

# **Management of Energy and Environment in Chinese Industrial Enterprises**

**By**

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## **Preface**

Energy conservation and environment protection is very importance global issues in the world. China is a major and growing energy consumer in the world, as well as a major contributor to pollution of the environment. While there is a pollution control policy, it competes with the urgent needs of social development. Consequently, little activity occurs in pollution control. Neither is much attention addressed to energy conservation and other ways of reducing pollution, nor the maintenance of economic strategies that within appropriate management systems can control pollution.

This paper will be to identify way by which it may be possible to reduce pollution and improve the methods of energy use through greater efficiencies and effectiveness.

We think that the energy conservation and the environment protection have to use three ways as follow: (a) new technology; (b) new management methods; (c) Culture change that adopts pollution as an issue of importance. All of them have to use management methods

## **1 The introduction of energy and environment issues in Chinese industrial enterprises**

### **1.1 Energy consumption**

China has a very fast pace of economic and industrial development. It has a 10% growth at present, though the government has been trying to peg it at 9%. There is no guarantee this will not increase. The very size of the country makes it an important energy consuming country. Matching this is its contribution to the development of environmental pollution. There is currently a lot of international concern about pollution because of such problems as damage to the ozone layer.

The project focus on use of high energy consumption industry such as the metallurgical industry that services such industries as construction. The metallurgical industry takes more than 11% of the energy consumption of total in China. Also, 10% consumer of the metallurgical industry is the materials manufacturing for the construction industry. This includes the railway, automobile and construction industry. Materials production for the construction industry uses more than 13% energy consumption. These therefore represent a significant component of China energy use. In the current period of construction all of these industries are expanding. Consequently pollution potentials increase.

## **1.2 Environmental Pollution**

Each year China produces more than 100 million tonnes of steel. It is the second largest producer of steel in the world.

More than 90% of the energy production in the metallurgical industry and the related provisions to satisfy the needs of the construction materials manufacturing industry derive from coal. Coal use represents 70% of the energy production in all industries. The consequence of using unprocessed coal is very high levels of pollution.

Environmental pollution high is. Consumption of energy is greater than 1.2 billion tonnes per year. More than 70% in coal. All industry uses unprocessed coal in China for energy production. Produces significant amounts of CO<sub>2</sub> and CO<sub>2</sub>. The consequences of this to the environment are well known [references needed], with damage resulting to the whole ecosystem.

Every one tonne of steel requires 0.8 tonne of coke. Coke is derived from coal and produces some environmental benefit when burnt. The production of coke from coal varies according to who produces it. Thus, in the country mining industries, one ton of coke is produced from 1.8 tons of coal, while in more efficient processing systems 1.4 tons of coals are required for a ton of coke. Unfortunately, the production of coke itself is a polluting process that is not addressed.

## **1.3 The achievement**

The Chinese government has emphasised energy saving since 1978. At the beginning of the 1980's, a policy was launched that emphasised both development and conservation of energy. Recently, conservation has had priority. This policy has fostered energy saving throughout China.

During the 1980's, the average energy consumption per 10 thousand RMB GMP declined from 13.36 Tons Coal Equivalent (TCE) in 1980 to 9.26 TCEs by the end of the decade. The total energy saving reached 0.28 billion TCEs, the rate of energy saving was 3.7%. The efficiency of energy application has been increased. For example, in the metallurgical industry, the energy consumption to produce each ton of steel was reduced by 36.57%.

During the wave of energy saving, the technological level and management in industrial enterprises was upgraded. As far as technology was concerned, some enterprises adopted continuous casting, recycling the gas of converters, generating power using the pressure of the blast furnace, and so on. In the view of management, many enterprises improved the monitoring system, adopted system of energy statistics and analysis, made the balance and testament of energy, set up energy management policy and organisations, and improved operational management. Some enterprises used computers to assist in statistic analysis of energy use.

- 2.1 The attitude and perception of manages should be changed. Many leaders of enterprises in the past have not been really concerned about energy conservation. In the period of economic reform, the object of profit attracted more attention from managers. Due to the low price of energy, the economic results of energy saving could not be reasonably reflected by the change in profits.
- 2.2 The department of energy and environment management in enterprises was weakened. In some enterprises, the function of energy and environment management has been undermined.
- 2.3 Energy conservation is seriously short of investment.
- 2.4 The management methods used in planning economics are outdated, but new measures have not been introduced.

In short, in the matter of development of energy management, many issues are worth discussing. For example, what is the status and function of energy management in the whole management of enterprises? How should energy management be conducted? How can increase savings in energy are made? ...

### **3 Energy management in industrial enterprises**

#### **3.1 The objectives of energy management**

- 3.1.1 Labor management. This includes training in the regulations and practice of the rationed use of energy.
- 3.1.2 Material and equipment management. This includes monitoring of energy consumption, making of energy quotas, management in storing, distributing, transporting and utilizing of energy. It also includes the economic operation of equipment and rational organization of production processes.
- 3.1.3 Technical management. This includes the selection of energy saving technologies, planning of technological innovation and energy saving project management.
- 3.1.4 Financial management. This includes the budgeting of investment projects, capital distribution and investment.

## 3.2 The principle of energy management

### 3.2.1 The quantity principle

It is the foundation of energy management to correctly monitor energy consumption and to collect statistical data. It is also necessary to test the balance of energy periodically. Quantity analysis of energy application is the foundation of making energy quotas and controlling energy.

### 3.2.2 The system principle

Enterprises should be considered as a whole body, just like a system, with people trying to find the rational ways to use energy. It is necessary to combine energy saving in single pieces of equipment with energy saving in stages of each process and in whole enterprise. By using an energy information management system the energy can be used rationally and effectively according to various methods and steps.

### 3.2.3 The standardization principle

It is worthwhile to standardize the quality of energy, to standardize monitoring and statistics and to standardize the assessment of energy management.

### 3.2.4 The regulation principle

It is worthwhile making regulations on energy management, which should make clear content, procedures, approaches, requirements and responsibility. The regulations will be the guideline of running and assessing for energy management.

## 3.3 The content of energy management

### 3.3.1 The energy motoring

### 3.3.2 Quotas for energy consumption

### 3.3.3 Energy balance analysis

### 3.3.4 Planning of energy application

### 3.3.5 Process management for energy use

Here the process management for energy means not only the control of energy consumption in the process of production, but also management during the process of storing, transporting, converting and distributing energy.

### 3.3.6 Energy information management

Based on IT, enterprises could get the data feedback from all stages of the production process to time and control energy consumption efficiently.

### 3.3.7 Energy saving technology

To further energy saving, new technology should be explored and utilized. The management of energy saving technology will involve the planning of technology innovation, selection of projects. Evaluation of alternatives, decision-making and project construction management.

### 3.3.8 Human resource management

Energy saving will depend on the efforts of all staff. Staff training in energy saving is necessary. Through training and incentive policies, enterprises can make staff focus on energy saving actively and skillfully with the help of technology.

### 3.3.9 Energy auditing

Energy auditing carried out by professional auditors based on energy balance analysis is a measure, which can help the energy consumption and provide analysis of the situation of energy management. The auditing results will be helpful for enterprises in pursuing energy saving to select energy saving technology, to make short-or long-term plans and so on.

## **4 Approach to improve energy management: suggestions**

Energy management is complicated work, which involves many disciplines. To improve energy management, various measures should be applied.

- 4.1 Many aspects of a modern scientific approach to management, such as objective management, standardized management, system engineering and so on, should be applied to energy management. The process management of production, optimum organizing and management of equipment are all helpful to increase the efficiency of energy application.
- 4.2 Economic means should be used in energy management. Through economic means enterprises can combine the enterprises interests with the employees' interests. The government can also offer incentives for energy saving, penalties for abusing energy and a price policy for over-consumption. The government should continue the policy of granting lower-interest loans to support technological innovation and projects of energy saving. The government should make policy to encourage enterprises to investment in energy saving projects.
- 4.3 It is necessary to continue the dissemination of energy saving ideas, so that public awareness can be increased. It is also necessary to conduct education in the whole society to let people know that it is shameful conduct to waste energy. It is significant for our next generation to awaken the public's awareness of resource conservation and environmental conservation. We hope that energy saving will be pursued actively through the dissemination of energy saving ideas.
- 4.4 To implement Energy Saving Law is very important. It is recommended that the energy saving, like environmental conservation, should the law drive action.

Legislation on energy saving will foster energy conservation especially in the primary period of the market system in China.

- 4.5 Through the application of modern technology, energy management could be automated. In the United Kingdom, some enterprises have applied computer systems to energy management. There are two main kinds of energy management systems, one is the energy management information system (EMIS), which mainly is used in automatically recording, statistics, and analyzing results of energy consumption, and supplying the information for energy control. The other is the energy automatic control system (EACS), which is mainly used in automatic adjustment of energy balance, and heat loading in reaction change in the environment.
- 4.6 It is necessary to further enterprise reform. Only by changing the mechanisms of enterprise management can enterprises run their business according to the needs of the market. Then the pressure of market competition will become the dynamic force acting on enterprises, leading them to advance energy saving.

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