Research on the Business Model of Multi-station Integration of Grid Enterprises

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Abstract. In the context of national strategies such as the energy revolution, "Internet +" and innovation drive, the transformation of traditional energy-based enterprises to integrated energy service providers has become a general trend. Multi-site integration is an important field of integrated energy services. This article takes the business model theory as the perspective, based on the interpretation of the basic connotation and business model theory of multi-site integration, starting from the four-element model of the business-level business model, the four aspects of business layout and scope, value proposition, target customers, and profit model are the power grid under the energy Internet environment. Provide suggestions on the design of multi-site integrated business model for enterprises.

1. Introduction
The concept of the Energy Internet was first seen in the 2011 book “The Third Industrial Revolution” by American scholar Jeremy Rifkin. He predicted that a new energy utilization system that deeply integrates Internet technology and new energy technology will appear soon, and will The energy system is named Energy Internet (Energy Internet). In recent years, in order to cope with the energy crisis and environmental pollution, and to promote the revolution in energy production, transmission, consumption and other links, countries have made the energy Internet the focus of the development of emerging industries.

China has also set off a wave of energy Internet development, emphasizing the close integration of information technology and modern power grids. In this context, as represented by the State Grid Corporation of China, various traditional energy companies have accelerated their transition to integrated energy service providers in combination with Internet technology, and promoted "Internet +" energy services to establish a customer-side intelligent energy Internet. State Grid in 2017 The company officially launched the integrated energy service transformation.

Station assets are one of the core assets of power grid companies. Power grid companies use their existing core assets to integrate Internet + technology and the market under the energy Internet environment, and instead focus on consumer-side users to provide one-stop energy solutions. Among them, multi-station integration business is an important field in the transformation of integrated energy services for grid companies, and its business model research is of great significance.

2. Concept Interpretation

2.1. Energy Internet
The Internet of Energy is based on the power system as its core, while simultaneously accessing
large-scale renewable energy and distributed power sources. It uses advanced sensors, controls, and software applications to strongly integrate energy infrastructure and cutting-edge information technology to provide widespread information through an energy management system. Domain optimization and coordinated control realizes the optimization and complementation of multiple energy sources such as cold, heat, gas, water, and electricity, and finally integrates a high-efficiency intelligent energy management and control system [1].

All in all, the Internet of Energy is a new business format that deeply integrates the Internet and energy production, transmission, storage, consumption, and energy markets. It has the characteristics of equipment intelligence, multi-energy coordination, decentralization, decentralized supply and demand, flat systems, and open transactions.

2.2. Multi-station Integration
Multi-station integration is one of the specific types derived from the “Internet +” business during the transformation of integrated energy services by grid companies. "Multi-station integration" is essentially a digital initiative. By exploring the use of substation resources to construct and operate data center stations, 5G base stations, Beidou foundation enhancement stations, charging piles, energy storage stations, etc., share power grid resources and construction results to meet 5G and pan The need for high-density deployment of computing nodes in the Internet of Things supports the demand for bandwidth-intensive and real-time application scenarios in the consumer Internet and industrial Internet, and promotes the large-scale development of multi-station converged edge computing services to create state grid "computing power" services to help 5G Deployment and digital China construction [2].

2.3. Business Model
There is no uniform definition of business model, namely "Business Model" (hereinafter referred to as BM). In the fields of business, economy and management, business models tend to be understood as the meaning of the profit model of the enterprise, the value-creating model of the enterprise, and the collection of ideas composed of multiple factors [3].

The business model originates from the formulation of corporate strategic goals. The business model is a response to corporate strategy and changes with changes in strategic goals. It is a connection between corporate strategy and operating strategy, and is built by the company using its own resources and capabilities. A consistent set of concepts. Unlike strategy, which is divided into three clear levels: business-level strategy, company-level strategy, and global strategy, the main function of the business model is the business level. Therefore, the business model needs to be based on the construction of business-level strategic objectives, and in-depth study Strategy implementation logic within a specific industry or business. This article focuses on the business model of multi-station integration in the transformation of power grid enterprises.

3. Literature Review
Yang Wei et al. [4] believe that in the era of energy Internet, the transition to an integrated energy service provider has become an inevitable choice for traditional energy companies.

Huabiao Jiang [5] combined the current situation of my country's energy industry and the needs of economic transformation, and discussed the business model of the energy Internet from the four core elements of product, target customer, supply chain and revenue model.

Jianping Huang [6] based on Wei Zhu's six-element BM model, and proposed that the basic idea of grid companies is to become a comprehensive energy service provider with core competitiveness and develop six major businesses (energy basic service business, clean energy development and supply business, Comprehensive utilization of energy resources, energy-saving services, energy data value-added services, financial services), focusing on the four major stakeholders (power users, Internet companies, integrated energy equipment suppliers, and financial institutions), and grasping the three keys Resource capabilities (data information resources, financial capital resources, professional talents, professional technology), to provide basic services and value-added services as profit channels, design cash flow structure, control risks, and clarify corporate value.
Yulin Yan et al. [7] analyzed the integrated energy service strategy and business of Energinet. It is pointed out that its strategic goals are mainly to ensure the security and efficiency of supply in the context of the energy Internet, as well as the mutual assistance of surrounding energy and support the future digital business model of the company.

Siwu Li et al. [8] constructed a ubiquitous power Internet of Things ecosystem based on the analysis of the three elements of energy suppliers, grid companies and users. Its goal is to supply energy to energy consumers and improve energy efficiency. Platform users include energy suppliers, energy consumers and energy delivery units. The platform needs to improve the energy coordination mechanism, and needs the support of cloud computing, big data, 5G, artificial intelligence and demand response technologies.

Yue Zhang [9] and others took the multi-station integration of a safe city in North China as a case, discussed the business system and operation mode of multi-station integration, and confirmed that it has good economics.

Hongli Feng [10] specifically summarized the main business model of State Grid Corporation: including EPC, BOT, EMC, energy custody, product sales, financial leasing, collection of agency fees, operation and maintenance fees, etc.; China Southern Network Corporation defines business positioning in order to transform from a traditional energy provider to an integrated energy service provider, the main types of BM include EMC, EPC, BOT, BOO, PPP, BT, energy custody, etc.; GCL’s business positioning is to become an international integrated energy service provider and adopt EPC, product sales, collection and replacement of operation and maintenance fees, energy costs and other models; Trina Solar’s strategic goal is to become a provider of comprehensive energy solutions and core products, adopting EPC, BT, energy custody and other models, and the cooperation model uses contract management, Energy steward, PPP and other modes.

In summary, it can be found that the use of strategy and business model theories on the energy Internet business model and the comprehensive energy service business model is becoming more and more abundant, but there are few research literatures on the use of business model theories by power companies for multi-station integration business. Station assets are one of the core assets of power grid companies. How to use business model theory to guide power grid companies to use station assets to develop multi-station integrated business is very necessary.

4. Research Method

The generation of business models and the establishment of strategic goals are the concrete implementation of strategic goals. The four-element model of the business model was proposed by Adrian Slywotzky, which is simple and intuitive, easy to use, and practical. As shown in Fig. 1, the four elements are business scope, value proposition, target customers and profit model.

The business scope includes two aspects of decision-making. One is to determine what kind of business the company wants to carry out (products, services, solutions, platform networks), and the other is to clarify which activities or functions of the business can be completed within the company and which need to be subcontracted, Outsourced or provided with partners. The value proposition is the embodiment of the company's core competitiveness, the value provided to customers, the company's ability to protect its profit stream, and the core of the business model. The target market is inseparable from the value proposition. The target customer is the target market, which is a response to market demand and a market segment selected by the company for a certain business. The target market is the result of the analysis of the external environment of the enterprise and the analysis of the internal resource capacity. The profit model is how a company can get rewards by creating value for customers. Including product sales, service fees, financing, licensing fees, solutions, commissions, advertising, downstream of the value chain and other methods. As shown in Table 1, the basic types of the four elements of the business model are summarized in the table.
5. Analysis of Multi-Station Integration Business Model of Power Grid Enterprises

5.1. Commercial Characteristics of Multi-Station Integration

Multi-station integration is based on the use of the traditional three stations of the power grid, including new services such as communication base stations, distributed energy power stations, satellite navigation base stations and environmental monitoring, to achieve the integration of energy, information communication, government affairs and other fields, and realize grid enterprises and communication operations Collaboration between business and government. Realize multiple benefits. Therefore, multi-station integration has the characteristics of integration, high speed and efficiency. "Convergence" is mainly reflected in the use of traditional resources by grid companies to integrate new ICT services to achieve optimal allocation of resources. "High-speed" means that through the optimized layout of 5G base stations and edge data center stations, a high-speed network is provided for mass data transmission to achieve low latency of data processing and high immediacy of business response. "Efficiency" is mainly reflected in three aspects. One is to promote energy consumption, increase the income of power generation companies from selling electricity, reduce the cost of power transmission and distribution network transformation and transformer expansion of power grid companies, and reduce the energy cost of users to achieve multiple benefits; Through the opening and sharing of station resources, reduce the investment in information and communication infrastructure of other investment entities; third, in the field of government affairs, multi-station integrated construction can provide a wide range of station, tower channel resources and other government departments such as meteorology, environmental protection, public security, and urban management. High-speed power communication and data response resources help reduce costs and increase efficiency of government
services.

5.2. Business Layout and Scope
The multi-station integrated business layout mainly focuses on providing customers with edge cloud services, industry edge computing solutions, industry solutions, 5G infrastructure services, providing IDC leasing services, and professional solutions such as big data analysis, security tools, data migration and backup, CDN distribution and other services.

Multi-station integration has a wide business scope, spanning multiple industries such as comprehensive energy utilization, information communication, and government affairs, and runs through the entire industry chain system such as consulting design, equipment manufacturing, system integration, operation and maintenance, etc., based on the horizontal dimension, multi-station integration. The business includes shared leasing of resources such as power grid enterprise station assets, towers, cable trenches, communication infrastructure, equipment installation, operation and maintenance services, and related power supply; positioning and navigation, 5G communications and other specific field business services; smart cities, industrial Internet, and intelligence Multi-domain integrated services such as home furnishing. Based on the vertical dimension, through the formation of strategic alliances with diversified market entities such as consulting and design agencies, product providers, solution providers, system integrators, operation and maintenance service providers, etc., to provide end-to-end consulting and design services related to multi-station integration. It covers the provision of services for products and solutions of chips, smart terminals, communication hardware, etc., integration services of software and hardware such as infrastructure resources and application systems, and multi-station characteristic operation and maintenance services.

5.3. Value Proposition
The value proposition is the company’s core win point relative to its competitors. The value proposition is diverse and difficult to exhaust, but its core idea is to respond to the two basic competitive strategies of cost leadership or differentiation, and then according to the difference in the target market. There are four types of cost leadership, differentiation, centralized cost leadership, and centralized differentiation.

The core competitiveness of grid companies serving the multi-station integration market lies in finding a balance between business cost leadership and differentiation. The important basis for this balance is the characteristics of the target market. Power grid companies should, on the one hand, reduce the operating costs of power grid companies under the guidance of national policies, on the other hand, optimize their core resources, improve product and service quality, innovate business design, connect the upstream and downstream market players in the industry chain, and deepen their business value-added channels. Find your position in the multi-station integrated market ecology. Therefore, with the power grid companies relying on assets as the background, power grid companies should strengthen the operational efficiency of problem-solving solutions design, delivery, and service, clean up company systems and mechanisms, control financial risks, and develop strategic cooperation around core resources and technologies; increase strategic cooperation; The density and intensity of customer management relationships are centered on customer needs, and through resource sharing, energy-saving transformation, energy efficiency evaluation, auxiliary services, and data analysis services, we will vigorously broaden marketing channels and fully tap customer needs and potential value-added service opportunities.

5.4. Target Market
The target market can be divided into covering the entire market (meeting a customer’s needs), focusing on a single market, selective specialization (multiple market segments), product specialization (specializing in the production of a certain product or service), market specialization. Five types of transformation (meeting all the needs of a certain type of customers). The types of markets that can be radiated by multi-station integration are relatively wide, mainly including government customers, commercial customers, and industrial customers.

Multi-station integration provides operators with 5G base station and MEC deployment; for
Internet companies such as Baidu, Ali and Tencent, provides edge computing services for emerging Internet services such as high traffic and low latency; Provides for CDN operators such as Wangsu and China Mobile Edge data centers support the sinking of CDN; provide SME cloud platform services for small and medium-sized enterprises; provide charging and charging pile operation and maintenance services for bus companies; for substations near urban residential communities, enterprises and institutions, use substation resources to build an integrated optical and charging system Charging stations, providing charging services for residential communities, enterprises and institutions. Provide fast charging overall solution services for logistics companies; provide charging services for residential communities, enterprises and institutions, etc.

Multi-station integration provides industrial Internet edge computing nodes and industrial cloud services for the industrial field. Relying on the substation resources of the industrial park to build edge computing nodes, it can solve the complexity problems caused by a large number of heterogeneous equipment and networks in the industrial field, realize the real-time access and reliable transmission of multiple heterogeneous data in the field, and avoid unnecessary networks, storage and calculations Resource overhead.

5.5. Profit Model
The profit model is the ultimate realization of the business model. The basic methods include operating income, investment income, asset income, usage fees, advertising fees, intermediary fees, membership fees, lease fees, and authorization fees.

Multi-station integration can be divided into a profit model of basic services based on rental income and a profit model of value-added services provided by grid companies using their core resource technology.

The basic service profit model can be roughly divided into: First, for operators, 5G base station infrastructure resources are provided. The income of this model mainly comes from the rental income of basic resources such as site and communication, and the rental service fee of edge computing nodes. The second is to provide GPU (graphics processing server) for game service providers. Revenue mainly comes from GPU server rental fees and game value-added service revenue sharing. The third is to provide computing power + capacity for high-definition video service providers. Revenue mainly comes from bare cabinet rental fees, customized server resource rental, and long-distance data transmission revenue. Fourth, it provides edge computing node services for the industrial Internet. Revenue mainly comes from bare cabinet rental fees and customized server resource rental.

All in all, at the basic service layer, multi-station integration income comes from the operating income and investment income of basic resource services and other businesses, including basic resource leasing, edge computing node leasing, personalized solution design, construction, evaluation, maintenance, etc. Service fees, and profit from investing in electric transportation projects and clean energy power generation projects. At the value-added service layer, the company can expand its business on the basis of its existing business, make full use of the massive user data owned by the power grid for mining and reprocessing, and use the energy Internet and Internet cloud platforms to provide strategic alliance partners with the needs of users. Data processing and sales of consumer behavior and preference models provide operational value-added services, and profits can also be made through development of advertising fees, intermediary fees, and membership fees.

6. Conclusion
As shown in Fig. 2, the overall idea of the integrated multi-station integrated business layer business model is summarized in the figure. Judging from the current situation, the multi-station integrated service market is generally in a period of rapid growth, the market structure is uneven, the commercial value is clear, and the commercialization and industrialization operation is still in the early stage.
Figure 2. Schematic diagram of the key points of the multi-station integration business model.

In the energy Internet environment, multi-station integration of power grid companies urgently needs to establish a profit-oriented market competition thinking. The strategic focus is to control costs, improve capabilities, and strengthen marketing. The business model responds to the needs of strategic goals, relying on the business foundation of the enterprise, and gradually establishes a complete and clear concept for each business. Specifically, the value proposition focuses on operational excellence, core resource technology, and marketing channels, subdivides target markets, clarifies business scope and processes, completes profit at multiple levels, and forms the entire BM closed loop, which in turn stimulates corporate value creation activity and helps companies in Multi-station integration market competition is neutral in a favorable position.

7. References

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