Energy Format and Classification Based on Format Summary

Shanshan Wu¹, Lili Zhang¹ and Rui Tang²

¹State Grid Energy Research Institute, Beijing, China
²Harbin University of Commerce, Harbin, China

*Corresponding author e-mail: tr940419@163.com

Abstract. The article mainly analyses scholars’ research on related concepts of format and energy format, clarifies the definition of format and energy format. Format is defined from the perspective of “meeting the needs of consumers”, which is a general description of the organizational form, management mode, business model and profit model of an enterprise. Energy format is a comprehensive concept which includes business type, industry status and industry potential. The energy industry format refers to the industrial form of different energy products (services), energy production mode and energy management organization form formed by the energy industry organization to meet different consumption needs in the energy market, combining various elements involved in modern energy production and operation. Combined with the different combinations of product types, production modes and operation organization form, the classification standard of energy formats is formed. By examining the comprehensive evolution trend of these three factors, the main basic types of energy formats are concluded.

Keywords: Format, Energy Format, Classification

1 Introduction
The article mainly defines the related concepts of format and energy format, analyzes the current development of energy format, and summarizes its development types, laying a foundation for the theoretical research on the development of new energy formats.

2 Definition of Format
The word “format” first appeared in Japan. Japanese scholar Suzuki Yasaki (1980) believes that business format refers to the business form of retail stores, that is, retail operators’ specific retail business premises [1]. Business type refers to the type of business, and the starting point is “what to sell”, that is, from the perspective of commodity suppliers, the scope of business and sales is determined according to the physical characteristics of goods. The Japanese Retail Business Association (1982) defines the retail format as “the business form of the retail operator that adapts to changes of consumers’ purchasing habits”. Different from business types, retail formats are classified according to the characteristics of consumers’ purchase [2]. Xiangshan Yafu (1986) believes that “format” is “retail business form”, which refers to “a collection of retail business organizations with the same business methods and the same techniques and methods”[3]. Kanemura Eizhe (1993) defines...
the retail format from the broad and narrow perspectives. In a narrow sense, the retail format is defined from the perspective of stores or sales that directly contact consumers, which is equivalent to “type of store”, “store format” and “store concept” in English, which refers to the various retail stores or stores provided for consumers according to their needs. In a broad sense, the retail format covers a wide range. In addition to the narrow format, it also includes the corresponding forms and operation organizations that support the operation of the narrow format, which is equivalent to the English “type of operation”. Therefore, he believes that retail formats in a broad sense include new types of organizational operations such as automatic vending and storeless retail [4]. American scholars and officials generally define it from the perspective of retail classification or type. Arieh Goldman (2001) believes that the retail type is composed of internal and external factors. External factors include product classification, store atmosphere, service, store location and price, and internal factors mainly include retail technology and retail culture [5]. Domestic scholars have also studied the definition of tourism format. Yang Jishi and Sun Xiaqin (2001) first mentioned “tourism format” [6]. Zou Zaijin (2007) thinks that tourism format is a complex, dynamic and characteristic concept. It is actually a comprehensive description of the organization form, operation mode, operation characteristics and economic efficiency of tourism industry (enterprise) [7]. To sum up, scholars mainly define the format from the perspective of “adapting to consumer needs”. Format usually refers to a specific industry form or status, which is a subdivision description of the organization form, management model, business model, and profit model of an enterprise.

3 Definition of Energy Format

Energy format is a brand-new concept and research field, and there is currently no authoritative and unified definition in academia. This article mainly reviews the history and current situation of energy development, deduces and summarizes the definition of energy format from a narrow and broad perspective, from the characteristics of product elements, commodity structure, service functions, target markets, and operating channels at different stages.

The history of energy development is accompanied by the history of human civilization and technological development. The energy transition is often manifested as a change in the dominant position of primary energy, with new energy varieties replacing old energy varieties. The world energy structure has experienced two major changes: coal replacing firewood and oil replacing coal, and is undergoing a transformation from fossil energy to renewable energy. Specifically:

The first energy revolution was the “black civilization” that entered the industrial society from the fuelwood energy era. Before the industrial revolution, fuelwood-based energy could meet the cooking and heating needs of human society. In 1769, Watt invented the steam engine. With the development of productivity driven by the first industrial revolution, fuelwood could no longer meet people’s demand for energy. Because of its advantages of easy mining, high burning heat, and convenient storage and transportation, coal has become the power source for driving steam engines. In 1880, it surpassed firewood in the primary energy consumption ratio and became the largest primary energy consumption. Because coal production and transportation require specialized conditions, the energy management organization at this stage has gradually changed from the decentralized and self-sufficient type in the fuelwood era to large-scale and industrialization. The coal energy era is the first stage of human society entering the fossil energy era.

The second energy revolution was from the age of coal and steam engines to the age of oil and internal combustion engines. In 1876, Otto invented the internal combustion engine, and petroleum as the power of the internal combustion engine officially stepped onto the stage of history. Later, Ford’s Model T and Wright brothers’ aircraft revolutionized the way humans travel. The transformation of internal combustion engines in transportation vehicles has led to a rapid increase in demand for oil and natural gas. As the petrochemical industry chain is longer than that of coal and the production process is more complex, energy management organizations such as scale and industrialization at this stage have been further consolidated and strengthened. Oil and natural gas have gradually become the most
important energy varieties and chemical raw materials after coal, and human society has entered the second stage of the fossil energy era, the “oil and gas era”.

The third energy reform is still in progress, which is reflected in the global energy development towards high energy density, greening and diversification. Under the background of economic globalization and global climate change, global energy production and utilization is developing towards a more efficient, convenient, cleaner, safer and more sustainable direction. The Internet and other cutting-edge information technologies will be an important technology platform in this energy transformation. With the power system as the core, the Energy Internet can make full use of clean and efficient energy. Both energy producers and consumers are the nodes of the network, enabling two-way conversion. Due to the dual progress and mutual integration of information technology and energy technology, the energy industry at this stage not only has a sharp increase in varieties, but also manifests itself as a return to a distributed and self-sufficient business organization. The new round of industrial revolution creates new demand for energy. Technological innovation will provide tools for the energy revolution, and the energy revolution will support economic and social changes.

In summary, energy industry format refers to the industrial form of different energy products (services), energy production modes and energy management organization forms formed by combining various elements involved in modern energy production and operation in order to meet different consumption demands in the energy market. In a narrow sense, the energy industry format refers to the combination of energy products and energy production methods. Broadly speaking, the business format of the energy industry includes both the narrow business format and the business organization form that consumers cannot directly observe and support the operation of the narrow business format. Energy format is a comprehensive concept that includes industry types, industry status and industry potential. Among them, industry types include energy product forms, production methods and organizational forms. The industry status refers to the status quo of the development, and the industry potential refers to the development trend.

4 Classification of Energy Formats

Establishing a set of scientific and reasonable division standards for formats is the basic prerequisite for scientific management of the industry. The classification of retail formats currently internationally is mainly determined by the location, scale, target customers, product structure, store facilities, operating methods, business hours, service functions, and price strategies of retail stores. P. Kotler (1996) proposed five criteria for the classification of retail formats: product mix, price appeal, store characteristics, store management form, and store collection form. E.M. Dinlerson (2004) divided the retail business into chain stores, independent stores with a large business scope, and independent stores with a small business scope according to the number of retail stores and the size of the business scope [8]. China’s latest national standard (2004)-“Classification of Retail Formats” points out that retail formats can be divided into two categories, namely retail with stores and retail without stores. With the attention of Chinese scholars to the study of tourism formats, the basic theoretical system of tourism formats has been gradually established, and the research level involving the concepts and types of tourism industry has gradually deepened. Zhang Wenjian (2010) summarized four major types of business efficiency from the perspective of format efficiency. Comprehensive agglomeration formats include shopping mall, holiday mall, and project cluster promotion center. Professional and segmented formats include tour guide service companies, car rental service companies, etc. The integrated promotion type includes tourism distribution centers, industrial tourism promotion centers, etc., and the network technology type includes Ctrip, eLong, etc.[9].Cui Wenjuan (2012) summarized three types of tourism business from the four aspects of tourism business mode, organizational form, consumer demand, and leading factors, including professional differentiation, resource integration, and industry integration. American scholars often classify retail formats based on the strategic combination of store retail, storeless retail, and ownership forms [10].

In summary, scholars at home and abroad have different classification methods for different industrial formats. Generally speaking, it is mainly classified from the perspectives of commodity
structure, operation mode, ownership, and product or service efficiency. In comparison, the classification from the perspective of commodity structure and business mode is relatively intuitive, easy to understand, and the classification method is relatively simple; Classification from the effectiveness of products or services, mainly from the perspective of consumers, is conducive to discovering other formats that can meet consumer needs, so as to innovate in formats; The division of formats in the form of ownership is relatively comprehensive and clear. The energy format is a collective concept, and it is difficult to categorize it strictly with uniform standards. From different dimensions, energy formats have different manifestations. The division methods based on energy products and energy production methods are not only relatively intuitive and easy to understand, but also have large differences in products, production methods, and business organization forms. This article mainly combines the different combinations of three factors of product types, production methods and business organization forms to form the classification standards of energy formats. By examining the comprehensive evolution trend of these factors, the main basic types of energy formats are summarized.

From the perspective of energy products, it includes primary energy and secondary energy. Primary energy includes raw coal, crude oil, natural gas, oil shale, nuclear energy, solar energy, water power, wind power, wave energy, tidal energy, geothermal energy, biomass energy and ocean temperature difference energy. Secondary energy sources include electricity, steam, coal gas, gasoline, diesel, heavy oil, liquefied petroleum gas, alcohol, biogas, hydrogen, and coke.

From the perspective of energy production methods, it includes large-scale production, distributed production, planned production, and customized production. Specifically, large-scale production means that the factory is organized, orderly, and mass-produced in accordance with a fixed pattern, with the main goal of reducing costs. Large-scale energy production is the most traditional and common form of format, such as large coal mines, large thermal power plants, and centralized wind power plants. Distributed production comes from distributed computing of computers. With the advancement of globalization, a distributed manufacturing system on a global scale has been formed. The distributed production of energy is represented by distributed energy grid-connected power generation and distributed energy storage utilization, with the main goal of making full use of resources. Planned production refers to a production method in which processes such as raw material procurement, product manufacturing, quality inspection, and packaging and delivery are strictly implemented in accordance with the plan, with optimized configuration as the main goal. Planned energy production methods are still the current mainstream format, such as planning to generate electricity online. Customized production is to produce according to customer needs, and to meet the individual needs of customers as the main goal. Customized energy production methods are self-produced and self-sold production methods, such as household photovoltaic power generation for self-use.

From the organizational form of energy production, there are four kinds of organizational forms: specialized production, horizontal integration, vertical integration and diversified expansion. Among them, specialized production is the most primitive and common form of organization, which refers to the organization of production around a specific product or field, such as the current conventional coal power and hydropower. Horizontal integration refers to the unity of enterprises with different resource advantages at the same stage to form an economy. The horizontally integrated form of energy production organization mainly refers to the integrated management of various energy varieties, such as multi-energy complementation. Vertical integration refers to the alliance with the users of the company’s products or raw material suppliers or the expansion of these business areas on its own. That is the enterprise’s business behavior that the enterprise develops to the upstream or downstream of the existing business on the basis of the existing business to form the integration of supply, production and consumption or supply, production and consumption, so as to expand the existing business scope. The vertically integrated energy production organization form mainly refers to a form that integrates design, manufacturing, construction, production, and sales, such as photovoltaic cloud network. Diversified and expanded production organizations mainly refer to related diversified forms
of expansion, relying on the advantages of energy technology, introducing information technology, and expanding new forms of energy products or services, such as micro-grid operation and virtual power plants.

In summary, according to various combinations of different energy products, energy production methods, and energy business organization forms, the classification of energy formats has been clarified. See the table below for details.

Table 1. Energy formats classification

| Energy products | Energy production method | Scale | Distributed Planning | Customization |
|-----------------|--------------------------|-------|----------------------|---------------|
| Coal            | √e.g.: Large-scale coal production | √e.g.: Small workshop coal production | √e.g.: Produce 5500 kcal coal according to fixed specifications | √e.g.: Multi-energy complementarity (horizontal integration) |
| Petroleum       | √e.g.: Large-scale oil production | -- | √e.g.: Produce gasoline according to fixed specifications | √e.g.: Multi-energy complementarity (horizontal integration) |
| Natural gas     | √e.g.: Large-scale natural gas production | -- | √e.g.: Produce natural gas on demand | √e.g.: Multi-energy complementarity (horizontal integration) |
| Energy products | Fossil energy power generation | √e.g.: Large-scale thermal power plant | √e.g.: Small thermal power | √e.g.: Multi-energy complementarity (horizontal integration) |
|                 | √e.g.: Centralized wind power plant | √e.g.: Small hydropower | √e.g.: Generate electricity as planned | √e.g.: Green certificate, (horizontal integration: multi-functional complementary) |
|                 | √e.g.: Centralized photovoltaic power station | √e.g.: Residential rooftop photovoltaic power generation, (vertical integration: photovoltaic cloud network), (diversified) | √Vertical: Generate electricity as planned | √Vertical: Green certificate, (horizontal integrated: multi-functional complementary) |
expansion: virtual power plant, micro grid

Biomass

√Material: Rural biomass thermal energy industry chain (vertical integration)

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