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Retraction

Retracted: Energy Efficiency Improvement of Composite Energy Building Energy Supply System Based on Multiobjective Network Sensor Optimization

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] J. Huang, "Energy Efficiency Improvement of Composite Energy Building Energy Supply System Based on Multiobjective Network Sensor Optimization," *Journal of Sensors*, vol. 2022, Article ID 6935830, 11 pages, 2022.

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Research Article

Energy Efficiency Improvement of Composite Energy Building Energy Supply System Based on Multiobjective Network Sensor Optimization

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In order to solve the problem of improving the energy efficiency of the energy supply system, the author proposes a method for improving the energy efficiency of the energy supply system of composite energy buildings based on multiobjective grid optimization, the method solves the energy efficiency improvement of the grid-optimized composite energy building energy supply system, with the increasing material needs of people, the traditional fossil energy consumption is increasing, and the environmental pollution problem is also becoming more and more serious, and people will face serious energy crisis. Due to the high proportion of coal in China's energy, most thermal power plants use coal as fuel to generate electricity. In the process of coal combustion power generation, a large amount of air pollutants such as CO^2, SO^2, and No_x are produced, which destroys the ecological environment. In order to alleviate the energy crisis and reduce the emission of polluting gases, the development of renewable energy sources such as wind energy and solar energy is extremely important. Electricity supply and heat supply account for the main part of China's energy consumption, 40% of China's energy consumption is used for electricity supply, and 25% is used for heat supply. In terms of electricity supply, 12% of electricity is used for residential use, about 74% is used for industrial production, and 14% is used for commercial development.

1. Introduction

The microgrid unifies the distributed power generation units into an organic whole, the original microgrid can only provide electricity for users, with the development of multienergy interconnection, the combined heat and power system is connected to the microgrid, so that the microgrid can provide electricity to users, which can also provide thermal energy, and it realizes the transformation from microgrid to microenergy grid. Adding the energy storage system to the cogeneration microgrid, it can better realize the combined electric and heat dispatching of the system, making the system more flexible and controllable. Due to the joint supply of electric energy and heat energy to users at the same time, the distributed power sources in the cogeneration microgrid are becoming more and more diverse and complex, which also makes the flexible scheduling of each unit in the microgrid more difficult; therefore, it is better to study the synthesis of various energy microgrids. Reducing energy and environmental energy impacts, making total energy use renewable and reducing emissions, are the best goals of many economic and environmental decisions, worth looking into around cost. Study the combined electric and heat dispatching of CHP-type microgrid; it is beneficial to the unified management of energy and the coordinated operation of the system. By optimizing the output of each unit of the microgrid, the energy flow of the multienergy interconnected microgrid system is efficiently optimized. The combined optimization of electricity and heat for the microgrid can improve the peak shaving capacity of the unit. In the microgrid system, the cogeneration unit mostly works in the working mode of "heat-based electricity," in this mode, due to the constraints of the unit's electric-heat coupling; the unit's electrical output follows the thermal output, which makes the unit inflexible operation, reducing the effect of the unit on load peak shaving and valley filling. The author adds electric energy storage and thermal energy storage devices to the combined electric and heat system of the microgrid and installs an electric boiler for electric-heat conversion, which will greatly decouple the electric-heat coupling characteristics of the CHP unit. The microgrid studied by the author not only operates in connection with the large power grid but also operates in connection with the thermal grid; in this operating mode, the microgrid can exchange electrical energy with the grid and thermal energy with the thermal grid, which not only improves the flexibility of the system control, the comprehensive utilization of energy is realized, and the operating cost of the whole system is reduced.

2. Literature Review

Bhattarai et al. said that, in recent years, China has experienced multiple severe storms, and the habitat has persisted, facing the dual efforts of energy conservation and emission reduction and environmental constraints [1]. Kalkan et al.'s power industry is the key to emission reduction. In the face of energy saving and emission reduction, only improving the power generation capacity of equipment can no longer adapt to the construction of low-carbon industries under the new situation [2]. Brahim and Abderafi said that the "13th Five-Year Plan" period is to continue to deepen China's energy revolution; it is an important period for the comprehensive realization of energy transformation and development [3]. Dan et al. said that in the context of structural reforms on the energy supply side, the decentralized form of clean energy utilization will develop rapidly, and the power market reform will also drive the power industry, from supply-side management to both demand-side and supply-side management [4]. Yu and Song said that with the promotion of smart grid and energy Internet technologies, a large number of distributed power sources and demand-side resources will participate in the optimal scheduling of power systems [5]. Li et al. said that distributed renewable power, demand response, electric vehicles, and other demand-side resources have been paid attention to because of their advantages of low maturity, fast response, and low pollution emissions [6]. Storodubtseva et al. said that users reduce electricity load by using energy-efficient terminal equipment or responding to electricity price signals, use demand-side resources to partially replace the output of units with high power supply costs, reduce pollutant emissions, and realize comprehensive and optimal allocation of power resources; the power system has the characteristics of simultaneous completion of power generation, power supply, and power consumption, and electrical energy cannot be economically stored on a large scale [7]. Punsawat and Makcharoen said that this requires that the entire power system dispatching must be balanced in real time; in order to cope with the pressure on resources and the environment, China will develop and utilize renewable energy on a large scale and increase the proportion of clean energy, and by 2020 and 2030, the proportion of nonfossil energy in China will reach 15% and 20%, respectively [8]. Berawi and others believe that in the future, a large number of wind power, photovoltaic power generation, and other renewable energy power generation with random fluctuation characteristics will be connected to the grid, which will seriously threaten the quality of power transmission and the safe operation of the power system [9]. Among them, the distributed power generation resources with scattered layout, because of their small installed capacity, as a result, is difficult to fully participate in the competition in the electricity market. Serale et al. said that in order to alleviate the above negative effects, stabilize the volatility of renewable energy power generation output, give full play to the positive effect of clean energy power generation, and promote the development of distributed energy, virtual power plants have received increasing attention [10]. A virtual machine is an integrated power plant that combines the control of energy and small electronic devices through technologies such as data, control, respect, and communication. Power distribution is usually the distribution of electrical equipment, the required capacity, and the distribution of electrical equipment that can be connected to the grid. With the development of Internet energy technology, virtual machine owners can directly participate in the equipment and demand balance in electrical energy, optimize the power load curve, and promote the utilization of renewable energy. At present, China's economy has entered a new normal, and its development mode will also change from relying on excessive consumption of energy resources, turn to pursue the quality of economic growth, and optimize the economic structure. The goal of future power industry development will not only support economic development but also improve the quality of power consumption and the sustainable development of the ecological environment. The deepening of China's power system reform is driving the power industry to shift from single supply-side resource planning to comprehensive power resource planning and from supply-side management to demand-side and supply-side comprehensive management, and virtual power plants are also developing in the direction of marketization, as shown in Figure 1.

3. Methods

In the power business environment, two types of on-site application of virtual power plants can establish a relationship. Price-based demand-responsive virtual power plants focus on different applications, combine multiple pricing strategies, and interact with different levels of the virtual power industry. Incentive-based application fields' virtual power plants can bring together a variety of ideas to participate in medium- and long-term power markets, daily markets, and real-time markets [11], the time period in which two types of demand response virtual power plants participate in the electricity market. As a result, power operators need to integrate multiple demand response options, adjusting the need for capital participation in market value and timing accordingly. As different industries, formulate strategies to participate in the power industry, as shown in Figure 2.

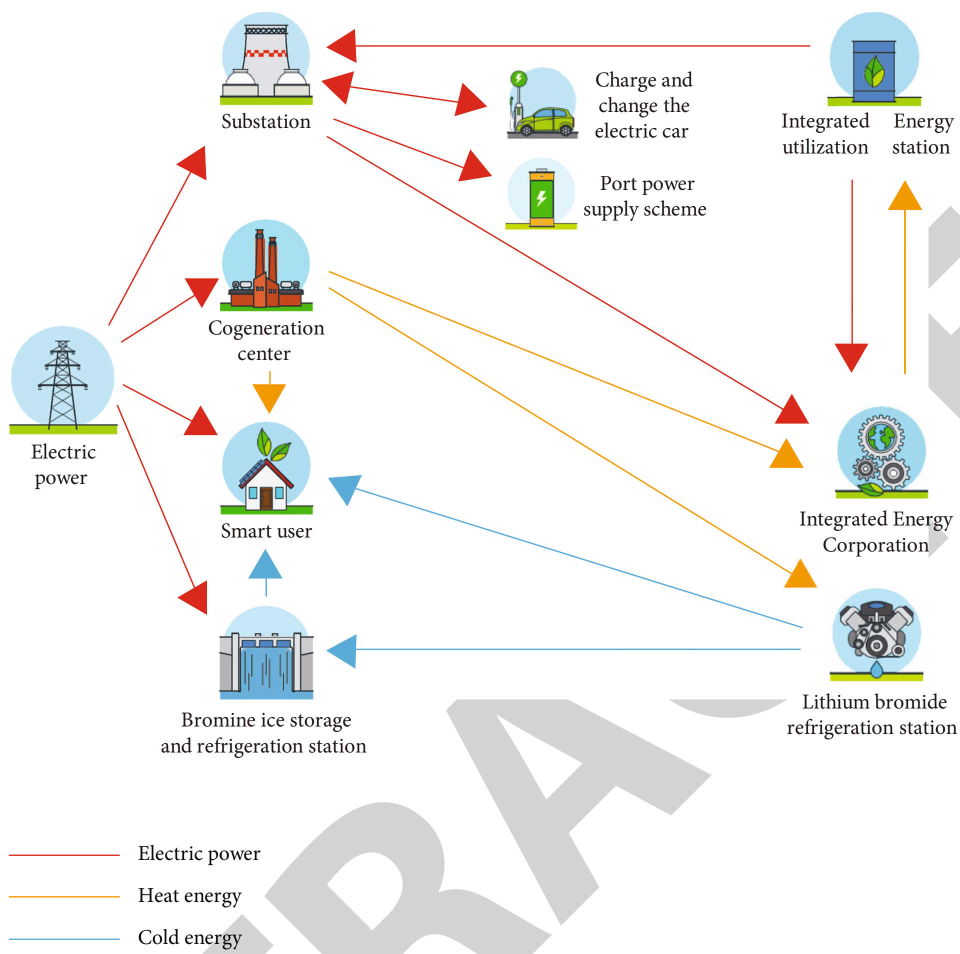

FIGURE 1: The energy efficiency improvement of the energy supply system of composite energy buildings based on multiobjective network optimization.

During system dispatch, the demand response virtual power plant can be regarded as the generation output and compete with traditional generator sets in the power market [12, 13]. Therefore, the authors compare the similarities and differences between traditional generator sets and demand response virtual power plants. The output of the two types of power plants is similar in that there are upper and lower output constraints, system ramp rate constraints, and operating cost constraints. But they have many differences in minimum downtime, number of system calls, and startup cost, as shown in Table 1.

This section will consider market operation strategies based on price-based demand response projects; it acts as a price taker to purchase electricity in a multilevel market to meet the electricity demand of users. In the electricity market environment, the transaction and scheduling process of virtual power plant operators is shown in Figure 3.

From a transaction point of view, as the main body of electricity sales of virtual power plant operators, a reasonable time-of-use price strategy is formulated downward to attract users to participate in the response to load reduction and upward through the power dispatch trading center and power generation entities to carry out medium- and long-term transactions and spot transactions, in order to purchase electricity to meet the needs of users and obtain the income from the purchase and sale of electricity. E-commerce companies transmit the changes in electricity prices in the store to consumers through electricity consumption time and encourage users to adjust the power consumption and reduce the maximum voltage. After assembly, the “negative” motor unit can generate peak hours [14]. Therefore, through the time-of-use electricity price, the virtual power plant operator can save electricity purchase cost and system operation cost. From the perspective of dispatching, the main body of electricity sales collects the electricity price response information of users downward, summarizes the overall load reduction, and uploads it to the dispatch center, which adjusts the power generation dispatch plan during peak, flat, and valley periods [15, 16]. Based on the maximization of its own interests and the requirements of system energy-saving scheduling, the main power generation entity will readjust the operation combination of the units. In a commercial environment, the demand for virtual power plants by electricity sellers needs to purchase electricity from the electricity market, medium- and long-term electricity, and retailers to meet the needs of consumers. Electricity will be sold to consumer. This chapter will consider the changes in the electricity sales revenue of e-commerce after using the peak-

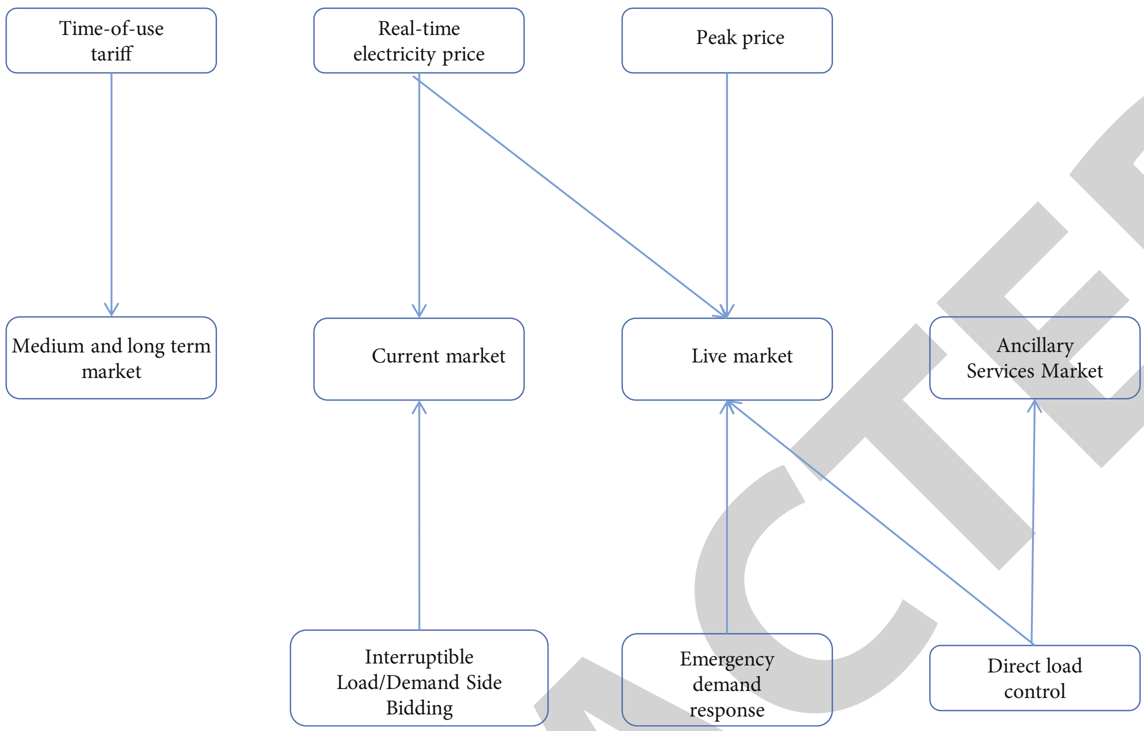

FIGURE 2: Schematic diagram of the time period when virtual power plants participate in the electricity market.

TABLE 1: Differences between traditional power plants and demand response virtual power plants.

Project	Traditional power plant	Price-based demand response VPP	Incentive demand response VPP
Minimum start and stop time	√	×	√
System call limit	×	×	√
Unit start-up cost	√	×	×

valley electricity price and explain the impact of the peak-valley time-sharing rate of virtual power plants. Based on the cost, the power equipment must be sourced and retailed in the medium- and long-term market. In the medium- and long-term market, based on the game of consumer electronic transportation, a part of electricity is purchased at a certain cost with the energy generated by both parties or the virtual consumer electricity market that competes in the middle [17]. In the current electricity market environment, power generation companies finally sell power generation loads for multiple periods of time to users at one price. Therefore, in the medium- and long-term market, the author does not consider the impact of the peak-valley time-of-use electricity price on the power generation side on the main body of electricity sales. Before the implementation of peak and valley electricity prices, the electricity purchase cost of electricity sellers in the medium- and long-term electricity market is shown in

$$C_{ml}^{0} = \rho^{ml} \bullet L^{ml0}. \tag{1}$$

Among them, ρ^{ml} is the transaction price of electricity sellers in the medium- and long-term electricity market, L^{ml0} is the electricity purchase volume of electricity sellers in the medium- and long-term electricity market, it and is obtained by predicting the electricity consumption of the user side in the previous transaction period. Among them, $L^{ml0} = \sum_{t=1}^{t} \theta L_t^0$ and θ are the proportion of electricity purchased by electricity sellers in the medium- and long-term electricity market. L_i^0 is the load demand at time t before the implementation of the peak-valley electricity price. The electricity purchase cost C_{sp} of the electricity seller in the spot market before the implementation of the peak-valley electricity price is shown in

$$C_{sp} = \sum_{t=1}^{T} \rho_t^{sp} L_t^{sp0}. \tag{2}$$

Among them, ρ_t^{sp} is the electricity purchase price of the electricity seller at time t in the spot market, ρ_t^{sp} is the electricity purchased in the spot market at time t, and $\sum_{t=1}^{T} L_t^{sp0} = (1-0)\sum_{t=1}^{T} L_t^0$. In the spot market, the electricity purchase price of the electricity sellers in each period will fluctuate with the market price, and there is uncertainty. The author uses expectation theory to deal

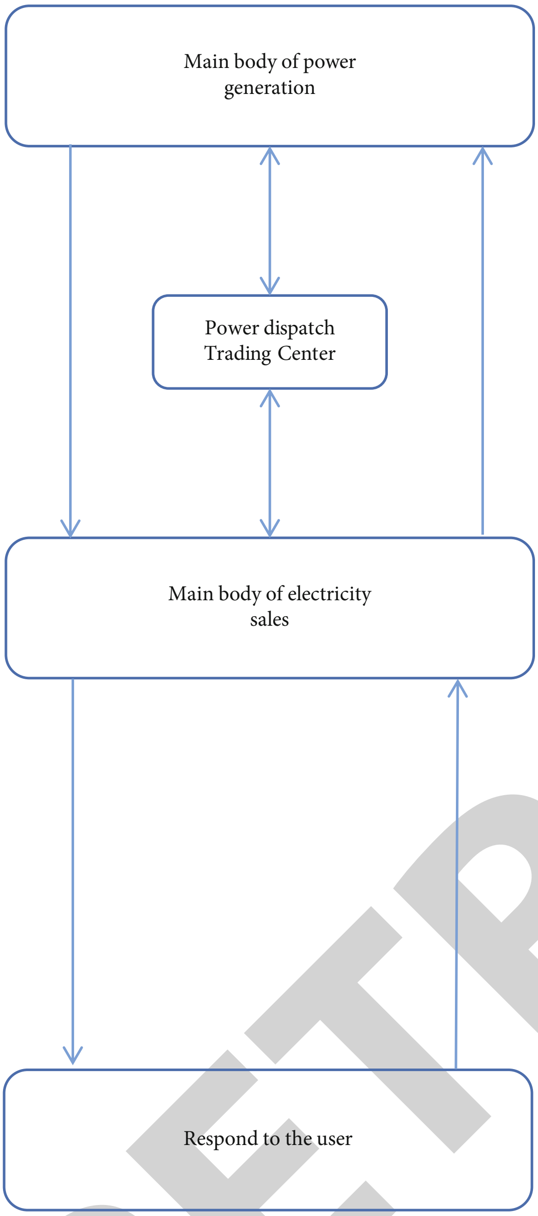

FIGURE 3: Market operation mechanism of price-based demand response virtual power plants.

with market price fluctuations, and the main body of electricity sales is affected by the fluctuations of spot market electricity prices. Assuming that there are s scenarios of electricity price fluctuations in the spot market at time t, the electricity price in each scenario is $\rho_{s,t}^{sp}$, and λ_s^{sp} represents the probability of occurrence of each scenario, then the expected electricity purchase cost C_{sp} faced by the electricity seller is represented, as shown in

$$C_{sp}^{0} = \sum_{t=1}^{T} \sum_{s=1}^{S} \lambda_s^{sp} \rho_{s,t}^{sp} L_t^{sp0}. \tag{3}$$

After using the maximum power consumption, the user's power consumption will change at any time. It is assumed that the concept of e-commerce purchasing power in the medium- and long-term market and retail market remains unchanged, that is, the proportion of electricity purchases remains unchanged, then the electricity sellers are in the mid-to-long-term and spot markets, and the electricity purchase cost in the long-term market is shown in

$$C_{ml}^{PB} = \rho^{ml} \bullet L^{mlPB}. \tag{4}$$

Among them, $L^{mlPB} = \sum_{t=1}^{r} \theta L_t^{PB}$ and L_t^{PB} are the load demand at time t after the implementation of the peak-valley electricity price. The electricity purchase cost C_{sp}^{PB} of the electricity seller in the spot market is shown in

$$C_{sp}^{PB} = \sum_{t=1}^{T} \rho_t^{sp} L_t^{spPB}. \tag{5}$$

Based on price uncertainty, the electricity purchase cost of electricity sellers in the spot market after the implementation of peak and valley electricity prices is shown in

$$C_{sp}^{PB} = \sum_{t=1}^{T} \sum_{s=1}^{S} \lambda_s^{sp} \rho_{s,t}^{sp} L_t^{spPB}. \tag{6}$$

Before the implementation of the peak-valley time-of-use electricity price, the revenue of the electricity sales company is the electricity sales revenue based on the fixed selling price, as shown in

$$I_{\text{sell}}^{0} = \rho_0 \sum_{i=1}^{N_c} \sum_{t=1}^{T} L_{i,t}^{0}. \tag{7}$$

Among them, N_c is the number of users, $L_{i,t}^{0}$ is the electricity load of user i at time t, and ρ_0 is the fixed sales price. After the implementation of the peak-valley electricity price, the income of the electricity sales company becomes as shown in

$$I_{sell}^{PB} = \rho_p \sum_{i=1}^{N_c} \sum_{t=1}^{T_p} L_{i,t}^{PB} + \rho_f \sum_{i=1}^{N_c} \sum_{t=1}^{T_p} L_{i,t}^{PB} + \rho_v \sum_{i=1}^{N_c} \sum_{t=1}^{T_p} L_{i,t}^{PB}. \tag{8}$$

Among them, ρ_p, ρ_f, and ρ_v are the electricity sales prices during peak, normal, and valley periods, respectively. T_p, T_f, and T_v represent the peak period, the valley period, and the peace period, respectively.

Therefore, the profit TR^0 of the virtual power plant operator before the peak and valley electricity price is shown in

$$\mathrm{TR}^0 = I_{\text{sell}}^{0} - C_{sp}^{0} - C_{sml}^{0}. \tag{9}$$

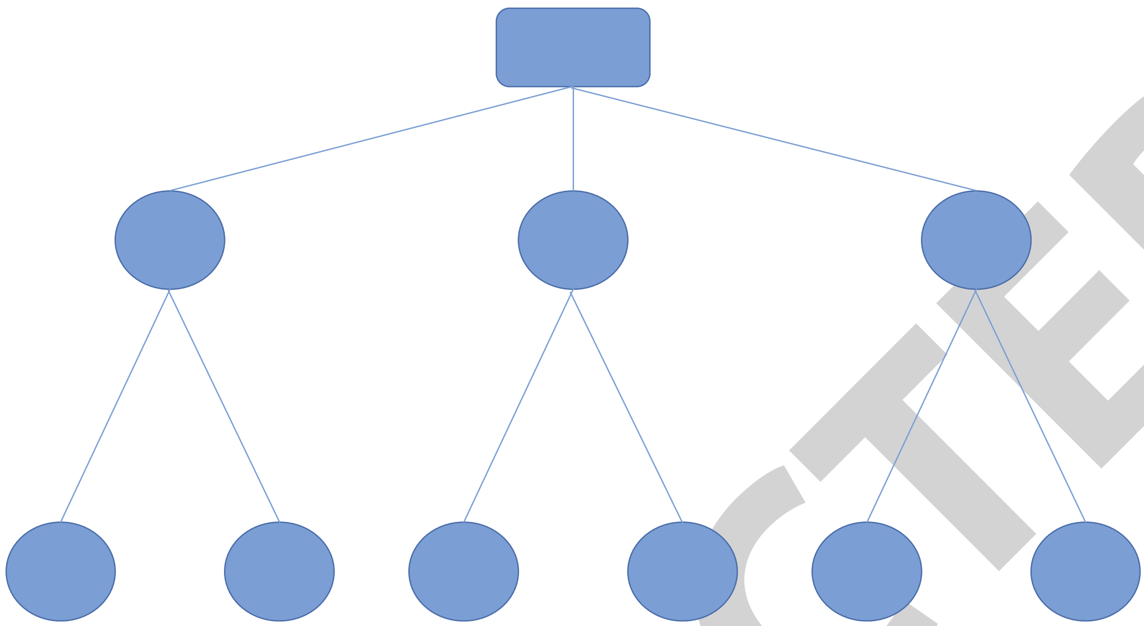

Figure 4: Hierarchical structure diagram of AHP.

It is arranged as shown in

$$\mathrm{TR}^0 = \rho_0 \sum_{i=1}^{N_c} \sum_{t=1}^{T_P} L_{i,t}^0 + \sum_{i=1}^{T} \sum_{s=1}^{S} \lambda_s^{sp} \rho_{s,t}^{sp} L_t^{sp0} - \rho^{ml} \bullet L^{ml0}. \tag{10}$$

The steps of fuzzy AHP decision-making based on the concept of horizontal triangle number are as follows, establishing the AHP hierarchical structure of indicators. Based on this hierarchical structure, the decision problem can be divided into three levels, namely, the target decision level, the criterion level, and the element level, as shown in Figure 4.

Judgment matrix is established by pairwise comparison between indicators. First, the pairwise comparison results of the importance of each indicator are collected by experts in the form of a questionnaire [18]. Due to the ambiguity of expert decision-making, the pairwise comparison results of indicator importance are represented by linguistic variables such as extremely important, very important, obviously important, slightly important, and equally important [19]. To determine the feasibility and performance of the various peak turnaround time cost-benefit models used in this chapter, the area considered by the S Electricity Marketing Company was used as an example to evaluate, for example, the typical load in this area before using peak-valley electricity; the peak-valley load is 1532 MW, and the valley load is 687 MW [20]. The author formulates the peak-valley electricity price strategy based on the original load data of this typical day, as shown in Figure 5.

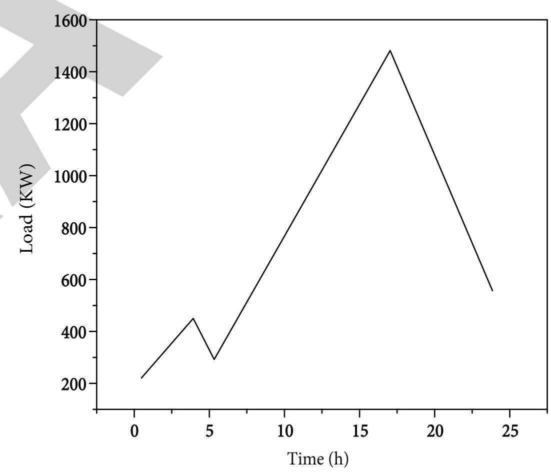

Figure 5: Typical daily load in the area under the jurisdiction of the electricity sales company.

Based on the market transaction model of demand response VPP in the VPP business model, the author discusses the operation mechanism of demand response VPP participating in the power system based on China's electricity market environment; the pricing decision model of price-based demand response VPP is established. Firstly, based on the characteristics of demand response, the demand response VPP is classified, and its operating characteristics are described, and from the perspective of participating in the market, it analyzes the relationship between price-based demand response VPP and incentive-based demand response VPP. Then, it focuses on the market share strategy of price-based demand response VPP with electricity sales companies as the main body and analyzes the impact of using peak-valley time-sharing from the perspective of price tariff and evaluated the use of VPP. The revised VPP response will focus on analysis in Chapter 4. Finally, the rate is calculated based on the peak-to-valley time period divided by the K-means path and the user's response to the electricity consumption peak-to-valley time. A cost-benefit model determination based on VPP response request is established with public utility companies as the main body

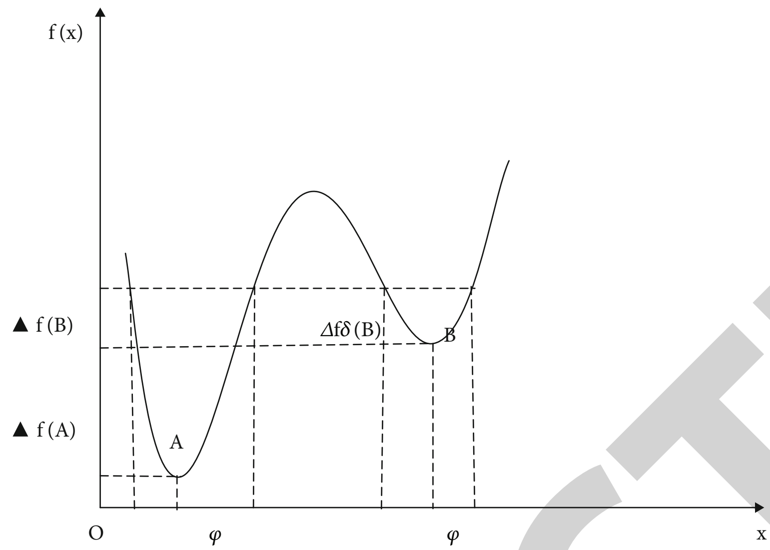

Figure 6: Schematic diagram of the robustness of the solution.

and peak and valley time utilization as the basis. Among them, the optimization objective selects the minimum coal consumption of the system, the minimum peak-to-valley load difference, and the minimum user electricity expenditure, and based on the fuzzy AHP method, the multiobjective optimization problem is transformed into a single-objective optimization problem. The results of the case analysis show that the implementation of the peak-valley electricity price can reduce the coal consumption of the system, reduce the peak-valley load difference, and reduce the user's electricity bill.

4. Analysis of Results

Due to the controllability of the output of traditional conventional generator sets, the power generation can be stable without fluctuation, while the power generation of wind turbines has fluctuations, and the random change of wind power will affect the balance of power generation of the entire system. Due to the influence of my country's climate, the output of wind power is usually larger at night and smaller during the day, and there is no load at night, and the day is the maximum load time, if the maximum shaving power is capable. Not enough, some air will be blocked. When wind power is connected to the grid, the uncertainty of wind power will affect the voltage and frequency of the system, the system voltage will exceed the limit or change, the air volume change rate at the point close to the wind turbine is larger, and the additional point is less affected [21]. When the wind speed is unstable, sometimes, it is greater than the cut-in wind speed, and sometimes, it is less than the cut-in wind speed, causing the fan to start and stop continuously, thereby increasing the frequency of system instability. As the compression power of the wind turbine increases, in order to reduce the impact of the wind turbine, the storage capacity of the wind turbine is further increased. RDES are distributed to end users as a combination of cooling, heating, and power systems, combined with local renewable and nonrenewable energy sources, and operate in a network with large projects and power pipelines to provide air conditioning, heating, and electricity, users in the same region at the same time, and other electrical services. Design, inspection, and refinement are important steps in understanding the R&D process, and China has done extensive R&D. In order to improve the quality of power distribution, China has done a lot of research on the development and improvement of power distribution. Model (building 233234) is based on a model that focuses on different applications and uses different tools and procedures to improve the model. However, most of the existing models start with a distributed power solution and provide other power sources in the area to optimize the solution from standard designs. Compared to traditional air conditioning and heating systems in the region, more power input and more power output of RDES data can lead to safety, performance-quality and high-quality electronics, integration of operations, and data flow, as well as communication, control technology, and information technology have been used to improve efficiency, improve energy efficiency, and provide feedback for the stable and efficient operation of RDES. Based on the consensus on the transmission of electricity and the main force in the network, Internet power will definitely take the main force as the "history," "network," and use distributed systems, microgrids, and other sites in a large-scale Regional Energy Internet Network. RDES with the characteristics of Internet energy is not a simple superposition of multiple energy sources. It has multiple connectivity such as power generation, power conversion, energy storage, and electricity consumption, as well as the interaction and connection of various energy sources. The flow of air conditioning, heating, and electricity in the system, through the integration of information fusion technology, realizes the extensive use and integration of energy at different levels and realizes the integration and exchange efficiency of various energy integrations, an energy system [22]. With the increasing dependence of various scheduling and control functions of the physical system on the information system, this puts forward higher requirements for the integrity, accuracy, and timeliness of information quality, that is to say, in the energy Internet, information systems are as important as physical systems. The basis for the research on the interaction between information and physical systems in the energy Internet is the unified modeling of information systems and physical systems, referred to as cyber-physical modeling. Cyber-physical systems with cyber-physical modeling and optimal control as the core are considered to be the future development direction of power systems; there have been some discussions on the cyber-physical modeling of power systems, but the research on cyber-physical modeling in the field of energy Internet has just begun. On the basis of the general structure of the regional distributed energy system, the author proposes a multiagent system- (MAS-) based regional energy Internet architecture model under the combined cooling, heating, and power supply, and on this basis, it has further constructed to meet the user's demand for cooling, heating, and electric energy and comprehensively consider the constraints of nature, environment, social development level, energy policy, system reliability, and operability, etc., a system optimization model to maximize economic and environmental goals. Caregivers are an important concept in the field of intelligence. It generally refers to an organization that has the intelligence to actively begin to achieve its goals by creating activities based on its own state and modifying its own internal data as the environment changes [23]. It is generally believed that the agent has several basic characteristics of autonomy, reactivity, initiative, sociality, and evolution; these characteristics are concentrated in that the agent can respond to external stimuli and actively adjust its own behavior according to changes in the external environment and state to adapt to changes and accumulate learning experience and knowledge. Multiagent system (MAS) consists of multiple loosely coupled agents (agents), each of which is a physical or abstract entity with incomplete information and problem-solving capabilities, the data is scattered and distributed, and the system can adapt to changes in the environment and the corresponding self-adjustment ability, focusing on solving complex distributed tasks and problems through interaction and cooperation between independent agents. Multiagent technology is an important realization of distributed artificial intelligence technology; the rise and development of complexity science have promoted the development and wide application of MAS; this is because there are a large number of complex systems with complex relationships, complex structures, interrelated, mutual constraints, and interactions in nature, such as economic, social, natural ecology and other objective environments; these systems are abstracted into MAS, the essential properties of complex systems [24, 25]. Multiagent technology and its ideas have been widely studied in power system, and robust optimization has always been one of the focuses of current research. How to define robustness has also been carefully considered by experts. At present, many experts have agreed to define the anti-interference ability of the solution as the robustness of the solution. There is a certain difference between the robustness of the solution and the optimality of the solution, the solution with good robustness is not necessarily the optimal solution, and the robustness of the optimal solution is not necessarily the best. In practical applications, the decision maker should choose the optimal solution or the solution with better robustness according to specific needs. Of course, there may be situations where the optimal solution is the solution with the best robustness. A comparative analysis of the robustness and optimality of the solution is shown in Figure 6.

There are many devices in the RDES system, and there is a certain degree of interconnection between the devices. The integration is difficult. The configuration and capability of the devices have a significant impact on the value economy, environmental benefits, and energy efficiency of the device system. Improper installation of equipment and excess capacity can result in wasted operations and low-energy consumption; if the capacity is too small to meet the needs of the region, it will result in power consumption that is greater than the reduction. It can be seen that to make the regional layout plan more suitable, feasible, and efficient, which is the basis for meeting the regional load demand, it is necessary to comprehensively consider the social development foundation, environmental conditions, system resource allocation, energy policy status, and physical properties of key equipment in the entire region. Characteristics know how to set the efficiency of the distribution area [26]. A decision-based and system-based RDES bilevel optimization is proposed, and a general RDES multiobjective optimization configuration model is constructed; the nondominated sorting genetic algorithm based on elite strategy (NSGA-II) is used to find the global optimal solution. The growth of power distribution is reflected in the widespread use of carbon monoxide triple power distribution. Driven by the further increase in oil resources and construction, China's natural gas-powered pipelines and RDES have developed well. However, as people's health requirements are getting higher and higher, the proportion of renewable energy in the total power generation is increasing, and its application in the power distribution system will be done more. Especially under the development concept of the energy Internet, as an open energy system, the complementarity between energy resources is brought into play; the distributed energy system will show the application trend of multiple energy types. Regional differences in natural gas resource ownership and pipeline network coverage affect the use of natural gas distributed energy systems, and various regions in China also have innate endowments in renewable energy such as wind energy, solar energy, geothermal energy, and biomass energy; the endowment difference of this energy resource constrains the choice of multienergy body types in the distributed energy system. Under the long-term development trend of climate change and energy transformation, building an environment-friendly energy system is the focus of regional distributed energy system planning; therefore, in the configuration decision of regional distributed energy system, it is necessary to fully consider and determine the variety and abundance of energy resources in the region, subject to conditions, and maximize the utilization of renewable energy, in order to improve the reverse distribution characteristics between China's energy resource endowment and energy demand. China's natural gas resources, pipeline network distribution, solar energy, wind energy, geothermal energy, biomass energy, and other renewable energy distribution and zoning research results, in order to determine the RDES allocation decision-making level of resource factors. The biggest advantage of the regional distributed energy system is the improvement of energy efficiency and the corresponding reduction of pollutant emissions; therefore, the realization of low-carbon development of energy conservation and emission reduction is one of the important forces to promote the development of RDES [27, 28]. At the same time, we see that under the trend of global climate change, more developed countries and regions have increased the use of distributed energy systems to replace traditional high-carbon energy consumption patterns, at present, China's environmental pollution problem is severe, and air quality is poor in most areas, large-scale and long-term smog has become the most difficult environmental problem, the current situation of carbon emissions and air quality in China is analyzed in detail. Heterogeneous economic development among regions is also reflected in regional environmental quality, with marked differences in carbon emission levels, energy efficiency, and air quality; this difference will inevitably lead to different degrees of awareness of energy conservation and emission reduction in different regions, different understandings of environment-friendly energy consumption, different concepts of energy planning, and different action forces for the energy consumption revolution. Therefore, the current situation of the regional environment should be taken into consideration at the RDES planning decision-making level, the environmental value of the distributed energy system should be highlighted, and the environmental benefits of the RDES planning should be comprehensively judged from the current situation of the regional environment and the environmental pressures faced. At the same time, environmental decision factors also help to optimize the configuration and operation of RDES. The energy Internet establishes a new energy system by coupling energy flow and information flow and uses computer technology and other means to coordinate resources and their utilization to improve energy efficiency. On the basis of the general structure of the regional distributed energy system, the author constructs a regional energy Internet model based on the multiagent system (MAS), that is, the MAS-based RDES model architecture. The model is closely coupled with four complex network systems, including power network, heating network, cooling network, and information network; by introducing MAS and its powerful energy management function, it can ensure that the energy supply equipment in the RDES and the equipment are connected to each other, the coordination, reliability, safety, and effectiveness of the control operation with the load. The energy management agent and routing agent are set in the model, and the future scheduling and operation of RDES are undertaken by the energy management agent; the coordinated control of physical devices such as energy supply, energy conversion, and energy storage in RDES is realized through the information network with routing agent as the core device. A decision- and system-based RDES two-layer optimization structure is proposed for the planning stage of regional distributed energy system. The decision optimization layer is composed of social development factors, environmental factors, resource factors, policy factors, and equipment factors and optimizes RDES planning decisions. The system optimization layer is composed of objective factors, constraint factors, and algorithm factors; the objective factors are composed of economic and environmental objectives, and the constraint factors are determined based on equipment performance and regional energy flow balance conditions, NSGA-II multiobjective genetic algorithm is used to solve multiobjective problems, the Pareto optimal solution is obtained, and the corresponding realization program is written. Using the RDES double-layer optimization structure, combined with the island operation mode and the grid-connected operation mode, the system optimization analysis of the simulation example is carried out, and the feasibility of the double-layer optimization structure is verified and realizes the operability of the program and the efficiency and reliability of the optimization algorithm. By comparing the optimization results of the calculation example under the two operating modes, reasonable planning suggestions are obtained, that is, under the development of the energy Internet, the regional distributed energy system should actively strive for grid-connected and online operation.

5. Conclusion

There are historical energy technologies, power management, and power consumption processes such as power generation, substation, distribution, and health. The past of the energy Internet, in the context of the energy Internet, is evolving into a diversified, clean, and cost-effective practice, to study the compilation of China's regional power distribution system, which is not only conducive to the construction of a stable power grid in China, but also to increase the energy consumption of electricity in the region, reduce carbon emissions, and improve air quality. The author studies the regional power distribution system planning under the background of Internet power development, formulates a regional power distribution system planning scheme, and provides a general structural framework and optimization algorithm technology for key planning problems and through the design and implementation of decision support, to provide decision support for regional planning and power distribution systems. The main conclusions of the paper are as follows: the definition of the regional distribution system and the definition of regional indicators are discussed. The regional distribution system in the development of the energy Internet is a low-carbon and flexible energy system that is widely used. The key to flexible and powerful online behavior is to realize the integration and integrity of site-network-load storage. System planning is in a certain spatial structure, under certain constraints, based on the realization of environmental protection, economic, and other goals, through the planning links of energy demand, system construction, configuration optimization, and pipe network optimization, in order to implement the system's production capacity, energy use, energy transmission, energy storage, and energy saving processes, and through the design of energy transmission network, energy information transmission network, and the Internet of Things for energy equipment, the framework of the regional energy Internet is realized. The regional distributed energy system under the development of the energy Internet has multiple and comprehensive characteristics, and it has sorted out the climate, resources, environment, architecture, social development, regional functions, and comprehensive system value that affect the system planning. Through cluster analysis, the regional distributed energy system climate adaptability zoning and solar energy availability zoning are obtained; combined with China's various clean energy resource endowment conditions, the energy complementary planning of distributed energy system is proposed; in terms of carbon emissions and air environmental pressure, therefore, regional distributed energy system planning needs to highlight environmental friendliness; macroeconomics, urbanization level, energy preferential policies, etc. determine the economic acceptability of regional distributed energy system planning; the profitability, technology, and environmental protection of the system also affect the planning of the regional distributed energy system. The change of building load is determined by internal and external disturbance factors, and there are obvious differences in the building load of different functions. After sorting out various load forecasting methods and comparing the existing dynamic load simulation software in China and abroad, it is proposed to combine SketchUp Pro, EnergyPlus, and Openstudio to realize the hourly load forecasting of cooling, heating, and electricity of individual buildings in the area; at the same time, the coefficient is calculated to obtain the overall load of the area, so as to avoid the problem of excessive load prediction error caused by simple superposition.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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