International Journal of Frontiers in Sociology
ISSN 2706-6827 Vol. 2, Issue 6: 1-8, DOI: 10.25236/IJFS.2020.020601

Research on Innovative Business Model of Electric Energy Substitution Projects in Hebei Province, China

Yi Liang[1], Yingying Fan[2,*], Yongli Zhang[1]

[1] *School of Management, Hebei GEO University, Shijiazhuang 050031, China*
[2] *School of Art, Hebei GEO University, Shijiazhuang 050031, China*
[*] *Corresponding author e-mail: fanyingying0928@126.com*

ABSTRACT. *The implementation of electric energy substitution is an important way to form a clean, safe, and intelligent new energy consumption mode. A reasonable business model can effectively promote the application and promotion of electric energy substitution technology. This paper studies the innovative business model of electric energy substitution projects in Hebei Province, China. Combining the characteristics of electric energy substitution projects, the EPC mode, PPP mode, B2B mode, and B2C mode in the field of electric energy substitution are proposed, to provide guidance and assistance for the future commercial operation and development of electric energy substitution in Hebei Province, China.*

KEYWORDS: *Electric Energy Substitution Project, Innovative Business Model, EPC, PPP, B2B, B2C*

1. Introduction

The electric energy substitution promotion model refers to the complete scheme of the methods and means used to promote and develop electric energy substitution strategies. The promotion of electric energy substitution projects has not only played a positive role in promoting the development of the power market and the smooth development of energy-saving and emission-reduction tasks but also played a very important role in reducing losses and energy saving, increasing supply and expanding sales of power supply companies. For this, the literature [1] analyzed the technical economy and popularization and application conditions of solid regenerative electric boilers instead of regional coal-fired heating boilers and air source heat pumps instead of household coal-fired heating furnaces based on the case of the Beijing heating power substitution project. Studies have shown that thermal storage electric boilers can be used for central heating. Its operation mode of directly trading electricity with wind farms can promote the large-scale application and healthy development of electric boiler heating. Air source heat pumps can be used for household heating. The clean and efficient performance of rural household coal-fired heating stoves has been affirmed by the market, and its operating

ISSN 2706-6827 Vol. 2, Issue 6: 1-8, DOI: 10.25236/IJFS.2020.020601

economy has certain market competitiveness. Literature [2] introduces the "Four All" marketing strategy of the State Grid Chongqing Urban Power Supply Branch, that is, comprehensive resource integration, full control of opportunities, full data support, and fast business processing. Through the integration of the company's internal and external resources, the promotion of heat pump hot water boilers, electric kilns, commercial induction cookers, and other technologies have been carried out. In the promotion process, relying on scientific sample data, implemented project operation data and government subsidy policies, persuade customers to quickly lock in electric energy substitution projects and ultimately realize user energy cost savings and growth of the electricity sales market. Literature [3] selects the commercial and drinking service industry as the research object, conducts research on the promotion methods of its electric energy substitution, uses market research methods to analyze the use of existing commercial electric cookers, and explains the economic and social aspects of the application benefit.

In general, there are still few studies on the promotion of electric energy substitution. Existing research mainly focuses on the promotion and analysis of electric energy substitution in different regions and industries, that is, promotion from the demand side, without considering the supply side. The "Guiding Opinions on Promoting Electric Energy Substitution" issued by the National Development and Reform Commission in conjunction with eight ministries and commissions pointed out that it is necessary to innovate business models and promote the vigorous development of electric energy substitution work, such as contract energy management, equipment leasing, and lease construction [4]. Therefore, from the perspective of business model innovation, it is of extremely important theoretical value to research the future development of electric energy substitution.

The future development potential of electric energy substitution projects in Hebei Province, China is huge. There is room for further exploration and optimization in the fields of residential heating and transportation. Further application and promotion of electric energy substitution projects are required, which is not only for the development of the electric power market and the task of energy saving and emission reduction. The smooth development of power supply enterprises has played a positive role in promoting, and can also play a very important role in reducing loss and energy-saving, increasing supply and expanding sales of power supply companies [5]. Given this, this article launches research on the innovative business model of the electric energy substitution project in Hebei Province, intending to provide guidance and assistance for the future development of electric energy substitution in Hebei Province, China.

2. Energy Performance Contracting Mode

The energy performance contracting (EPC) mode is widely used in the industrial field. It refers to the project that a professional energy service company (Energy Service Company, ESCO) is entrusted by a client enterprise to contract for it following the signed energy service contract. Provide energy-saving, investment and financing, technological transformation and other services, and use energy-saving

ISSN 2706-6827 Vol. 2, Issue 6: 1-8, DOI: 10.25236/IJFS.2020.020601

benefits as a service mechanism for return on investment and profit. The services usually contracted by energy conservation service companies include energy project design and development, installation and maintenance, measurement, monitoring, and verification of energy usage and savings services. The return of this service is based on the fact that the professional energy-saving service company has improved the energy conversion efficiency of the customer companies it serves and has reduced the cost of energy use or other negotiated standards. EPC mode can be divided into four types, as follows:

(1) Energy-saving benefit-sharing type

During the implementation of electric energy substitution projects, the energy-saving service company will provide its client companies with funds and full-process services, collaborate with customers to complete the construction of electric energy substitution projects, and agree in the contract to share energy-saving benefits with the client companies in a certain proportion. After the contract expires, the revenue generated by the electric energy substitution project and the ultimate ownership of the electric energy substitution project still belongs to the customer, which means that the customer's cash flow is always positive. The core of this type is to specify the measurement and calculation methods of energy-saving benefits in the contract.

(2) Guaranteed energy saving type

During the implementation of electric energy substitution projects, customers need to provide capital expenditures for the electric energy substitution projects in phases, and coordinate the implementation of the project by the energy-saving service company. The energy-saving service company is mainly responsible for providing full-process services and ensuring the realization of the project's energy-saving effects. According to the contract, the customer enterprise needs to pay the service fee to the energy-saving service company when the project reaches the promised savings. If the project does not meet the expected energy-saving promised, then the corresponding responsibility and economic losses will be borne by the energy-saving service company. If the project exceeds the promised energy-saving amount, the energy-saving service company and the customer will share the excess income in a certain proportion according to the contract. When the project is completed, the income generated by the electric energy substitution project and the ultimate ownership of the electric energy substitution project will still belong to the customer.

(3) Energy cost hosting type

During the implementation of the electric energy substitution project, the energy-saving service company is entrusted by the client company to provide services for the energy-saving transformation and operation management of the energy system, and the client company pays the energy custody fee to the energy-saving service company following the contract. The energy-saving service company provides financial support for customers to manage and transform the energy system. The contract also clearly specifies the evaluation index and the confirmation method of

ISSN 2706-6827 Vol. 2, Issue 6: 1-8, DOI: 10.25236/IJFS.2020.020601

energy service quality. If the standard is not met, the energy-saving service company will be liable for a contract breach. The economic benefits of energy-saving service companies and client companies mainly come from the saving and reduction of energy costs.

(4) Comprehensive energy service type

During the implementation of electric energy substitution projects, energy-saving service companies will provide users with financial support for energy system construction and technological transformation and full-process services according to their energy needs. During the contract period, the energy-saving company mainly provides design, investment and financing, construction, procurement and operation services for its energy service projects, and bears all costs incurred during project implementation. The user will pay a certain energy service fee to the power company according to the terms of the contract.

The relationship between the subjects of the EPC mode is shown in Figure 1.

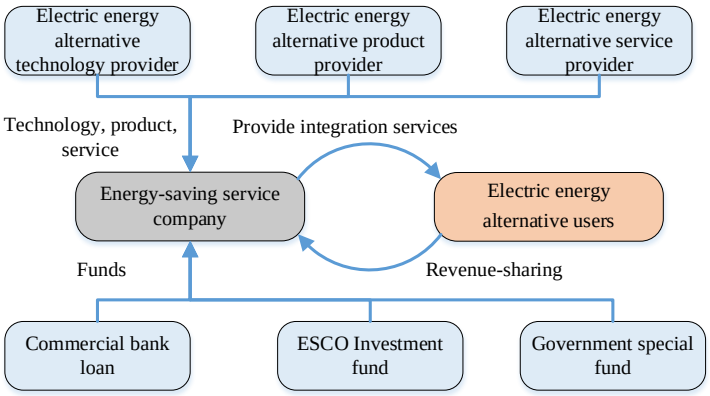

Figure. 1 Relationship between the subjects of the EPC mode

The advantage of the EPC mode is that the client company can transfer the financial burden of the energy-saving project to the energy-saving service company, and the energy-saving service company assumes the main responsibility for the development of the energy-saving project, which helps the client company to reduce the possible economic losses caused by the project, while also avoiding to solve the problems of unprofessional energy-saving projects and enterprises occupying too much energy, a win-win situation for energy-using enterprises, energy-saving service companies and social benefits has been realized.

The risks of the EPC mode include external risks and internal risks. External risks include political and legal risks, economic environment risks, market risks, etc. Internal risks mainly include customer credit risk, customer production risk, project technology risk, project implementation risk, and investment return risk.

ISSN 2706-6827 Vol. 2, Issue 6: 1-8, DOI: 10.25236/IJFS.2020.020601

3. Public-Private-Partnership mode

The public-private-partnership mode (PPP) refers to a business model of a partnership between government departments and social investors to provide the society with infrastructure construction and related services. The government department absorbs social capital, invests funds or resources into public projects, and social investors construct and operate the projects, and then obtain benefits following the initial proportion agreed in the contract.

For the construction of public facilities related to electric energy substitution projects, the project sponsors will first select suitable social investors through bidding and election. For projects with a large capital demand, the project sponsors will use bank loans and policy banks. The supportive role, establish a good investment and financing environment, to attract bank capital and social capital injection; then the project sponsor and the selected capital investor sign various documents to establish the project company; the project company is responsible for carrying out the project following the contract The specific work of the development and construction of the project; in the process of project operation, the project sponsor has the responsibility of supervision, and will formulate the corresponding supervision system, and conduct price supervision and quality supervision over the whole process of project operation. Capital investors can not only obtain the benefits generated after the operation of the project, but also the indirect benefits brought about by the support and subsidies of the project sponsor during the operation stage. The relationship between the subjects of the PPP model is shown in Figure 2.

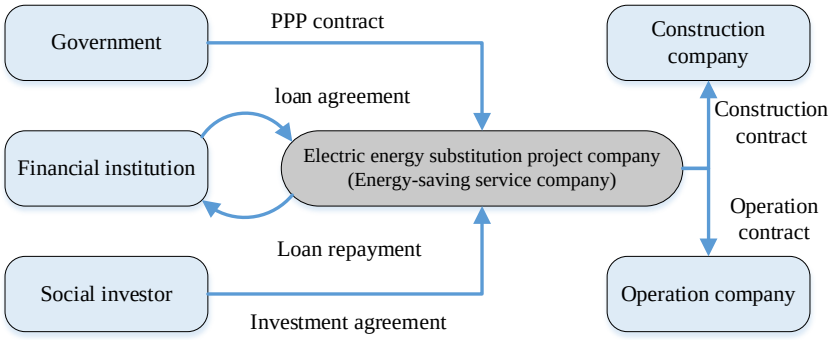

Figure. 2 Relationship between the subjects of the PPP mode

The advantage of the PPP mode is that it helps to avoid cost overruns, reduces the burden of government financial funds, and promotes the participation of diversified investment entities. Through the formation of strategic alliances between government and private sectors, project participants can work together and effectively Reduce construction and operating costs, and provide high-quality services to the public. In addition, the implementation of this business model helps to diversify risks reasonably.

ISSN 2706-6827 Vol. 2, Issue 6: 1-8, DOI: 10.25236/IJFS.2020.020601

The risks of the PPP mode are credit risk, political risk, policy and legal risk, financial risk, construction risk, cooperation risk, market and operational risk, etc.

4. Business to Business Mode

Business to Business mode (B2B) refers to a business mode in which enterprises exchange products, services, and information through the Internet platform.

With the development of electric energy substitution, grid companies can adopt the B2B model in the process of interacting with energy-saving equipment manufacturers, energy-saving service companies and other energy service providers. By building an "open, win-win, and sharing" State Grid e-commerce service platform, it is conducive to achieving efficient interaction between roles and promoting the rapid development of the energy Internet. The schematic diagram of the B2B model is shown in Figure 3.

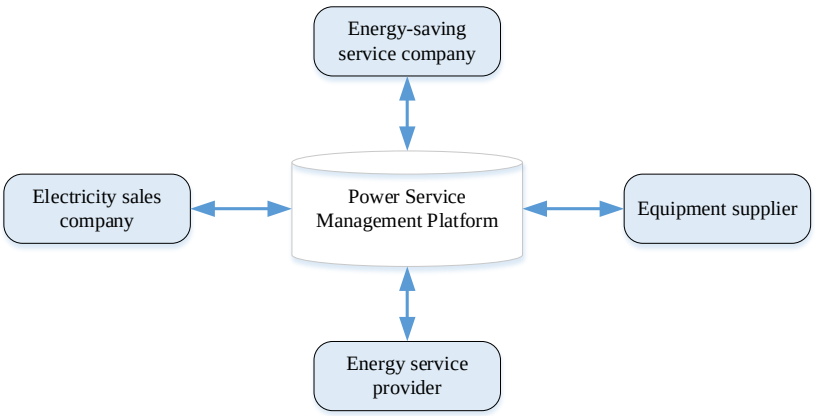

Figure. 3 Schematic diagram of B2B mode

The advantage of the B2B mode lies in that, on the one hand, it can effectively reduce purchase costs and inventory costs, strengthen information exchanges between market entities, and reduce transaction costs between market entities. On the other hand, it is also conducive to improving the information management and decision-making level of each market entity, so as to help grasp market opportunities and expand market development opportunities.

The risks of the B2B mode are that the B2B market has low entry barriers, high transaction risks, high security technology risks, and uncertain policy and legal risks and credit risks.

ISSN 2706-6827 Vol. 2, Issue 6: 1-8, DOI: 10.25236/IJFS.2020.020601

5. Business-to-Customer Mode

Business-to-Customer mode (B2C) is the product of e-commerce development to a certain stage, which is what we usually call a business model in which products and services are directly sold to individual users. This type of retail industry uses the Internet as its main carrier, and carries out various activities to promote products and services through the Internet.

With the development of electric energy substitution, grid companies or energy-saving service companies can adopt the B2C retail model in the process of interacting with users. Grid companies or energy-saving service companies provide electricity services (and energy services and technical services) to residential users, commercial users, industrial users, and agricultural users. Through the State Grid e-commerce management platform, it provides a trading environment for enterprises and users, and develops the B2C model in the sense of the energy Internet. The schematic diagram is shown in Figure 4.

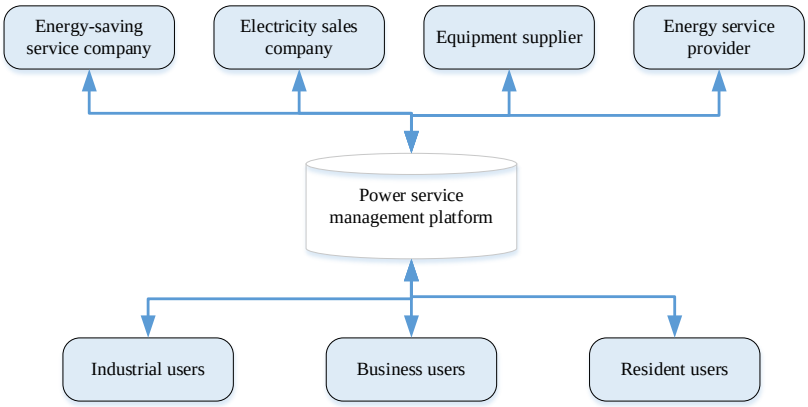

Figure. 4 Schematic diagram of B2C mode

The advantage of the B2C mode lies in the fact that the direct interaction between enterprises and users can reduce a series of trivial links in the transaction process and reduce transaction costs; on the other hand, it can provide personalized and differentiated services for different users, thereby reducing after-sales services. A series of fees for services.

The risks of the B2C mode include transaction risks, security risks, policy and legal risks, and credit risks.

6. Conclusion

This paper analyzes the participants of the electric energy substitution project, and combines the characteristics of the electric energy substitution project to

ISSN 2706-6827 Vol. 2, Issue 6: 1-8, DOI: 10.25236/IJFS.2020.020601

introduce a typical business model into the field of electric energy substitution. At the same time, the advantages and risks of various modes in the operation process are analyzed, in order to provide guidance and assistance for the future development of electric energy substitution in Hebei Province, China.

Acknowledgment

This work is supported by the Humanities and Social Science Research of Hebei University (Project No. SQ201097).

References

[1] T. Xue, J.S. Luo and Y. Zhou (2015). Preliminary studies on replacing coal-fired heating with electric power in Beijing suburb. China Electrical Engineering Society Annual Meeting, p. 1-9.
[2] J. Zhang, J.Z. Zhang (2015). Marketing strategy and implementation of electric energy substitution. Power Demand Side Management, vol.17, no. 1, p. 41-44.
[3] L. Wu, Q.H. Liu, W.Q. Niu (2011). Promotion and application of electric energy substitution in the commercial and drinking service industry. Economic Herald, vol. 9, p. 86-87.
[4] National Energy Administration (2016). Implementation of electric energy substitution to promote energy consumption revolution---Interpretation of "Guiding opinions on promoting electricity substitution". China Economic and Trade Guide, vol. 18, p. 51-52.
[5] Y. Liang (2019). Research on electric energy substitution potential prediction and optimal management in the Beijing-Tianjin-Hebei region. North China Electric Power University (Beijing), p. 139-143.