On the Basis of Computer Analysis of the Current Situation of Energy Conservation and Consumption Reduction in China's Iron and Steel Industry and Research Measures

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Abstract. Adhering to the strategy of energy conservation and emission reduction is one of the important principles of China's industrial development. As one of the indispensable pillar industries of the national economy with high energy consumption and emissions, at the same time because of the restriction of the natural environment conditions, the high-speed development of behind to face the problem of the shortage of resources, ecological destruction, in order to improve people's quality of life and life experience, improve the level of energy conservation and emissions reduction iron and steel industry is imperative. Steel smelting industry, comprehensive considering the steel utilization, energy conservation and emissions reduction targets, etc., have noticed that the costs in smelting system energy-saving, the importance of the question is, society for steel utilization, can't bring enough money for the iron and steel smelting industry benefit, and hindered the development of new energy saving technology, increased the energy saving of iron and steel smelting system pressure. Thus it can be seen that cost capital is the main problem of energy saving in modern iron and steel smelting system. Only with financial support can the level of energy saving be improved.

Keywords: Fundamentals of Computer, Iron and Steel Industry, Saving Energy and Reducing Consumption, Analysis, the Status Quo

1. Introduction

Process industry, also known as process industry, refers to the continuous production process through physical and chemical changes, generally including metallurgy, petrochemical, electric power, building materials, light industry, pharmaceutical, etc. Therefore, this paper takes the iron and steel industry as an example, summarizes the existing energy saving assessment technologies of the process industry system, analyzes and compares the existing energy saving assessment methods, and provides
a reference for seeking new ideas and new methods of scientific allocation, use and management of energy in the process industry in the next step. In iron and steel smelting system, the active implementation of energy saving technology is conducive to reducing energy consumption. The iron and steel smelting system occupies an important position in the whole industry.

2. Analysis of the current situation of energy consumption in steel works
Current circumstances, China's steel industry consumes energy is mainly the following two aspects, one is the direct energy consumption of raw materials, such as coke oven gas, oxygen, electricity, steam, compressed air and water in the iron and steel industry development indispensable raw materials, the other is the indirect consumption, such as molten iron, scrap steel, lime, iron ore, refractory materials and other industrial development in the inevitable loss. Therefore, to complete the task of energy conservation and consumption reduction, the iron and steel industry should start from these two aspects to improve the utilization rate of materials and reduce consumption. The energy consumption in the converter process is mainly composed of raw material consumption and recovery. The main body of energy consumption is oxygen, coke oven gas, electricity, steam, compressed air and water, while the recovery part is mainly completed through the recovery of steam. The reasons for the high oxygen consumption in the iron and steel industry are as follows: the cutting of scrap steel needs oxygen support; There are more blow-ups in converter operation; The characteristics of oxygen nozzle are not suitable for the current requirements of converter smelting in our factory, and the oxygen utilization rate is not high. Steel mills of the industrial process, whether it's hot or lime, is a demand for larger raw materials, both the consumption of raw material is very surprising, for the consumption of steel scrap is not so high, so the steel plant there is a big waste of resources, including the following several reasons: first, the hot metal with large amount of slag; Secondly, the lime quality is poor. Thirdly, the content of Si in molten iron is high and fluctuates greatly. Fourthly, the level of production organization and management needs to be further improved. Fifthly, steel slag recycling utilization rate of steel mills is low [1].

There are two kinds of phenomena in energy conservation of iron and steel smelting system in China. First is in iron and steel smelting system energy saving in our country, has made obvious achievements, iron and steel metallurgy industry, formulate energy-saving index in the steel smelting system, scientific and reasonable control the operation of the iron and steel smelting system, strengthening the allocation and utilization of the resources, to achieve energy saving, steel smelting system, using the data parameter, feedback the actual effect of energy saving and emission reduction, gradually increased the investment of the construction of energy saving, to a certain degree of financial support, improve the state of the steel smelting system energy saving; The second is the energy saving technology in the iron and steel smelting system, compared with foreign advanced energy-saving technologies, there is a gap of our country iron and steel smelting operation of the system [2].

3. Comparative analysis of existing energy saving assessment methods for steel process industry
Based on the above characteristics of process industry, it can be seen that the existing energy saving assessment methods and technologies analyze the energy saving of the system from different perspectives, with their respective characteristics and applicable scope. The calculation of comprehensive energy consumption per ton steel is simple and clear, which has been greatly promoted since it was proposed, and scholars have also conducted in-depth research. Comprehensive energy consumption per ton of steel can measure the amount of energy consumption per unit product in the steel production process, and can be used to analyze and assess the changes of energy consumption level of enterprises over the years, which is of great significance for studying the total energy consumption of the entire steel industry and enterprises. The construction of the energy center, emphasize the energy-saving features of iron and steel smelting system, in the process of construction, but also the introduction of automation technology, a comprehensive analysis of the iron and steel smelting energy data in the system, optimizing smelting production process, with energy center
database technology, to predict the iron and steel smelting capacity of the system, and ensure the maximum benefits of a smelting, an energy center's economical benefit. The operation of the iron and steel smelting system, increased spending on energy consumption, and the iron and steel smelting, has become a society of high consumption project, according to the steel smelting system energy saving status quo and problems of scientific and reasonable planning and energy saving technology, led energy-saving technology can improve status of iron and steel smelting system [3].

4. Research on energy saving countermeasures of Chinese iron and steel enterprises

4.1. Optimize the production process and reduce the consumption of raw materials and energy

From the place of iron and steel industry consumes energy, through the computer and information technology for raw materials and energy consumption for scientific computing, as far as possible to reduce the consumption of each link on and waste, this requests us to iron and steel industry from the optimization of manufacturing department, the iron and steel industry based on optimized production technology, the best advantage, to improve the function of iron and steel production line at the same time, let the iron and steel production line efficiency, continuous, systematic production. To do this, we need to reduce the single consumption and the carrying energy of non-energy and energy materials. Non-energy materials include raw materials, solvents, spare parts and refractories for each production process. At the same time steel mills should pay special attention to steel production process. The method of negative energy steelmaking refers to the use of converter to reduce the energy consumption of iron and steel smelting system and avoid the loss of oxygen as far as possible. In the process of negative energy steelmaking, the gas and steam in converter are recovered, and the improvement of oxygen supply intensity is emphasized. In the negative energy steelmaking of bOF, the oxygen supply intensity is easy to be disturbed by slag-making and furnace capacity ratio, so during the bof, the rate of slag formation should be increased actively to assist to improve the oxygen supply intensity. In terms of energy saving, the reblowing process should be optimized to extend the time of energy recovery and increase the amount of recovery. The application of negative energy steelmaking in energy saving has introduced computer control, which improves the accuracy of steelmaking and promotes the stable realization of negative energy steelmaking in converter [4].

Moreover, in a questionnaire about the "energy saving technology of steel smelting system" used by China's iron and steel industry through computer analysis of data, we get a lot of data, as shown in Figure 1 below.

![Figure 1. The energy-saving technology of iron and steel smelting system.](image)

4.2. Use energy flow network technology to improve energy conversion efficiency

Regenerative heating furnace technology, in the structure of the furnace, the temperature will not have too big difference, and heating furnace itself high scientific and technological content, reduce the frequency of maintenance, play a role in saving. Compared with ordinary heating technology, this kind
of heating furnace technology has greatly improved the combustion temperature, enhanced the efficiency of combustion, and improved the utilization efficiency of resources, indicating the energy-saving effect of the heating rate. When the heating rate is working, the combustion noise is low, which is conducive to improving the environment of iron and steel smelting. The role of "energy flow network" technology is shown in Table 1.

| The role of "energy flow network" technology | Energy conversion for iron and steel enterprises |
|---------------------------------------------|-----------------------------------------------|
| It is the energy storage of steel enterprises |
| It is the energy distribution of steel enterprises |
| It is the energy use of steel enterprises |
| It is the energy recycling of steel enterprises |
| It's an energy buffer for steel companies |
| Is the iron and steel enterprises to optimize the regulation of energy |

4.3. Implement energy-saving technologies to improve the comprehensive utilization rate of secondary energy

The secondary energy mentioned here refers to the emissions of gas, cinder and dust produced in the production line of steelmaking industry. This emission has a significant characteristic, that is, it contains a large amount of waste heat. How to rationally use these secondary energy sources has become a key issue that should be considered by our steel industry. Many iron and steel enterprises' secondary energy utilization rate is even close to zero. Therefore, under the guidance of relevant laws of thermodynamics, we should carry out the transformation of iron and steel industrial process lines, comprehensively analyze the quality and quantity of secondary energy and customer requirements, and make proper use of these secondary energy. By adopting energy-saving technologies such as CDQ and dry TRT, secondary energy is recovered and new technologies are constantly developed to recover secondary energy heat such as sensible heat of furnace slag and steel slag. In the iron and steel smelting system, rare gas is used, which replaces the application of water resources and realizes the energy saving of water resources. Rare gas stable chemical properties, its within the iron and steel smelting system does not produce harmful substances, the original wet coke quenching technology, the participation of water, it is easy to produce chemical reaction, in the final emissions of sulphur, cyanide, etc., a rare gas switch, is not only the water and energy saving, but also the role of environmental protection. The high quality coke can improve the combustion efficiency and the conversion rate of combustion heat energy [5].

4.4. Establish energy management and control technology to reduce energy dissipation

The energy management system in steel enterprises is not only a functional department to manage energy, but also should be responsible for directing the energy consumption control center, which can monitor the utilization of energy, reduce the consumption of non-renewable energy, and reduce the consumption of oxygen and other energy. So far, with the continuous development of computer and information technology, energy management system informatization has become the inevitable trend of development, which also reduces the cost of energy management system establishment in iron and steel enterprises. The computer and information technology can efficiently supervise and manage the energy information system, and develop a scientific management system through the computer to control the use of energy, improve the use efficiency, and finally realize the purpose of energy conservation and consumption reduction. Waste heat of sintering in iron and steel smelting system belongs to a kind of recoverable resources. Waste heat of sintering has been applied to waste heat. Waste heat resources can be fully utilized to avoid waste of resources. In recent years, in the iron and steel smelting system in China, the waste heat of sintering has been deeply studied and applied to the power generation of the iron and steel smelting system. Waste heat of sintering has always been the main research direction of energy saving in iron and steel smelting system, with the purpose of saving
energy resources during smelting. Energy-saving aspects of iron and steel smelting system, specially installed recycling equipment, such as blast furnace gas pressure transparent power generation device, the blast furnace top gas pressure, into electricity, such recovery power generation method, on the one hand, shows that the energy saving effect, on the other hand to reduce the pollution of the environment in the process of smelting, still can be in the process of blast furnace operation, the actual pressure stable roof. In order to improve the efficiency of recovery and power generation, dry dust removal equipment is added to the transparent blast furnace gas residual pressure power generation unit in the iron and steel smelting system to strengthen recovery and power generation [6].

5. Conclusion
These industries are energy-intensive. It is of great significance to carry out technical research on energy conservation potential assessment of iron and steel industry and establish a sound energy conservation assessment system for tapping the energy conservation potential of process industry.

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