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Research on the Implementation and Optimization of Energy Management System in Enterprises

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Abstract: With “carbon neutrality” and “peak carbon emissions” gradually becoming the unwavering goals of the world at present, China advocates that all types of enterprises further implement sustainable development strategies in their business development process. The energy management system is a key link that affects the development prospects of relevant enterprises. This article mainly analyzes the current operation status of the energy management system of enterprises, proposes corresponding optimization measures for the problems existing in operation, and aims to promote the process of enterprise energy management system by adhering to the principle of continuous innovation, continuously optimizing the energy management system of enterprises, scientifically allocating relevant personnel and energy, improving the economic efficiency of enterprises, and assisting the green, low-carbon and sustainable development of enterprises.

Keywords: Energy management system; Enterprise; Low-carbon economy; Optimization research

Introduction

With the increasing global attention to climate change and environmental protection, there is growing pressure for businesses to transition to green and low-carbon energy systems. The United Nations Framework Convention on Climate Change and other international agreements have set clear development goals for renewable energy, while domestic policies have also promoted green, low-carbon, and sustainable development in various industries. The concept of energy management system originates from the attention to energy issues, and the contradiction between energy constraints and demand development has led people to pay attention to energy conservation issues. Driven by policies and market demand, there are many problems that need to be solved in the promotion and application of energy management systems by various enterprises. The main challenges faced by enterprises are how to improve energy efficiency, reduce carbon emissions, and make rational use of energy resources.

1. Energy management system

The purpose of establishing an energy management system is to reduce energy consumption, improve energy economic efficiency, and promote the rational use of energy resources by enterprises. The energy management system focuses on controlling and managing "energy", covering the entire process of enterprise energy management and utilization. Starting from the entire process of enterprise energy system, following the principles of system management, establishing a complete and effective documented energy management system within the organization through the implementation of a complete set of standards and specifications.

In the process of introducing an energy management system into an enterprise, the focus is on how to establish an energy management system that belongs to the enterprise and how to use the established system to implement control. Enterprises need to establish key controls over factors that affect energy utilization efficiency and energy consumption processes. By utilizing the established energy management system, enterprises can control their energy consumption within the specified target range.

2. The current operation status of energy management systems in different types of enterprises

2.1 Petrochemical enterprises

Petrochemical companies have achieved energy-saving and consumption reducing effects through the construction and operation of energy management systems, but some petrochemical companies still need improvement in energy procurement, conversion, distribution, and use. For example, in terms of energy consumption in refining units, the possibility of energy recovery has not been considered, and energy consumption analysis has not been conducted on existing production equipment and processes, resulting in the loss of opportunities for energy efficiency improvement; Secondly, petrochemical enterprises have made positive progress in energy transformation and green low-carbon transformation. Many enterprises have begun to layout the new energy industry, such as the utilization of renewable energy such as solar and

wind energy, as well as the research and application of clean energy such as hydrogen energy. In the context of energy transition in recent years, hydrogen utilization has become an important path for low-carbon, clean and sustainable development.

2.2 Electric Power Enterprises

At present, the establishment of China's "dual carbon" goals has put forward new requirements for energy planning and the use of clean energy, and this is no exception for power companies. The management of long-term carbon neutrality remains a major challenge for power grid enterprises. Firstly, with the increase of social electricity consumption, the line loss and carbon emissions of power grid enterprises have been rising year by year. Secondly, the large-scale "West East Power Transmission" project has reduced carbon emissions from fossil fuels in the eastern region, while also increasing the additional consumption of power distribution by power grid enterprises. The hydropower resources in Ningxia are relatively scarce. Although Ningxia actively lays out water resources, the construction period of hydropower hubs is generally 5-15 years, which is a long construction period, so hydropower resources are still limited. Secondly, power companies still lack technological innovation capabilities.

3. Suggestions for the current operation status of enterprises

3.1 Technological innovation, layout of hydrogen energy industry

Petrochemical enterprises should continuously promote carbon reduction in oil and gas development and production, promote green and low-carbon oil and gas extraction, and carry out electrification transformation of fuel, natural gas, and coal-fired equipment. In addition, enterprises need to improve the efficiency of oil and gas processing, storage, and transportation, reduce carbon emissions, promote the transformation and upgrading of the refining industry, strictly control the expansion of refining capacity, systematically eliminate outdated and inefficient production capacity, strengthen the comprehensive utilization of resources, enhance energy conservation and waste heat recovery of energy processing and storage facilities, and promote the comprehensive utilization technology of residual energy in the form of waste heat pressure and liquefied natural gas cooling energy.

At present, most energy companies use natural gas for hydrogen production, and CCS technology is currently the main technology for "green hydrogen". However, CCS technology is not yet mature, so it is not recommended to use fossil fuels for hydrogen production on a large scale. Small scale demonstrations can be carried out. Finally, we need to accelerate the upgrade of digital intelligence and continuously innovate technologies. Promote the deep integration of the oil and gas industry with modern information, new materials, and advanced manufacturing technologies, strengthen the promotion and application of new generation information technology, artificial intelligence, cloud computing, blockchain and other new technologies, promote digital upgrading, update energy consuming equipment and facilities, and carry out intelligent upgrading of process flows; In the hydrogen energy industry chain, it is recommended that petrochemical companies base themselves on their own advantages, encourage innovation, actively engage in joint research with other enterprises or regions with more mature energy management systems, broaden their fields, deepen energy openness and cooperation, jointly break through core technologies, reduce industry chain costs, and provide technological support for hydrogen energy development.

3.2 Comprehensive planning of energy structure and improvement of carbon management system

Electric power companies should coordinate the planning of wind power, photovoltaic, and hydropower energy storage resources, build multi energy complementary integrated power stations, explore the application of hydrogen energy coupling technology, promote the electrification of intelligent agricultural greenhouses and ground source heat pumps, and promote the integration of agriculture and photovoltaics. In the process of optimizing the energy structure, it is necessary to actively promote the development and deployment of green energy, improve the quality of green electricity through improving the electricity structure, and ensure sustainable development. In addition, utilizing the power grid infrastructure, accelerating the electrification process, promoting the transformation and upgrading of energy structure, actively exploring green and clean energy such as hydropower, photovoltaics, and wind power, and guiding energy production and consumption towards a cleaner and low-carbon track. The key is to reduce the corresponding electricity costs through innovative technologies, in order to reduce dependence on traditional energy.

Improving the corresponding carbon emission management system of power enterprises is also of paramount importance. It is necessary to record and manage carbon emission data, detect carbon emission data during the power generation process, establish a carbon emission source data ledger, and establish a corresponding carbon emission verification mechanism; Actively exploring the development and optimization of carbon assets, power grid enterprises should regularly evaluate existing carbon assets such as power grid infrastructure to determine their carbon value and potential risks. While promoting the transformation and upgrading of certain optimizable assets, increase efforts in the development of carbon assets and related projects. For example, investing in renewable energy generation projects can reduce traditional dependence on fossil fuels; Actively promote transportation electrification by implementing measures such as providing charging infrastructure.

4. Conclusion

Energy conservation and emission reduction have become a major issue worldwide, and energy management systems are a key link affecting the development prospects of enterprises. The main purpose of establishing an energy management system is to optimize energy utilization efficiency, reduce carbon emissions, and achieve sustainable development. This article mainly analyzes the operation status of energy management systems in petrochemical and power enterprises, and proposes corresponding optimization suggestions. At present, China's energy management system is actively exploring and promoting. In the future, the establishment and operation of energy management system efficiency in enterprises must closely focus on the core element of "energy performance". Through continuous improvement of energy performance, it is truly necessary to establish a long-term energy saving mechanism for enterprises, reduce costs, and improve efficiency.

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