Research on Enterprise Energy Measurement Based on Sustainable Development

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Abstract. In the energy metering of enterprises, the purpose of energy saving and consumption reduction is achieved through the establishment of the information management system of energy metering instruments, the application of advanced metering and testing technology and the application of energy metering data.

1. Introduction
Energy is an indispensable material basis and guarantee for social progress and economic growth, and an important source of power for national economic production and economic growth. China's current energy intensity is still large, which will not only affect the long-term sustainable development of the economy in the long run, but also produce serious environmental pollution problems and reduce people's quality of life, so how to reduce energy consumption has become an important issue of concern in China.

China is a big consumer of energy resources, but its per capita energy resources are very low, only about 40% of the world average. Behind the rapid economic development, the problem of China's energy exhaustion is highlighted. Therefore, the work of energy conservation and emission reduction is extremely urgent, among which, the construction of energy measurement data system, the strengthening of energy measurement work and the implementation of refined energy management have become the focus of China's energy management and an important cornerstone of energy conservation and emission reduction.

Energy measurement refers to the detection, measurement and calculation of energy quantity, quality, performance and other parameters in each link (including energy production, transportation, use, supervision and other fields) in the process of energy consumption and transformation[1]. One of the focuses is the collection of energy measurement data.

To save energy, we must first quantify energy and accurately measure energy consumption, because energy conservation comes from accurate measurement. The energy consumption and cost of enterprises are not calculated by apportionment, but by accurate measuring instruments. Therefore, strengthening the management and verification of energy measuring instruments is an important way to save energy and reduce consumption.

2. The establishment of an information management system for energy metering instruments is the basis for effective metering
The use management of energy measuring instruments is mainly the management of measuring instruments and the management of quantity and value transfer. The establishment and improvement of the information management system of energy metering instruments is the basis of effective metering management.
As shown in table 1, the informatization of energy measuring instruments mainly controls the 8 modules, realizes the synchronous update of information of each module, and makes the information state inquiry of energy measuring instruments fast and convenient[2]. To achieve the use of energy measuring instruments, use quality, use status and classification management. In the system, two-dimensional code is used to encode measuring instruments, forming a two-dimensional code management information collection, information input, information update data management system.

Table 1. Information management system for energy metering instruments.

| Information management system for energy measuring instruments |
|---------------------------------------------------------------|
| 1 Classification management of measuring instruments ABCClass |
| 2 Gage identification management                               |
| 3 Periodic verification management of measuring instruments    |
| 4 Storage management of measuring instruments                 |
| 5 Management of unqualified energy measuring instruments       |
| 6 Energy metering appliance ledger management                  |
| 7 Energy metering appliance maintenance management             |
| 8 Management of metrological instrument verification and calibration certificate |

Informatization is a trend, especially for large energy-using enterprises. In combination with the production practice of enterprises and the management requirements of the country, industry and enterprises themselves, the appliance management ledger, verification management process, professional maintenance management and personalized logo management are gradually formed. The energy measuring instruments management information system can realize the real-time tracking of the dynamic process of measuring instruments management. The user can control the measuring instruments in the territory in real time and manage and follow-up plan according to the using state of measuring instruments. The administrative department of energy conservation may, according to the information system, analyze the effect of energy conservation measures and tap the potential of energy conservation. The metrological department in charge may trace and supervise the use state, quality and administration of the measuring instruments to ensure that the measuring instruments are accurate and reliable. The dynamic energy metering appliance information management system and the static energy metering appliance equipment statistical analysis system organic union, further consummates the energy metering management system.

3. Advanced metering and testing technology and energy metering data application, improve the accuracy of energy metering

3.1. Strengthen the management of energy metering technology
Technical management is particularly important. Enterprises shall establish the highest standards of measurement, reasonably equip measuring instruments, ensure the allocation of measurement resources, correctly trace measurement values, confirm measurement data, draft measurement management documents, and formulate measurement technical management procedures.

3.2. Strengthen the management of all kinds of energy measuring instruments
Without accurate measurement, there will be no reliable data. Supervision should be strengthened to strengthen the on-site management of energy measuring instruments. Special personnel should be
organized to carry out regular or irregular on-site energy saving inspection and spot check, and all energy-consuming equipment should be inspected at least once a day. The use of energy found unreasonable or leakage, take photos as a basis for assessment, regular in the company's office system and daily production will be published, in accordance with the issue of rectification notice - rectification - review - assessment procedures, so as to further strengthen the consciousness of energy saving workers to achieve the purpose of energy saving.

3.3. To carry out the supervision and management of energy measurement data

To ensure the accuracy and unity of measurement values, in addition to managing measuring instruments, it is necessary to strengthen the management of measurement data. To ensure the accuracy and reliability of measurement data is the core of enterprise metrology. Scientific selection of measurement and detection points, correct reading of original measurement data, establishment of measurement database archives, analysis and supervision of the original data, the discovery of abnormal data, timely investigation and research, reasonable disposal, effective measures to improve the reliability of measurement data, correct guidance of measurement work[3]. Strengthening the supervision and management of measurement data and ensuring the provision of reliable measurement data are of great significance to improving product quality, reducing various consumption, improving economic benefits and enhancing enterprise vitality.

At present, most enterprises in China can seriously, timely and correctly carry out data collection. They also have a relatively complete system for data collection and a treatment plan for data problems caused by abnormal measuring equipment. If the enterprise makes great efforts to design and install measuring instruments, it is only to deal with the inspection, which can not play a role in energy saving, which not only increases the cost, but also does not meet the purpose of energy measurement review. The purpose of installing energy metering instruments is to make full use of energy metering data to find energy saving points and improve energy utilization. Available energy measurement data to calculate the energy consumption per unit product, energy balance analysis, comprehensive energy consumption per unit product for the work, to carry on the energy efficiency supervision, according to the energy use to formulate the corresponding energy value, find themselves through these means, adopting the advanced energy saving technology, achieve the goal of saving energy and reducing consumption.

4. Energy audit for enterprises and ensure the energy measurement data is reliable and fair

Enterprise energy audit is mainly an assessment of the energy utilization effect of enterprises. Through the analysis of the authenticity, rationality and compliance of energy utilization in the whole production process of the enterprise, the implementation and development of energy conservation projects are promoted, and the energy conservation work of the enterprise is actively promoted.

Energy audit, as an effective way for the government to promote energy conservation and improve energy efficiency in the market economy, is most suitable for the requirements of energy management under the current economic system. Energy audit can be fully based on the relevant features of the audit, reasonably accurate analysis and evaluation of enterprise energy use, to provide certain guidance to management work, and make the enterprise of various stakeholders in a timely manner to understand enterprise energy usage and management level, timely find problems and take effective measures to reduce the wastage of the energy as much as possible, save the production cost, make the enterprise economic benefit maximization.

When carrying out energy audit, enterprises should measure and test energy, collect and analyze relevant data results, and try their best to improve equipment utilization rate and energy utilization rate[4]. At the same time, the related technological process and auxiliary energy use of the enterprise should be reviewed to ensure that all links within the enterprise meet the requirements of energy conservation. In the evaluation of energy utilization level of enterprises, the evaluation indexes should be taken into full consideration with the analysis of historical data. Combined with the actual situation
of enterprises, the paper puts forward targeted energy-saving strategies to promote the rapid progress of energy-saving technical renovation projects.

There are various methods of energy audit, including energy management, measurement and statistical verification methods, energy utilization and energy process verification methods, product output verification methods and energy consumption data verification methods. The relevant energy management system, training records and statistical ledger of the enterprise shall be collected during verification, and the verification shall be conducted in accordance with relevant national standards. In terms of energy utilization, the principle of material balance and energy balance should be used to fully investigate the basic situation of the enterprise, summarize and analyze the data, and check the inventory of energy and materials when necessary. When the output of products is approved, the quantity of finished products, semi-finished products and products in process shall be approved, and the products in process and semi-finished products shall be converted into a certain standard product, which shall be approved according to relevant accounts.

5. Conclusion
Nowadays, if enterprises want to maintain the competitiveness of sustainable development, energy measurement work is still a long way to go: establishing energy measurement equipment information management system, constantly improving the measurement and testing capacity, ensuring the accuracy, reliability and fairness of measurement data, and promoting the scientific development of enterprises, safe development, clean development, civilized development and harmonious development.

References
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