enterprises or similar products can help to seize market share and achieve profitability.

2.2.2 Smart energy profit model based on customer service

Firstly, meet the needs of consumers as the goal. Secondly, replace the traditional sales of products with customer demand discovery narrow pattern. Thirdly, establish a friendly and interactive relationship with customers. Fourthly, improve user loyalty and user stickiness [22].

2.2.3 Smart energy profit model based on platform construction

The profitability is achieved by constructing the platform and setting up enterprises and users. A good way is to be abandon to the center of the product market business model and replace it by the center of relationship quality business model [22]. After building a deep relationship with the users, other types of enterprises and suppliers can win benefit through the platform.

2.2.4 Smart energy profit model based on capital operation

Based on capital operation, the smart energy profit model is to invest and help others to set up a business and develop products [23]. To finally achieve profits, the enterprise can raise funds from the outside world and then obtain funds through crowdfunding, futures, lending, guarantee, and other means.

The summary of smart energy profit model is shown in Table.2.

3. THE VALUE REALIZATION SCENARIO OF SMART ENERGY

Smart energy is an advanced form of energy internet development. Smart energy can realize the efficient coordination of traditional business, serve the development of emerging business, realize the holographic perception of users, serve the construction of platform ecology, and realize the iterative evolution of platform ecology [20-24].

Domestic and foreign energy enterprises have explored many application scenarios in the field of smart energy. According to different business types, typical application scenarios can be divided into three categories: traditional business optimization, emerging business expansion, and platform ecological construction.

3.1 Intelligent management

Intelligent management is widely used in artificial intelligence, big data, and 5G technology. Intelligent management is also deeply integrated with planning, construction, operation, and big data application. Meanwhile, it will provide strong support for the lean, intelligent and efficient operation of the company [25].

3.2 Intelligent user service

Intelligent user service refers to the establishment of energy synergy mechanism, the realization of effective energy supply, the improvement of energy efficiency, and the realization of intelligent use of energy. Intelligent service by users relying on big data technology, Internet of things technology, cloud computing technology, etc. [26].

3.3 Intelligent ecological platform

The intelligent ecological platform is supported by the energy Internet to pool various resources, build platform ecology, promote supply. It has relied on the traditional business of power grid companies and existing resources foundation. The platform would expand and optimize the company and open new markets, new fields to drive the company from the traditional industry value chain to the Internet operation platform [27].

In terms of the Datacenter station, it is constructed according to the Datacenter station methodology of One Data, One ID and One Service. The corresponding sharing technology framework and sharing capability center are formed under the guidance of the landing requirements of competitive businesses to empower the platform partners.

Considering the dimensions of platform mode, business, region and user group, the platform should be built to form the industrial ecology of comprehensive energy. For the platform model, the following two models can be referred to: first, it is the vertical value chain platform, which considering the upstream and downstream industries of energy. Second, it is a bilateral market platform. Considering the regional dimension, a smart city energy management platform will be built [28-29].

4. CONCLUSIONS

Some new solutions are provided by this paper to solve the challenge of smart energy for the State Grid Corporation of China's business model. This paper focuses on the analysis of the smart energy marketing strategy and profit model and lists the business model. This article aims to analyze the value of smart energy and provide possible business model choices for integrated energy suppliers.

Table.1. The summary of smart energy marketing strategy

marketing strategy	product type	customer selection	promotion platform	characteristics
Big data platform marketing strategy	Physical products	inhabitant	internet	Products and services are sold online, which makes it easier and cheaper for users to purchase.
Search portal marketing strategy	Service products	inhabitant	internet	By building an energy search platform and portal, the first choice of users becomes to search for energy-related information.
Community marketing strategy	Physical products &	Enterprise & inhabitant	Community & internet	Establish long-term relationship with customers and cultivate customer loyalty.

	Service products			
Flow marketing strategy	Physical products	Enterprise & inhabitant	Community	Direct sales, which makes consumers spend less cost
Media marketing strategy	Physical products & Service products	inhabitant	Community & internet	Advertising in the potential customer place can improve their visibility
Trial marketing strategy	Physical products & Service products	Enterprise & inhabitant	Community	Free trial experience to attract and develop more potential customers

Table.2. The summary of smart energy profit model

profit model	product type	customer selection	concrete content
Cross-subsidy model	Physical products	Enterprise & inhabitant	The free or low price of a basic product drives the sales growth of related products. The actual profit source is related products
Terminal application mode	Physical products & Service products	inhabitant	Based on existing terminals, the competitiveness and profitability of terminals can be improved by providing applications and services
Value-added service model	Service products	Enterprise & inhabitant	Additional services are provided for additional interest growth point
Forward-backward charging mode	Physical products & Service products	Enterprise & inhabitant	Forward charging to users and backward charging to other enterprises to collect advertising fees
Platform trading sharing model	Platform products	Platform	It does not operate corresponding products and services. The platform providers charge for suppliers and users
Capital raising model	Physical products & Service products	Enterprise	To invest or raise money through financial means and ultimately to make a profit
Capital utilization model	Physical products & Service products	Enterprise	Holding and shares to carry out joint construction and cooperation with several energy entities. It also cooperates with high-end service enterprises to develop high-end services

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