



# INTERNATIONAL WORKSHOP ADVANCES IN CLEANER PRODUCTION

"KEY ELEMENTS FOR A SUSTAINABLE WORLD: ENERGY, WATER AND CLIMATE CHANGE"

## Analysis on Cleaner Production policy and its results in China

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**Abstract:** Divided into three stages, this paper elaborated the practice courses of Cleaner Production in China in last two decades, analyzing the characteristic of Chinese Cleaner Production policy in the different historical periods. It also analyzed the results of Cleaner Production policy in China according to the investigation and study data of Cleaner Production audit of national key enterprises from 2004 to 2007. The result indicated that the advancement pattern of the voluntary Cleaner Production audit and compulsory Cleaner Production audit effectively promoted the advancement of Cleaner Production in Chinese industry. The consciousness on Cleaner Production of the government, the enterprise and the public have had essential enhancement. The quantity of enterprises which implement Cleaner Production audit has been increasing. The Cleaner Production technical advisory services system was preliminary established. It is obvious to see the energy saving and emission reduction realized by Cleaner Production.

**Key words:** Cleaner Production; Policy; Results; Analysis

### 1. Introduction

The Cleaner Production idea was introduced into China in 1990s, while the production practice of China Cleaner Production has experienced the courses of the idea's introduction and dissemination, the enterprises' Cleaner Production audit demonstration, the experiment site advancement, legislation regarding the Cleaner Production and research on the Cleaner Production policy. How to know about the existing Cleaner Production policy system in China, analyzing the function of Cleaner Production in the present environmental management and the pollutant reduction of China, in order that it will play a role in solving the deep level contradiction between the fast development economy of China and the pollutant continuing reduction, is a question which we need to ponder urgently.

### 2. Forming process of China Cleaner Production policy

Dating back to the practice courses of Cleaner Production in China, analyzing a series of activities and Cleaner Production policy plan which carried out by our country in Cleaner Production aspects (shown in Table 1), it is not difficult to see the Cleaner Production development path was obviously divided into three stages.

#### 2.1 The stage of introduction and digestion of Cleaner Production

The first stage, 1989 -1992, was a stage of introduction and digestion of Cleaner Production.

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In 1989, the idea and method of Cleaner Production was introduced in China after United Nations Environment Program proposed the plan for action of carrying out Cleaner Production. The environmental protection department took the lead to study how to carry out Cleaner Production. The State Council formulated *ten countermeasures of environment and development* in August, 1992, proposing that the technical beginning must be high and Cleaner Production technique of little consumption of material and energy and pollutant discharge must be used as far as possible when the project was newly built, reconstructed and expanded. It started to propose the environmental policy of “Prevention comes first; and combine prevention with treatment”, officially opening the prologue of China Cleaner Production which becomes one of the countermeasures to solve the problem of China environmental and development.

## **2.2 The stage of Cleaner Production legislation**

The second stage, 1989 -1992, was a developmental stage of introduction and dissemination of Cleaner Production, Cleaner Production audit demonstration of the enterprises and advancement of Cleaner Production regarding legislation and policy research.

The former State Environmental Protection Administration and Nation Economic and Trade Commission held the second conference of prevention and control of national industry pollution in Shanghai in October, 1993, determining the strategic position of Cleaner Production in environmental protection enterprise in China. In March 1994, the State Council discussed and approved the *China Agenda 21 Century*, which took the development of clean coal technology, vigorously developing renewable and clean energy and promotion Cleaner Production technology as the essential content. In April 1997, the State Environmental Protection Administration formulated and promulgated *Some suggestions on implementation of Cleaner Production* and called upon the local administrative department of environmental protection would incorporate Cleaner Production into the environmental management of Cleaner Production policy in order to further promote Cleaner Production, while Cleaner Production was also integrated in related laws, such as *Energy Conservation Law*, *Law on Prevention of air Pollution*, *Law on Prevention and Control of Environmental Noise* and *Law on Prevention of Environmental Pollution Caused by Solid Waste*.

On the basis of these laws, the 28th Meeting of the Standing Committee of the Ninth National People's Congress examined and approved the *Cleaner Production Promotion Law of People's Republic of China* on June 29, 2002, which is China's first specialized legal to pollution prevention as its main content and is a new milestone of full implementation of Cleaner Production in China, marking that the China Cleaner Production coming into the legal way.

## **2.3 The stage of Cleaner Production rules and regulations**

The third stage, since 2003, was a stage of Cleaner Production rule-based, surrounding the main line, implementation of the *Cleaner Production Promotion Law* and *Cleaner Production Audit Interim Measures*. Cleaner Production policy, whose most distinctive characteristics are innovatively putting forward compulsory Cleaner Production audit system of industrial enterprises and assessment and acceptance system of Cleaner Production audit, is around compulsory Cleaner

Production audit work of key enterprises to promote Cleaner Production audit from pilot to extension.

(1) Foundation and implementation of compulsory Cleaner Production audit system

National Development and Reform Commission and the former State Environmental Protection Administration formulated, examined and approved the *Cleaner Production Audit Interim Measures* on August 16, 2004, in which Cleaner Production audit was divided into voluntary Cleaner Production audit and compulsory audit for the first time, in which clearly stipulated that "the enterprises, whose emission of pollutants exceeds nation and regional emission standard and whose total emission of pollutants exceeds the total load target controlled by local government, should enforce Cleaner Production audit; for the enterprises, toxic and harmful materials are needed as raw material or produced during production, should enforce Cleaner Production periodically"; In 2005, the State Council issued *The State Council on the decision to strengthen environmental protection by implementing the concept of Scientific development* namely the National Development [2005] No. 39, and requirement of "implementation of Cleaner Production audit in accordance with law", so that compulsory Cleaner Production audit is laid on a crucial position. In December 2005, the former State Environmental Protection Administration issued *Procedures of Cleaner Production Audit for Key Enterprise*(UNCED [ 2005] 151), and formulated procedures and requirements of compulsory Cleaner Production audit work, which was a very important step to institutionalize and legalize Cleaner Production; In 2007, the State Council had just issued *Comprehensive Work Program of Energy-saving and Emission Reduction*, which clearly put forward "fully promote Cleaner Production " and regarded Cleaner Production as an important way to realize energy-saving and emission reduction.

(2) Foundation of assessment and acceptance system of Cleaner Production audit for key enterprises

In July 2008, the Ministry of Environmental Protection issued a *Notice of Strengthening Further Cleaner Production Audit for Key Enterprises* (UNCED [2008] No. 60), and *Guidance of Assessment and Acceptance of Cleaner Production Audit for Key Enterprises*, which marked foundation of assessment and acceptance system of Cleaner Production audit for key enterprises. The two documents are important elements of policy on Cleaner Production and innovation and improvement for Cleaner Production audit system, making senses in guaranteeing quality of Cleaner Production audit and enhancing the implementation rate of large expenditure in Cleaner Production, which has solved long existence problems of lack of regulation of government and lack of indemnificatory measures in Cleaner Production audit.

(3) Foundation and implementation of Cleaner Production standard system.

State Environmental Protection Administration in 2000 took the lead to propose and draw up Cleaner Production standards, trying to utilize the leading function of Cleaner Production to develop enterprises' Cleaner Production and to look for the potential of Cleaner Production, which

made sure that Cleaner Production standard was regarded as an effective tool to assess the performance of Cleaner Production. By the end of 2008, State Environmental Protection Administration have promulgated Cleaner Production standards for 42 industrials profession ( Table 1 ) , which constitutes important parts of China Cleaner Production policy.

**Table 1 The policy and the planning for action of promoting China Cleaner Production** <sup>[1][2]</sup>

Time(year)	Administrations	Activity/Policy document/Plan
1992	State Environmental Protection Administration United Nations Environment Program and World Bank	Preparing “China environment technical assistance project” B-4 sub-item in the World Bank, advancing Cleaner Production in China, is the first Cleaner Production project in China
	State Environmental Protection Administration and United Nations Environment Program	Held the first international Cleaner Production seminar in our country, promoting “the China Cleaner Production planning for action for the first time (draft)”
	The State Council	Authorized China <i>ten countermeasures of environment and development</i> , proposing that the technical beginning must be high and cleaner production technique of few consumption of material and energy and few pollutant discharge must be used as far as possible when the project was newly built, reconstructed and expanded
1993	State Environmental Protection Administration and National Economic and Trade Commission	Held the second conference of prevention and control of national industry pollution, proposing that prevention and control of national industry pollution must transform pure terminal control into controlling intire process of the production, implementing Cleaner Production
1994	The State Council	Promulgate <i>China Agenda 21 Century</i> , expounding interrelationship between Cleaner Production and sustainable development
1995	National People's Congress Committee	<i>Law of the People’s Republic of China on Prevention of Environmental Pollution Caused by Solid Waste</i> and <i>Law of the People's Republic of China on Prevention of Air Pollution</i> definitely stipulate that the enterprise should adopt raw material with high using efficiency and Cleaner Production craft of few pollutant discharge; The country encourages and supports the development of Cleaner Production
1996	National people's	<i>Law of the People's Republic of China on Prevention of</i>

	congress	<i>water Pollution</i>
	The State Council	The forth conference of national environment protection <i>the decision of some questions about environmental protection</i> emphasized on promoting Cleaner Production
1997	International cooperation committee of China environment and development	Establish Cleaner Production groups, Cleaner Production policy demonstration and research on policy of provinces and cities experiment sites
	State Environmental Protection Administration	Issue <i>some suggestions on carrying out cleaner production</i> , implementing the request of Cleaner Production definitely combining environment protection policy and environment management system
1998	The State Council	The State Environmental Protection Administration, representing the Chinese government, signed at <i>International Cleaner Production Manifesto</i> , pledging to carry out Cleaner Production
	The State Council	<i>Environment protection management methods on construction project</i> encourages Cleaner Production; proposing that industry construction project should adopt Cleaner Production
1999	The State Council	The Second Session of the 9th National People's Congress <i>Government work report</i> mention "encourage Cleaner Production"
	Nation Economic and Trade Commission	Promulgate <i>Demonstration plan of experiment site on implementing cleaner production</i> , deciding to carry out cleaner production demonstration experiment sites in ten cities and five professions; issue <i>eliminations backward productivity, craft and product catalogue</i> and <i>technology guidance catalogue of Cleaner Production for country key industry</i>
	National people's environment and resource Commission	Cleaner Production was listed in the legislative agenda, the legislative investigation and draft
2000	National people's environment and resource Commission	Nation Economic and Trade Commission was requested to carry out Cleaner Production legislative investigation and began to draft <i>Cleaner Production law</i> in 1999
2001	The State Council	"Tenth Five-Year" plan indicated that "carry out Cleaner Production, pay special attention to the key industry's pollution prevention, control and govern industrial pollution sources
		March, 2001, Jiang Ze-min gave a speech at the symposium of population, resources and environment,

		emphasizing on implementation of Cleaner Production
2002	28th Meeting of the Standing Committee of the Ninth National People's Congress	Passing <i>The Law of the People's Republic of China on Promotion of Cleaner Production</i> , Cleaner Production enters the stage of legalization, standardization and the comprehensive carrying out
2003	State Environmental Protection Administration	Promulgate <i>some suggestions</i> on implementation of <i>The Law of the People's Republic of China on Promotion of Cleaner Production</i>
	The State Council	The State Council transmit <i>suggestion on accelerating to carry out Cleaner Production</i> of 11 ministries and commissions
	State Environmental Protection Administration	Promulgate Cleaner Production standard of Petroleum refining industry, coking profession, leather making profession (light leather of pig)
2004	National Development and Reform Commission and State Environmental Protection Administration	Issue <i>Cleaner Production auditing Interim Measures</i> , explicitly dividing the Cleaner Production auditing into voluntary auditing and compulsory auditing for the first time
2005	The State Council	The State Council <i>The decision to strengthen environmental protection by implementing the concept of Scientific development</i> proposing that encourage to conserve energy and reduce consumption, implement Cleaner Production and force legally to implement Cleaner Production audit
	State Environmental Protection Administration	State Environmental Protection Administration issue <i>Procedures of Cleaner Production Audit for Key Enterprise</i> , Stipulating the object and procedure of Cleaner Production audit of key enterprise
	National Development and Reform Commission and State Environmental Protection Administration	Issued jointly the Cleaner Production evaluating indicator systems of nitrogenous fertilizer profession, the galvanization profession, the steel and iron profession in June
2006	State Environmental Protection Administration	Organized Cleaner Production audit workshop of national key enterprise
	State Environmental Protection Administration	Promulgated the Cleaner Production standard of 15 professions: beer manufacturing industry, edible vegetable oil industry (soybean oil and bean cake), textile industry (cotton and kapok printing), sugar cane

		sugar industry, electrolysis aluminum business, nitrogenous fertilizer manufacturing industry, steel and iron profession, basic chemistry raw material manufacturing industry (oxirane/glycol), automotive industry (painting), iron ore selection industry, galvanization profession, building board profession (density fiberboard), dairy products manufacturing industry (pure cow's milk and fat powdered milk), paper industry (blanching alkaline process bagasse thick liquid technique of production), steel and iron profession (cut deal steel rolling)
2007	The State Council	Issue <i>Comprehensive work program of energy-saving and emission reduction</i> , proposing explicitly the comprehensive advancement of Cleaner Production, formulating guidance of industry profession Cleaner Production audit
	National Development and Reform Commission	Issued the Cleaner Production evaluating indicator systems of seven professions in April: phosphate fertilizer profession, coating profession, tire profession, packing profession, thermal power profession, ceramics profession, lead and zinc profession
	State Environmental Protection Administration	Promulgated the Cleaner Production standards of 7 professions: The electrolysis manganese profession, the nickel mineral processing profession, the chemical fiber profession (spandex), the colored kinescope production, the plate glass profession, the paper industry (production craft of sulfate chemical pulp), the paper industry (sulfate chemical pulp technique of production), the tobacco processing industry, the white liquor manufacturing industry
2008	Ministry of Environmental Protection	Promulgated 15 Cleaner Production standards: The coal selection industry, the lead accumulator industry, the tanning industry (Light leather of cow), the synthesis leather industry, the print circuit wafer manufacturing industry, the petroleum refining industry (asphalt), the monosodium glutamate industry, the starch, the grape wine manufacturing industry, the calcium carbide profession, the steel and iron profession (blast furnace iron-smelting), the steel and iron profession (iron-smelting), the steel and iron profession (sintering), the chemical fiber profession (polyester fiber), the cleaner production standard making technology leads
	Ministry of	Promulgated <i>Notice of Strengthening Further Cleaner</i>

	Environmental Protection	<i>Production Audit for Key Enterprises and Guidance of Assessment and Acceptance of Cleaner Production Audit for Key Enterprises</i>
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### 3. Results of Cleaner Production Policy in China

With well-organized propelling of government, for over ten years, policy and program of Cleaner Production have enforced continually, which accelerated course of China Cleaner Production effectively. The promulgation and implementation of *Clean Production Promotion Law of People's Republic of China* and *Clean Production Interim measures* have marked that the state, from a strategic perspective, has established policy to prevent and control contamination produced from the source and entire process of production in order to realize win-win goal of promoting environmental protection and economic development. Combined with national conditions at the operational level, China also innovatively puts forward the key enterprises through compulsory Cleaner Production audit to promote industrial source reduction, and comprehensively promote the goal of Cleaner Production. The promotion of Cleaner Production processes a definite legal basis and a better policy system. By the impetus of this policy system, China Cleaner Production begins to effect.

#### 3.1 Awareness of Cleaner Production realized conversion from concept to practice

The concept of Cleaner Production was proposed later in our country. Initially, the mode of implementation was only to set up pilot in a few enterprises, propelled in the way of voluntary auditing without spreading in large-scale, causing a state of stagnation at a fairly long period of time. Awareness of Cleaner Production of government administration and enterprise is still relatively vague.

The promulgation and implementation of *Clean Production Promotion Law* has determined the definitely legal status of Cleaner Production. National Development and Reform Commission, Ministry of Environmental Protection, Economic and Trade Commission and other government departments through the adjustment of industrial policy, Cleaner Production technology development and policy on the promotion integrate Cleaner Production into development planning at all levels of government. The awareness of Cleaner Production in government department personnel has been greatly improved. The gradual deepening of compulsory Cleaner Production audit of key enterprises has effectively improved awareness of Cleaner Production conversion.

#### 3.2 Industrial enterprises' carrying out Cleaner Production effectively promotes the process of pollution reduction

Industrial enterprises have achieved obvious environmental and economic benefits through the implementation of Cleaner Production. According to incomplete statistics from 33 provinces, autonomous regions and municipalities in 2007, the implementation of Cleaner Production program save 3.69 billion kWh electricity, 7.04 million tons coal, 380 million tons water; 60,462,646,700 tons of wastewater reduction, COD reduction of 95,000 tons, SO<sub>2</sub> reduction of 71,000 tons; Atmospheric emissions from boiler, sulfur dioxide and dust are drastically reduced. Reducing emissions of pollutants obtained the economic benefits of 15.2 billion Yuan, while saving energy and reducing consumption generated direct economic benefits of 5.89 billion Yuan. From the above data, it could obtain obvious environmental and economic benefits through the implementation of Cleaner Production program. Figure 1 reflects trends of economic benefits

through the implementation of Cleaner Production program from 2004 to 2007.

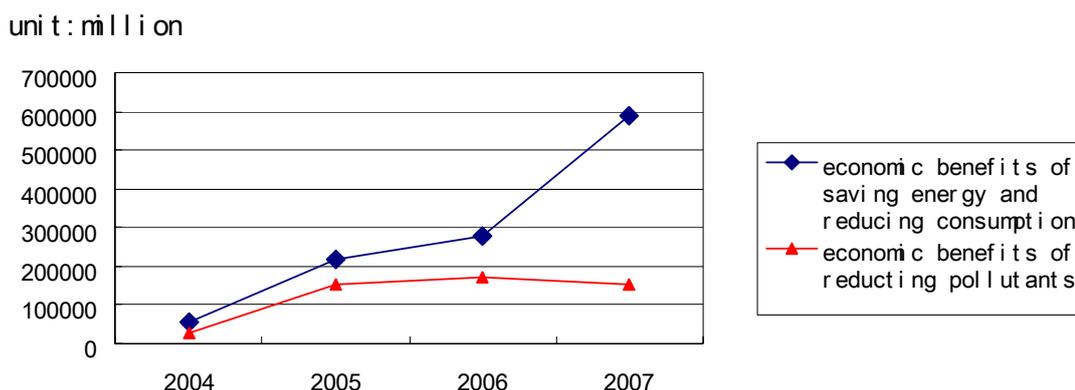


Fig. 1 implementing cleaner production program of economic situation for 2004-2007

### 3.3 Regional Cleaner Production Capacity Building of technical advisory services being strengthened

Professional competence of staff and the number of Cleaner Production services organization reflect the capacity of technical advisory services of Cleaner Production. From the level of nation, China national Cleaner Production Center has organized training courses of national Cleaner Production auditor since 2001. By the end of 2007, a total of 8339 persons had been trained. From the provincial and municipal level, 113,505 persons were received Cleaner Production training. Figure 2 reflects the number of staff received Cleaner Production training from 2004 to 2007.

Well-developed intermediary organizations and the perfect intermediary system are essential conditions to promote Cleaner Production. If there is no intermediary organization to promote Cleaner Production as technical support and advisory services platform, a crucial role in the chain will be lost in propelling Cleaner Production. According to incomplete statistics, more than 300 industries or local Cleaner Production centers, some provinces and municipalities, such as Beijing, Guangdong, Gansu, Zhejiang, Sichuan, Jiangsu and others have recommended a number of Cleaner Production advisory services agencies with a high level through an open tender. The acceptance of Cleaner Production audit of technical services in enterprise is accompanied by institutional capacity assessment meanwhile.

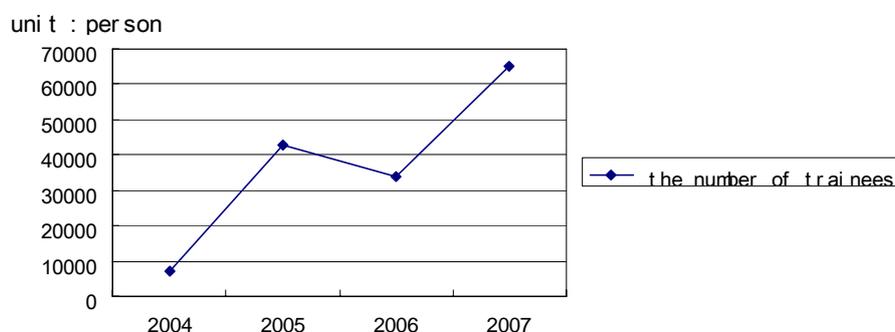


Fig. 2 training of cleaner production auditing for 2004-2007

### 3.4 Cleaner Production audit of industrial enterprises realized from pilot to expansion

The practice of Cleaner Production in China mainly conducted through the promotion of Cleaner Production audit. Before 2005, Cleaner Production audit was propelled through pilot demonstration until after the promulgation and implementation of *Cleaner Production Promotion Law*, exactly after national environmental system began to promote compulsory Cleaner Production audit comprehensively of key enterprises, the industrial Cleaner Production audit realized a leap-forward development from a point to a plane, the number of enterprises of Cleaner Production audit have emerged the trend of rapid growth. Figure 3 reflects the condition of the key enterprises' clean production audit. Over 95% of provinces and cities have already carried out Cleaner Production audit of key enterprises. By the end of 2007, according to incomplete statistics, Cleaner Production audit has been carried out in near 10 thousand enterprises, involving iron and steel, nonferrous metals, printing and dyeing, textile, paper, power, petroleum, chemical, building materials, pesticides, electroplating, manufacturing, and other some 20 industrials. The enterprises quantity of compulsory Cleaner Production audit will be growth at a faster rate in China.

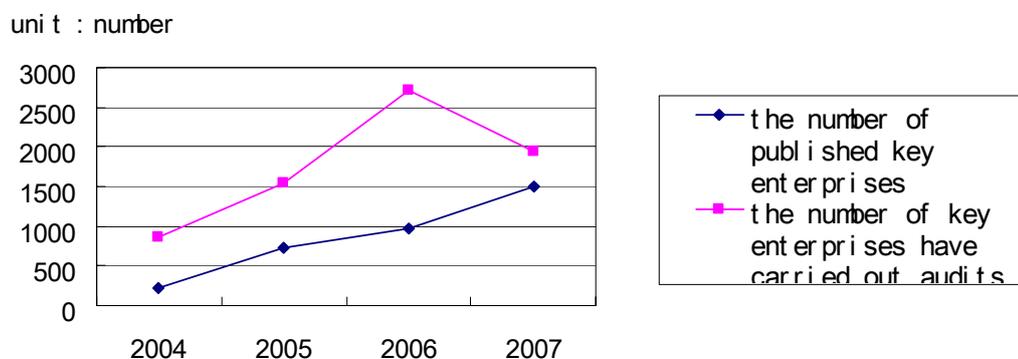


Fig. 3 Cleaner production audit work of key enterprises for 2004-2007

## 4. Conclusions

Near twenty years of Cleaner Production practice in China, from the *Cleaner Production Promotion Law of People's Republic of China* to *Cleaner Production Audit Interim Measures*, from the voluntary Cleaner Production audit to compulsory Cleaner Production audit system of key enterprises accomplished, from developing assessment and acceptance of Cleaner Production audit of key enterprises to studying the results of Cleaner Production policy in accounting solution, from the Cleaner Production training to the Cleaner Production advisory management, a more complete policy and legislation system for promoting Cleaner Production has been set up. Initial effect has been achieved, such as more than 10 thousand enterprises developing Cleaner Production audit, more than 300 organizations of Cleaner Production audit providing technical services for the enterprises' Cleaner Production audit and massive environmental and economic benefits in the energy-saving and emission reduction brought by Cleaner Production having also achieved initial success. However, it is regrettable that Cleaner Production which has been determined in legislation and environmental protection could not fully play a role in solving the contradiction between economic development and environmental protection. It is necessary for the government at the macro level to strengthen terminal control, at the same time, to focus on Cleaner Production and emphasize reduction contamination of source and the entire process,

achieving innovative convergence between Cleaner Production and existing environmental management systems, so that Cleaner Production could exhibit strong vitality in realizing binding targets of emission reduction and energy-saving and become an important regulation of Chinese environmental management systems, serving for target of Chinese environmental management.

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