

Analysis and Measures of Economic Operation of Power System

Gu Zheng, Gao Jing, Yang Bo

State Grid Liaoning Electric Power CO, LTD. Power Electric Research Institute, Shenyang, Liaoning110015, China

ABSTRACT. *Many people know that the power industry is closely related to the national economy and people's livelihood, which greatly promotes economic development. In the management of the power industry, it is necessary to strengthen the management of the power system, so as to ensure the economic operation of the power system and lay a solid foundation for my country's economic development. This article elaborates from the following aspects in order to improve the economic operation level of the power system and promote better economic development.*

KEYWORDS: *power system; economic operation; analysis; measures*

1. Introduction

To measure the operation quality of the power system, we need to start with the analysis of the economic operation of the power system, which is the key and fundamental to ensure its operation quality. In recent years, the society has made great progress, the economy has achieved faster development, and people's lives are like sesame seeds blooming steadily. At the same time as my country's economic development, power grid development is also required to adapt to it. In addition, people's demand for electrical energy is also increasing, which has greatly increased the power pressure on my country's power grid. Coupled with the rising coal prices in my country in recent years, this has increased the burden on the power system and greatly reduced the economic benefits of the power system. Therefore, the power system operation level has become a hot topic[1-3].

Electricity is a very unusual commodity, and the storage capacity cannot be too large. The power plant generates electricity, and then the power supply company or power bureau delivers the electricity to the user. In the process of transmission, the frequency of the electric energy must remain unchanged, and the maximum amplitude must be guaranteed. In addition, there will be a certain loss of electrical energy during transmission, which must be taken into account. The amount of power loss also directly determines the quality of operation. As the power industry, the scale of customers is not very concentrated, the price is not flexible, the number of

customers is relatively small, the power consumption is large, and the influence of external factors is great. The economic operation factors of the electricity market mainly include three aspects. First, the macro environment; second, the industrial environment; third, the micro environment. The most influential factor is competition between different industries and the same industry. The profit maximization of the power system is also affected by the micro-environment [4-7].

2. Measures

As a power company, it is the main task and goal of the power company to maximize the economic benefits of the power industry based on reliability. However, the scale of the power system is also expanding. At present, the economic operation of the power system can no longer meet the demand. Therefore, if you want to improve the operation level, you need to start from the following points[8-11].

2.1 Fully join the ranks of energy saving

In power system operation and management, economic means are very necessary. The most effective economic tool is the electricity price mechanism. As an electricity price mechanism, it must be scientific and reasonable. Only when it is scientific and reasonable can both power supply and power users actively participate in the operation and management. If both parties are more active, the pressure on the system will be reduced, and the electricity price will fully reflect the relationship between cost and supply and demand. Operators, operators and producers are closely integrated, so that all three parties can get a certain return. Therefore, to further improve the electricity price mechanism, it is necessary to start from the market, actively operate the electricity price system, and constantly innovate and break through, so that every citizen can participate in the establishment of electricity prices, so that all employees can save energy and greatly improve the efficiency of power utilization. , Let every user into it, the reliability of using electricity is greatly improved.

2.2 The power quality assurance system must be efficient and reliable

In the electricity market, its commodity is electricity. Electricity is different from other commodities. Without a certain physical object, it is difficult for us to find its quality. The quality of power in the power market requires high efficiency and reliability. This is the highest quality power commodity. Therefore, the power system must rely on advanced technology, and must be connected to the grid through the smart grid, so that the level of electrical energy has been greatly improved, and it can also improve its competitiveness in the market. Through comprehensive intelligent technology, the power system can be activated. In addition, in the power system, we must also consider from the perspective of environmental protection, and integrate wind and solar energy into it. Even if the environment is effectively protected, the cost of electricity will be reduced. In this way, it can improve its level of competition

and gain an advantage in the competition[12-16].

2.3 Leverage government fiscal and price policies

As a power system, to truly achieve energy conservation and emission reduction, the government's fiscal and price policies must be leveraged. The government has to do a lot of work: First, it manages the planning of the power grid and the construction of the grid. In terms of layout, the power network must be rational and optimized, so that the technical requirements for power system operation can be met. In addition, as the government, when setting electricity prices, it must proceed from the actual conditions of each region and implement classified guidance, rather than setting it according to the same standard. If the electricity price is set according to the same standard, it will be unreasonable. At present, when the central government sets electricity prices, it adopts diversified forms, with the power system as a unit, to make rational use of resources to determine its electricity prices. Re-setting electricity price through finance and price can make electricity price machine[17-18].The system is more reasonable and the allocation of resources is more harmonious. It is also necessary to further improve the economic incentive mechanism, based on the overall interests of society, to ensure that the interests of power grid companies and users are maximized.

2.4 Reform the consumer electricity price system

Because of our country's vast land and rich resources, the natural resources are not evenly distributed, which makes economic development different. It is necessary to reform the consumer electricity price system and establish a time-of-use electricity price system. In this way, not only can it be adapted to local conditions, but also the price of power supply can be freely selected, so that resources can be effectively used.

2.5 Reduce costs and expenses based on reliability

To improve the operation level of the power system, the reliability of the power system must be improved on the one hand, and the cost must be reduced on the other hand. Driven by the market economy, the power system began to be put into the market, and it was constantly changing according to market changes, breaking the monopoly. As a power plant, after entering the market competition, while obtaining the maximum benefits, it must move towards reliability. As a user, we must minimize consumption while ensuring reliability. In a market economy, it is necessary to achieve the lowest cost under the premise of ensuring the quality of the power system.

3. Conclusion

In short, as the economy advances, higher requirements are placed on the power system. The power system is the foundation of economic development and the guarantee for all tasks. The economic operation and management of the power system is the starting point for improving the efficient operation of power. Although the current power operation management has certain shortcomings, it is necessary to take effective measures to ensure efficient and high-quality operation, gain an advantage in market competition, escort economic development, and insert wings for social development. Only in this way can the overall economic and social development be achieved.

References

- [1] Zhou Huaxin, Wang Baoqiang. Talking about the economic operation analysis and measures of the power system[J]. Journal of Beijing Electric Power College: Social Science Edition, 2019 (003): 245-246.
- [2] Zhu Dinglan, Li Jianxin. Summary of economic operation of power system and power economic dispatch[J]. China's new technology and new products, (23): 156-157.
- [3] Xu Tiankun, Zhao Dongxing. Economic operation of power system and main technical measures modern research[J]. Science and Information Technology, 2018 (010): 152-153.
- [4] JUBRILAM, KOMOLAFE OA, ALAWODEKO. Solving multi-objective economic dispatch problem via semidefinite programming[J]. IEEE Transactions on Power Systems, 2013, 28(3): 2056-2064.
- [5] BASU M. Dynamic economic emission dispatch using nondominated sorting genetic algorithm-II[J]. International Journal of Electrical Power & Energy Systems, 2008, 30(2): 140-149.
- [6] FILATOVASE, KURASOVA O, SINDHYA K. Synchronous R-NSGA-II: An extended preference-based evolutionary algorithm for multi-objective optimization[J]. Informatica, 2015, 26(1): 33-50.
- [7] TSOU C S. Multi-objective inventory planning using MOPSO and TOPSIS[J]. Expert Systems with Applications, 2008, 35(1-2): 136-142.
- [8] ZHANG Ji'ang, WANG Ping, CHENG Ze. Multi-objective generation scheduling based on Chaos particle swarm optimization and interior point method[J/OL]. Power System Technology, 1-11[2020-05-12].
- [9] ZHOU Shenghai, YIN Hang, GU Ying, et al. Distribution network fault recovery reconfiguration based on POP NSGA-II[J]. Journal of Electrical Engineering, 2018, 13(6): 28-35.
- [10] JIANG Xingwen. Dynamic environmental economic dispatch using multiobjective differential evolution algorithm with expanded double selection and adaptive random restart[J]. International Journal of Electrical Power & Energy Systems, 2013, 49(1): 399-407.
- [11] LI H, ZHANG Q. Multiobjective optimization problems with complicated Pareto sets, MOEA/D and NSGA-II[J]. IEEE Transactions on Evolutionary

Computation, 2009, 13(2): 284-302.

- [12] LI M S, LIN Z J, JI T Y, et al. Risk constrained stochastic economic dispatch considering dependence of multiple wind farms using pair-copula[J]. Applied Energy, 2018, 226: 967-978.
- [13] MAO Meiqin, WANG Xurui. Economic dispatch method of islanded microgrid based on distributed control[J]. Journal of Electrical Engineering, 2018, 13(9): 8-13.
- [14] BAHMANI-FIROUZI B, FARJAH E, AZIZIPANAH ABARGHOOEE R. An efficient scenario-based and fuzzy self-adaptive learning particle swarm optimization approach for dynamic economic emission dispatch considering load and wind power uncertainties[J]. Energy, 2013, 50: 232-244.
- [15] ZHU Zhijian, WANG Jie. Power system dynamic environment economic dispatch based on improved NSGA-II[J]. Automation of Electric Power Systems, 2017, 37(2): 176-183.
- [16] BEIRAMI A, VAHIDINASAB V, SHAFIE-KHAH M, et al. Multiobjective ray optimization algorithm as a solution strategy for solving non-convex problems: A power generation scheduling case study[J]. International Journal of Electrical Power & Energy Systems, 2020, 119: 105967.
- [17] YAN Panpan, YU Haizhen, SHI Xuhua, et al. Circuit area and power optimization of MPRM based on Pareto domination[J]. Computer Engineering & Science, 2020, 42(4): 596-602.
- [18] MIRJALILI S. Moth-flame optimization algorithm: A novel nature-inspired heuristic paradigm[J]. Knowledge Based Systems, 2015, 89: 228-249.