

# Market Research Report

# Ecologically Sustainable Textile Machinery in China

March 6<sup>th</sup>, 2011



# Table of Contents

<b>Section A: Chinese Textile Industry Overview .....</b>	<b>2</b>
1. Status Quo.....	2
2. Future Development.....	6
<b>Section B: Eco-sustainability in China’s Textile Industry.....</b>	<b>9</b>
1. Status Quo.....	9
2. Future Development.....	14
3. Related Laws and Standards on Eco-sustainability.....	17
<b>Section C: Survey Findings .....</b>	<b>25</b>
1. Key Findings: Sector Regulating Bodies and Associations.....	25
2. Key Findings: Fabric and Garment Manufacturers.....	40
<b>Section D: Case Studies.....</b>	<b>58</b>
Case Study I: New Wide Group.....	58
Case Study II: High Fashion Silk (Zhejiang) Co., Ltd. ....	62
<b>Section E: Conclusions and Recommendations.....</b>	<b>67</b>
1. Executive Summary.....	67
2. Market Entry Suggestions and Recommendations.....	75
<b>Section F: Appendix.....</b>	<b>84</b>
1. Interviewee Profiles.....	84
2. Useful Information.....	110

## ***Section A: Chinese Textile Industry Overview***

### **1. Status Quo**

#### **Scale and Output**

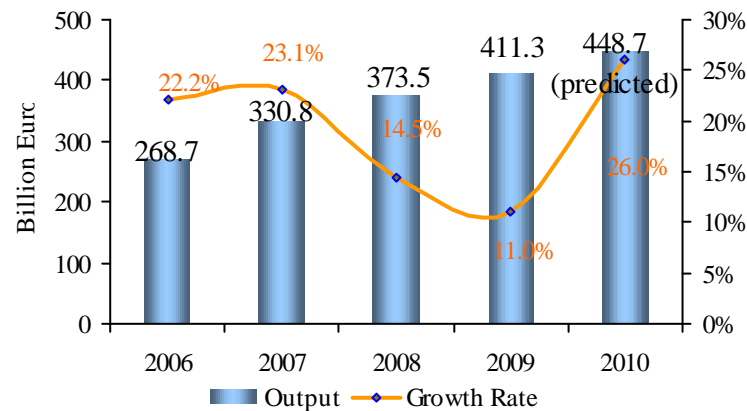
- China is the world's largest producer and exporter of textile and garment, and the whole industry is rapidly growing every year. According to the national statistics, the output value of the textile industry in Y2010 may exceed Euro 440 billion, and the sizable enterprises<sup>1</sup> have increased to 54,100 from 39,400 five years ago employing 10.88 million workers across the country.
- According to China National Textile and Apparel Council (CNTAC), in Y2009, China produced 27.26 million tons of chemical fiber, 10.4% higher than that of last year; 24.05 million tons of yarn, an increase of 11.8% over the previous year; 56.74 billion meters of fabric and 23.75 billion pieces of garments, an increase of 9.02% and 11.79% over the previous year respectively.
- Due to the impact of the financial crisis, the output value growth of China's textile industry has slowed down significantly in the years of 2008 and 2009, despite of which, the general output value in the "Eleventh Five-Year" period (from Y2006 to

---

<sup>1</sup> including all state-owned industrial enterprises, as well as non-state-owned industrial enterprises with annual sales income over RMB 5 million, or EURO 0.54 million. (To follow the previously used value, the exchange rate of RMB against Euro in this report is calculated by 1:0.108)

Y2010) still increased at a rapid pace with average annual growth rate of 19.36%. In the first three quarters of Y2010, the output value of China's sizable textile enterprises reached RMB 3.37 trillion, or Euro 363.5 billion, an increase of 26.04% over the same period last year, and it is predicted that, the output value of the whole year may exceed Euro 440 billion.

China Textile Industry Output Value and AAGR, Y2006-2010



Source: (CNTAC)

- *In the past five years, the average annual growth rate (AAGR) of the industry was 19.36%. Although the total output value increased each year, the annual growth rate was severely influenced by the global financial crisis from Y2008, and sharply dropped to 11% in Y2009.*
- *With the improvement of the global and domestic economic situation, the growth rate recovered quickly in Y2010, ranking the highest within the last five years.*

- Due to effective policies enacted by the Chinese government as well as the slow but stable recovery of the global economy, the profits of China's textile industry has increased since the beginning of Y2009, and it is predicted by CNTAC that in Y2010 the profits of the whole industry will be Euro 21.6 billion, an increase of 50% compared with same period of the last year, reaching a record high.

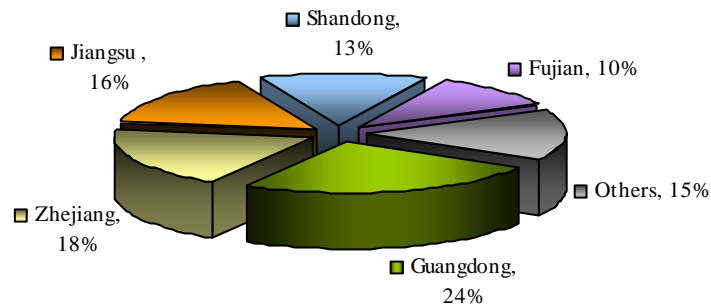
## Foreign Trade

- China is the world's largest exporter of textile and garment products. In Y2010, under the promising import and export situation of the whole country, China's textile industry also achieved encouraging results towards the import and export value, especially export growth rate in the second half of this year which even exceeded the expectation. In Y2010, the export value of textile yarn and fabric amounted to USD 77.05 billion with an increase of 28.44% over same period of last year, and the export value of garment and accessories reached USD 129.48 billion with an increase of 20.88% over same period of last year. It is predicted that from Y2010-Y2015, the annual growth rate of the textile and garment export will be 5%-8%, and the export value will achieve USD 250-280 billion.
- The rosy export volume figure doesn't mean the Chinese textile enterprises can be optimistic about the trade with their foreign partners because the European and American countries turn to utilize "*green barrier*" to replace "tariff barrier" to contain the China's exportation efforts as the world economic situation is still ailing. The established textile enterprises tend to keep the foreign markets as one of the steady profit source while the fast-growing enterprises are seeking overseas market as the potential profit contributing source. The "*green barrier*" is confronting these enterprises and posing threat to their international "living space". As a result, the solutions that can help them bypass the "*green barrier*" are destined to be widely accepted.

## Geological Spread

- China's top five provinces for textile and garment industry are all located in its economically developed east coastal area, namely Guangdong, Zhejiang, Jiangsu, Shandong and Fujian, amounting to 85% of the industry's production capability. In terms of output, Guangdong province ranks the first with its garment output accounting for almost one quarter of the national total. The import and export of the textile and garment industry are also active in those coastal areas due to convenient location and complete supporting industries.

Leading Provinces for Textile and Garment Production



Source: National Bureau of Statistics

- *Guangdong province ranks the first with its garment and accessories output accounting for almost one quarter of the national total.*
- *Altogether, Guangdong, Zhejiang, Jiangsu, Shandong and Fujian contribute to 85% of garment and accessories production in the country.*

## 2. Future Development

### Market Drivers

- ***Domestic Demand:*** Chinese domestic market will be the world's fastest growing market from Y2010-Y2020, and it is estimated that by Y2015, the value of China's textile industry will exceed Euro 756 billion. Predicted from the consumer demographics, the next ten years will be the golden era for the development of Chinese textile industry. In the following 10-15 years, China's demographic structure will support the domestic demand of China's textile products. In addition, the urbanization rate of China was 50% in Y2010, and this rate is expected to reach 65% by Y2030, revealing huge consumption potential upgrading. This will also bring promising opportunity for China's textile industry.
- ***International Demand:*** The unfavorable factors such as RMB appreciation and the soaring price of the raw material didn't slow down China's textile and garment export, the growth rate has been surprisingly improved since the second half of Y2010, and export value achieved USD 206.53 billion by the end of this year, increasing by 23.59%. The pressure from the international market has brought new motivation for China's textile industry to strengthen its competitiveness and by now, China's textile exports accounts for 33% of the world's total exports, and apparel exports accounted for 40% of the world's total exports, proving the worldwide recognition of China's textile industry.

## **Development Trends**

The next five years will be a critical period for China's textile industry's transition from pursuit of large size to pursuit of strong competition. Both opportunity and challenge will be encountered, and *Sustainable Development* has become the most important strategy for Chinese textile industry to take the chances and overcome the challenges.

- ***Expand domestic demand.*** Within the next 5-10 years, China's sustained and rapid economic growth will drive continuous improvement on citizens' income, allowing more expenditure on clothing by urban and rural residents. With prevailing trend of low carbon lifestyle in China, more and more consumers begin to have demand on the eco-sustainability of the products purchased, and “*green*” has become one of the most important purchasing criteria which may greatly influence the purchasing decisions. Therefore, the *eco-sustainability* of textile products, a new value for which the consumers are willing to pay more money, will be a key market driver to capture new market opportunities and maintain sustainable development.
- ***Upgrade innovation capability.*** Innovation and new technology are the fundamental approaches to ease the cost pressure on *energy and resources*, as well as to meet the requirements of *eco-sustainability* for China's textile industry. China's textile industry will focus on improving the industry innovation mechanism, accelerating the research and industrialization on key technologies, and cultivating innovative talents to ensure the innovation capability and master cutting-edge technologies.

- ***Promote Eco-sustainability.*** China's textile industry will focus on pollution control and energy conservation in the next 5-10 years. In order to achieve this goal, the textile industry will *speed up the research of related technologies on cleaner production, waste recycling and energy conservation, adopt environmentally friendly materials, improve energy conservation and environmental protection standards, as well as establish energy management mechanism* with specialized personnel for enterprises.
  
- ***Enhance brand building.*** Brand building is always the weak link in China's textile industry, and the future development of the textile enterprises will focus on establishing a self-owned brand value system. Since “*environmentally friendly*” is a critical aspect for the corporate image, *eco-sustainability* may also become one of the key factors for successfully building a complete brand value chain.
  
- ***Accelerate industrial structural adjustment.*** Chinese textile industry will experience a dramatic transfer and optimization to best balance the conflict between production capacity and resources. Since over 90% of the textile enterprises are SMEs, the *energy and resource utilization* of the whole industry is lower than the international level due to incomplete management as well as outdated technology and manufacturing equipment. In the next five years, great effort will be made to optimize the industrial structure, improve the comprehensive competitiveness of the SMEs so as to improve the overall *energy and resource utilization* of China's textile industry.

## ***Section B: Eco-sustainability in China's Textile Industry***

### **1. Status Quo**

#### **Textile Industry's Eco-sustainability Goal during Y2006-Y2010**

- “The Development Outline for the Textile Industry during the Eleventh Five-year Plan ” clearly stipulated that *low levels of initial processing textile machinery with low efficiency, heavy energy consumption and high pollution should be effectively limited and eliminated, and substantive progress on energy conservation and environmental protection should be achieved from Y2006-Y2010*. In addition, specific targets on energy conservation, consumption reduction and environmental protection during the five years are also set to assure the implementation of such plans throughout the industry is measureable.
  - ***Energy Consumption***: (by Y2010) the electricity consumption per ton of fiber should be reduced by 10% than in Y2005;
  - ***Water Consumption***: (by Y2010) the fiber used per unit output value and the water consumption per ton of fiber should be reduced by 20% than in Y2005;
  - ***Waste Water Discharge***: the waste water discharge per unit output value should be reduced by 22% than in Y2005.

- Besides, the Development Outline also assigned specific Ecologically Sustainable targets and related measures for each Sub-sector according to their actual situations, that by the end of the eleventh five-year period,
  - In *Cotton Textile Industry*, related technology and equipment on energy conservation and consumption reduction should be applied and promoted, and electricity consumption per 10,000 RMB (or 1,080 Euros) should be reduced by 10%-15%;
  - In *Chemical Fiber Industry*, cleaner production and resource recycling should be strengthened, and electricity consumption per 10,000 RMB (or 1,080 Euros) should be reduced by 10%-15%;
  - In *Industrial Textile Industry*, technologies on energy conservation, consumption reduction and cleaner production should be promoted, and electricity consumption per 10,000 RMB (or 1,080 Euros) should be reduced by 10%;
  - In *Printing and Dyeing Industry*, to promote printing and dyeing processes which are environment friendly and energy conservation, change from “pollution reacted” to “pollution prevented”, strengthen environmental law enforcement, and eliminate outdated processing technology and equipment causing high consumption and severe pollution. The waste water discharge per unit output value should be reduced by 22%, and electricity consumption per 10,000 RMB (or 1,080 Euros) should be reduced by 10%-15%;
  - In *Wool Textile Industry*, waste water and waste management and utilization system should be strengthened.
  - In *Bast & Leaf Fibers Textile Industry*, new degumming technology with low pollution and high energy efficiency should be applied and promoted, besides, water and electricity consumption, as well as waste water discharge per 10,000 RMB (or 1,080 Euros) should be reduced by 10%-15%;

- In *Silk Industry*, advanced silk dyeing and finishing equipment with high efficiency and low consumption should be used, new processing technology on improving efficiency, shortening the processes, lowering liquor ratio, ecologically sustainable and recycling should be developed, and electricity consumption per 10,000 RMB (or 1,080 Euros) should be reduced by 10%;
- In *Textile Machinery Industry*, more efforts should be made on energy conservation, environmental protection and automation, especially for the chemical fiber machinery, cotton textile machinery, as well as dyeing and finishing machinery.
- In *Knitting Industry and Garment Industry*, no specific eco-sustainable target is assigned.

### **Textile Industry's Actual Accomplishments during Y2006-Y2010**

The textile industry has been promoting cleaner production and the overall energy consumption was greatly reduced. During the “11th Five-year Period”, the textile industry witnessed rapid growth thanks to the greater demands caused by increasing living standards. According to the national statistics, the energy consumption level remains unchanged. During Y2006-Y2009, the textile enterprises' energy consumption of unit added-value was reduced by 39.27%, waste water emission of unit added-value was reduced by 22%; the use of heat energy & reclaimed water and cycling fiber regeneration has taken shape.

- ***Energy Conservation:*** During “the 11<sup>th</sup> Five-year Plan” period, the energy-efficient equipment and new energy-saving technology have been widely applied in textile industry. Cotton textile industry has been promoting energy-efficient motor,

automatic control technology of textile mill air-conditioning and other technologies while the automatic control technology on air conditioning can reduce the energy consumption by 10%-15%; chemical fiber industry has been promoting the differential direct spinning technology, new silk spinning cooling technology and other practical energy-conservation technologies among which the new fused mass of direct spinning & heat medium heating system can reduce the fuel consumption by 1/3. The R&D and promotion on new technology in textile printing industry have made great progress and the high-efficient abridged spinning process & pretreatment technology which has been widely applied in various cotton products and the blended fabric products can save power and gas by 30%; CPB dyeing technology can save steam by 40%.

- ***Water Conservation:*** During “the 11<sup>th</sup> Five Year Plan” period, textile industry made progress on water conservation while the fresh water consumption on 100-meter fabric dyeing was reduced by 37.5% (from 2.5 tons to 4 tons). The high-efficient abridged spinning process & pretreatment technology is getting more and more popular in textile printing industry and it can reduce the water consumption by at least 30%. The biological enzyme de-sizing/de-starching can save water by 20% while the cold-pad-batch pretreatment dyeing technology can save water by 15%.
- ***Pollutant Control:*** During “the 11<sup>th</sup> Five Year Plan” period, the waste water emission of unit added-value in textile industry is generally reduced by more than 40% while the technology of pollutant emission control has achieved great

progress. The technology of further treatment and reuse of waste water in textile printing and dyeing industry improves reuse rate of fresh water for fabric dyeing to 15% in 2010 from 7% in 2005, and greatly reduced the waste water emission. The circulating water purification technology on waste water of reeling silk production can make the waste water reusing rate as high as 90% in silk industry. The membrane technology for wastewater treatment adopted in chemical fiber industry can effectively reduce the emission of liquid and air pollutant and help the whole industry to work more efficiently based on a clean and energy-efficient way, and other equipment and technologies are going to be widely adopted including fourdrinier pulp washer, continuous pulping machine, the smart pulping wastewater bleach system, treatment on black liquor of viscose grade cotton pulp production, activated carbon adsorption method.

- ***Recycling Use of Resources:*** The recycling technology of resources have been widely adopted in the whole industry, such as reuse of the condensing water or cooling water, reuse of waste heat, reuse of reclaimed water, new reclaiming method of waste mercerizing liquor. Thanks to the technologies, the resource utilization efficiency of waste water and heat has been greatly improved while the pressure to reduce pollution is alleviated to some extent, which generated good economic and social benefits.
- ***“Green” Textile Equipment:*** The improvement of R&D and production capacity of green textile equipment made in China paved the way for textile industry to

become more energy-efficient. The continuous pretreatment and dyeing equipment made in China can save steam and water by 20% respectively; the recently developed batch-dyeing machine can save water by 50% and energy by 40% compared with the traditional dyeing machinery.

## 2. Future Development

### China's Eco-sustainability Target during Y2011-Y2015

- ***National Energy Conservation and Emission Reduction Targets***: It is stated in the "Comprehensive Working Program on Energy Conservation and Emission Reduction" that by Y2010 the *energy consumption* per ten thousand Yuan of GDP should be reduced from 1.22 ton of coal equivalent (TCE) in Y2005 to 1 TCE, *reduced by about 20%*, *water consumption* per unit of industrial added output value should be *reduced by 30%*. During "Eleventh Five-Year" period, the total *discharge of major pollutants* should be *reduced by 10%*, and by Y2010, *sulfur dioxide emissions* should be reduced from 25.49 million tons to **22.95 million tons**, *chemical oxygen demand* (COD) should be decreased from 14.14 million tons to **12.73 million tons**.
- The quantitative indicators of China's energy conservation and emission reduction are further enhanced in the "**Twelfth Five-Year Plan**" (Y2011-Y2015). The *energy consumption* per unit of GDP should be *reduced by 17%* and the *CO<sub>2</sub> emissions*

per unit GDP should be *reduced by 20%*. Mr. Xie Zhenhua, Deputy Director of National Development and Reform Commission said, the *binding energy conservation and emission reduction targets* during the "Twelfth Five-Year" period include the *carbon intensity, energy intensity, and the proportion of non-fossil energy sources*, etc. The purpose is to ensure that *carbon emission decreases by 40% -45% in Y2020*.

- ***The Energy Conservation and Emission Reduction Target of the Textile Industry:*** It is illustrated in the recently released “The Twelfth Five-year Plan Outline for Textile Industry’s Scientific and Technological Progress” that the *energy conservation and emission reduction target* is to *satisfy all the national compulsory standards, to complete the missions on energy saving and emission reduction assigned, to popularize cleaner production mechanism within the whole industry, and to generally establish the low-carbon, green and circular economy*.

### **Main Actions to be Adopted for Textile Industry’s Eco-sustainability**

With the enhanced awareness regarding energy conservation and environmental protection, eco-sustainable manufacturing is no longer just a compulsory policy forced to be implemented by the textile enterprises through laws and regulations. Currently the fabric and garment manufacturers have realized the significance of *eco-sustainability* in various aspects including cost, export, corporate social

responsibility and brand building, etc. Therefore, China's textile industry has established strategic action plans to implement *eco-sustainable manufacturing* for further development and expansion.

- ***To speed up the elimination of the outdated textile equipment.*** By Y2011, 7.5 billion meters of outdated printing & dyeing production capacity, and 2.3 million t/a of outdated chemical fiber production capacity will be eliminated. Old equipment tends to consume more water and electricity, and the processing steps are complicated compared with the new equipment. By using advanced textile machinery, the enterprises can not only achieve the goal for eco-sustainability specifically assigned to each enterprise, but can also save cost and improve the production efficiency which is helpful for the company's long-term development.
- ***To develop and popularize new processing technologies on energy conservation.*** The textile industry will focus on the technology development related to subsectors with high pollution such as chemical fiber industry and printing & dyeing industry. Traditional processes with high pollution and water and electricity consumption will be replaced with shortened processes and advanced technique to effectively reduce the energy consumption and pollutants emission. And the utilization of clean energy such as solar and wind energy is expected to reduce the consumption and the emission of the waste air.

- ***To enhance resources recycling.*** Greater endeavor will be made on developing new approaches to recycle waste water to improve the efficiency of the resource utilization and reduce waste water discharge and fresh water consumption. In addition, the recycling of steam and fiber can save the energy to be consumed for generating new steam and fiber, and avoid extra pollutants emission as well.

### **3. Related Laws and Standards on Eco-sustainability**

China has sound legal system with generally three tiers, namely, national laws, implementation regulations and industry standards. The Chinese Constitution states its own supremacy under which the laws upon environment of different industries are made as the guiding principle for the reference of local governments who work out the regulations or implementation rules especially applicable locally. It is the industry standards made by associations or industry authorities who elaborate on or specify the criteria and detailed parameters to follow.

#### **General Laws & Regulations on Eco-sustainability for Textile Industry**

The central government makes national laws to be the general guidelines of the legal rules to follow by textile industry and the punishment can also be found in the laws. There are laws upon the control of water use, waste water discharge, environment pollution, solid waste, noise pollution, energy use, cleaner production process:

- ***Law of the People's Republic of China on Prevention and Control of Water Pollution*** (Y1984): This Law is enacted for the purposes of preventing and controlling water pollution, protecting and improving the environment, safeguarding human health, ensuring effective utilization of water resources and it applies to prevention and control of pollution of rivers, lakes, canals, irrigation channels, reservoirs and other surface water bodies and of ground water bodies.
- ***Environmental Protection Law of the People's Republic of China*** (Y1989): This Law is formulated for the purpose of protecting and improving people's environment and the ecological environment, preventing and controlling pollution and other public hazards, safeguarding human health. "Environment" as used refers to the total body of all natural elements and artificially transformed natural elements affecting human existence and development, which includes the atmosphere, water, seas, land, minerals, forests, grasslands, wildlife, natural and human remains, nature reserves, historic sites, and urban and rural areas.
- ***Law of the People's Republic of China on Prevention of Environmental Pollution Caused by Solid Waste*** (Y1995): This law is applied to the prevention of environmental pollution caused by solid waste within the boundaries of China.
- ***Law of the People's Republic of China on the Prevention & Control of Environmental Noise Pollution*** (Y1997): This Law is enacted with a view to preventing and controlling environmental noise pollution, protecting and

improving the living environment, safeguarding human health and promoting economic and social development.

- ***Energy Conservation Law of the People's Republic of China*** (Y1997): This Law is enacted with a view to promoting energy conservation in China, improving energy utilization and economic performance, protecting the environment, ensuring national socio-economic development. The energy resources referred to in this law mean coal, crude oil, natural gas, electricity, coke, coal gas, thermal power, finished petroleum products, liquefied petroleum gas, biological energy and all other resources from which useful energy is obtained directly or through processing or transformation.
  
- ***Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution*** (Y2000): This Law is formulated for the purpose of preventing and controlling atmospheric pollution, protecting and improving people's environment and the ecological environment, safeguarding human health, and promoting the sustainable development of the economy and society. The local people's governments at various levels shall be responsible for the quality of the atmospheric environment within the areas under their jurisdiction, making plans and taking measures to ensure that the quality of the atmospheric environment within the said areas meet the standards.
  
- ***Cleaner Production Promotion Law of the People's Republic of China*** (2002):

This Law is enacted to promote cleaner production, increase the efficiency of the utilization rate of resources, reduce and avoid the generation of pollutants, protect and improve environments, ensure the health of human beings and promote the sustainable development of the economy and society. The nation is committed to encouraging and promoting cleaner production. The State Council and the local people's governments at or above county level must infuse cleaner production into plans and programs for national economic and social development, as well as environmental protection, resources utilization, industrial development and regional development.

- ***Renewable Energy Law of People's Republic of China*** (2006): This Law is formulated to promote the development and utilization of renewable energy, increase the energy supply, improve energy mix structure, ensure energy security, protect environment and achieve the sustainable development of the society. The renewable energy refers to the non-fossil energy such as wind, solar, water, biomass, geothermal, ocean energies.
- ***Circular Economy Promotion Law of the People's Republic of China*** (Y2008): The Law is formulated for the purpose of facilitating circular economy, raising resources utilization rate, protecting and improving environment and realizing sustained development. The Circular Economy is the general term for the activities of decrement, recycling and resource recovery in production, circulation and consumption.

## **Industry Standards (please refer the Appendix for detailed parameters)**

The textile enterprises should refer to the industry standards to fulfill the eco-sustainable manufacturing process. Specified terms, index, quota, parameter and value can be found in Industry Standards and they can be a good source of reference for “green label” standard which is expected to get more Chinese elements involved. The standards encompass the access prerequisite for Chinese Textile Printing & Dyeing Industry, calculation & basic quota on energy consumption, unit consumption quota and calculation method of water usage.

### **■ Energy and Water Consumption:**

- *Access Prerequisite for Chinese Textile Printing and Dyeing Industry* (2010 Version): It can be seen as the guideline for those who are expected to dedicate to textile printing and dyeing industry, and it involves the criteria on investment, construction, examining & appraisal of environment protection performance, land supply, loan & credit, production & operation, monitoring and management of production safety, corporate social responsibility;
- *Textile Printing & Dyeing Enterprises Calculation & Basic Quota on Comprehensive Energy Consumption*: this regulation is made by Ministry of Industry and Information Technology (MIIT) and stipulates the calculation and basic quota on energy consumption, the calculation on total volume of standard products. It sets criteria upon the energy consumption performance of pretreatment, bleaching, dyeing, printing, waste water and so on;

- ***Calculation Method of Water Usage in Knitted Goods Wet Processing and Unit Consumption Quota:*** This regulation is made by MIIT and stipulates the scope of water usage, calculation method on knitted goods wet processing and unit consumption, calculation method on output volume of standard products, unit consumption quota for various knitted goods with wet processing. It can be also used as the benchmark to compare the water usage by different enterprises in the same industry.
- ***Calculation Method of Water Usage in Woven Fabrics Wet Processing and Unit Consumption Quota:*** This regulation is made by MIIT and stipulates the water usage scope of woven fabrics wet processing , calculation method of water usage on unit production, comparable water usage of unit production, the unit consumption of basic quota on various woven fabrics with wet processing;

■ **Water Pollution:**

- ***Discharge Standard of Water pollutants for Dyeing & Finishing of Textile Industry:*** this regulation is made by Bureau of Environmental Protection and stipulates the discharge direction of waste water, the up-limit discharge density and volume of water pollutants for dyeing & finishing of textile industry.

■ **Noise Pollution:**

- ***Emission Standard for Industrial Enterprises Noise at Boundary:*** This standard specifies emission limit and measuring method for industrial enterprise and fixed equipment factory noise at boundary. This standard is applicable to the

noise emission management, evaluation and control of the industrial enterprise. An administrative organ, social group or public institution and etc. that emit noise also shall be in compliance with this standard.

■ **Air and Dust Pollution:**

- *Emission Standard of Air Pollutants for Coal-burning Oil-burning Gas-fired Boiler:* This Standard specifies the supreme permissible effluent concentration of flue dust, SO<sub>2</sub> and nitrogen oxides as well as the emission limits of flue gas blackness by age limits. This Standard applies the supervision and management of the air pollutant emission by coal-burning, oil-burning and gas-fired boilers with difference in capacities and uses, except coal-powder-burning generation boilers and the generation boilers whose output per set is greater than 45.5MW (65t/h) and applies the environmental impact assessment, design, final acceptance and after-construction effluent management of construction projects.

*China's eco-sustainability goal set for textile industry during Y2006-Y2010 was allocated to specific sub-sectors. Among the ten sub-sectors, six have established electricity consumption target, two have established waste water discharge target, and one has established water consumption target. However, the calculating methods of the different sub-sectors on eco-sustainability revealed from the targets were not unified, and that issue is supposed to be solved in the target setting of the next five years.*

*In the last five years, China's textile industry has made great achievements on eco-sustainable manufacturing in terms of energy and water conservation, pollutants control, waste recycling and development of "green" textile equipment. The next five years is still critical for the industry's eco-sustainability, and several significant measures will be taken to consolidate the results achieved, such as the elimination of outdated textile equipment and the popularization of new processing technology, etc.*

*There are structural laws and regulations on eco-sustainability for the textile enterprises to refer to, and for implementation, they can also find instructions and specific parameters in the industrial standards. Most of standards established for the industry's eco-sustainability are regarding raw water consumption, especially for printing & dyeing enterprises. Besides, China is also making great efforts to establish the energy consumption calculating standard for better reporting and monitoring on the eco-sustainability of all the industries across the nation.*

## **Section C: Survey Findings**

To collect first-hand information on the eco-sustainability of China's textile industry, and acquire comments and opinions on the "green label" concept of the textile machinery, Topview conducted a comprehensive market survey both at the governmental level and at the textile machinery end-user level. For the governmental level, Topview acquired valid information from the most relevant regulating bodies and industry associations including *National Development and Reform Commission, Ministry of Industry and Information Technology, Ministry of Environmental Protection, China National Textile And Apparel Council, China Dyeing and Printing Association, and Responsible Supply Chain Association*. For end-user level, Topview contacted about *150 leading companies* on the list of the *TOP500 of Chinese Competitive Textile and Garment Enterprises* (2009-2010) released by CNTAC covering main *sub-sectors of fabric, garment, home textile, raw material and textile machinery*.

### **1. Key Findings: Sector Regulating Bodies and Associations**

#### **Survey Scope**

- To conduct the survey, Topview selected a total of 20 most relevant government regulating bodies as well as industry associations towards eco-sustainability, and

acquired valid comments and opinions from six of them, i.e. National Development and Reform Commission, Ministry of Industry and Information Technology, Ministry of Environmental Protection, China National Textile And Apparel Council, China Dyeing and Printing Association, and Responsible Supply Chain Association, and the key findings are summarized as follows.

## **Survey Results**

### **■ Ministry of Environmental Protection (MEP)**

- **Roles and Responsibilities:** The responsibilities of MEP on eco-sustainability is to establish and complete basic systems for environmental protection; to formulate national environmental protection policies and programs and implement accordingly; to draft laws and regulations and enact department provisions; to organize the formulation of environmental function zoning, enactment of various environment protection standards, benchmarks and technical norms; To undertake the responsibilities of prevention, control of environment pollutions and environment destructions as their origins; under the entrustment of the State Council, to conduct environment impact assessment of major economic and technical policies, development programs, as well as major economic development programs, put forward suggestions in respect of environment impact for environment protection laws and regulations, review and approve environment impact assessment statement of major construction

regions and projects according to state provisions; To be responsible for the supervision and administration of environment pollution prevention and treatment, to enact administrative rules for the pollution prevention and treatment in respect of water bodies, atmosphere, soil, noise, light, mephitis, solid wastes, chemicals and vehicles, and organize implementation accordingly;

➤ **Interviewee:** Mr. JIAG, Director of Department of Environmental Technology

➤ **Key Findings:**

***Comment on Green Label for Textile Machine:***

- **To construct a “Green label” for Italian textile machinery is a very good idea. Such “green label” has strong potential to add competitiveness to the Italian machinery. It will no doubt give a fillip to the world textile machinery industry. It will also erect new standards for China textile machinery industry and bring it forward as well. We welcome such breakthrough in the “Green Label” family.**
- **However, to be convincing, there must be clarified parameters, for instance, indicators such as energy consumption, water consumption, waste water discharge, green house gas emission, noise and dirt must be quantified. These quantified indicators will make the labeled machines comparable to the non-labeled ones.**
- **Promoting such “Green Label” will be a huge, systematic project. Various kinds of textile machineries will make it difficult to set up quantified standards. Mutual recognition between Italy and China on such standards should not be a**

**big issue.**

- **To promote machinery, “Green Label” is a good way, but not the only way.**

*Current “Green Label” Concept in China:* At present, there are two types of officially recognized Green Labels, i.e. China Environment Labeling, Type I and Type II. Type I is a qualification for the product to meet related eco-sustainable criteria, and Type II represents an announcement of the product manufacturers to implement eco-sustainable standards within the organization. So far, some textile machinery manufacturers have acquired qualification of the China Environment Labeling, Type II, indicating these enterprises have made self-declared public announcement on energy conservation and environment protection. However, the textile machinery itself as a product has not been put into the evaluation scope of the China Environment Labeling, Type I.

## ■ **National Development and Reform Commission (NDRC)**

- **Roles and Responsibilities:** The responsibilities of NDRC on eco-sustainability is to formulate and promote the strategy of sustainable development; to undertake comprehensive coordination of energy saving and emission reduction; to organize the formulation and coordinate the implementation of plans and policy measures for recycling economy, national energy and resource conservation and comprehensive utilization; to participate in the formulation of plans for ecological improvement and environmental protection; to coordinate the solution of major issues concerning ecological building, energy and resource conservation and comprehensive utilization; to coordinate relevant work

concerning environment-friendly industries and clean production promotion. To organize the formulation of key strategies, plans and policies in addressing climate change; to take the lead with related ministries in attending international negotiations of climate change; to undertake relevant work in regard to the fulfillment of the United Nations Framework Convention on Climate Change at national level.

➤ **Interviewee:** Mr. LV, Chief of Energy Conservation and Emission Reduction Department

➤ **Key Findings:**

***Macro-Policy on Energy and Emission:***

- During the nation's 11<sup>th</sup> Five-Year Plan period, the state government, for the first time, set up its binding targets on emission reduction. China is currently under tremendous external pressure in cutting greenhouse gas emissions.
- To ensure the realization of carbon emission be reduced by an overall of 40%-45% in 2020, appropriate incentive economic policies will be enacted to guide and support the development of environment protection industry.
- The approach to identify emissions reduction indicators for the 12<sup>th</sup> Five Year Plan period will be more scientific. The emission cut target will be allotted to various industries, regions, and might be allotted to some specific enterprises.

***The Overall Eco-sustainability of China:***

- During the 11<sup>th</sup> Five-year Plan, a compulsory target of energy conservation by 20% was established for per unit GDP; limitations on carbon emission and energy consumption intensity for per unit GDP, major pollutant emission, proportion of non-fossil energy consumption, forest coverage reduction, etc. will be established to serve the eco-sustainability targets. These limitation targets will be allotted to specific enterprises in different regions, industries.
- During the 11<sup>th</sup> Five-Year Plan period, an overall of RMB 2,000 Billion or Euro 216 billion were invested in eco-sustainability for the whole society, 10% of which was from central budget. The measure produced sound effect: in the first 4 years of the period, in supporting an annual economic growth of 10%, the average yearly energy consumption decreased to 6.8%.

*Indicators on Emission Control:* Only two Major Pollutants, COD and SO<sub>2</sub> emissions were identified as indicators in the pollutants emission binding targets in the 11<sup>th</sup> Five-year-plan period; However, to further strengthen the emission control, another two chemical pollutants, oxynitride and ammonia nitrogen will be taken into account as well to ensure the fulfillment of the binding targets for the upcoming 12<sup>th</sup> Five-year-plan period.

## ■ **Ministry of Industry and Information Technology (MIIT)**

- **Roles and Responsibilities:** The main responsibilities of MIIT on eco-sustainability is to formulate and implement sector programs, plans and industrial policies for industries and communication industry, put forward policy suggestions on optimization of the industrial deployment and structures,

draft related laws and regulations and enact rules and stipulations; to draw up technical norms and standards for different sectors and organize their implementation, and guide the quality administration of different sectors; to formulate policies for the promotion of energy conservation, comprehensive utilization of resources and cleaner production and organize their implementation; to participate in the formulation of programs for the promotion of energy conservation, resources comprehensive utilization and cleaner production; to organize and coordinate the major demonstration projects and the extension and application of new products, new technologies, new equipment and new materials; and to formulate related policies and measures to promote the development of medium and small enterprises and non-state-owned economy, and coordinate and solve related major issues;

➤ **Interviewer:** Mr. Hongliang LI, Department of Energy Conservation and Emission Reduction

➤ ***Key Findings:***

***Actions Taken for Eco-sustainability of China's Textile Machinery Industry:***

- In Y2010, MIIT released the list of 2,087 enterprises from 18 industries including textile industry, which should **cut down their backward production capacity**. In the next step, carbon emission will be adopted as the one of the key index for enterprises' qualified capacity evaluation.
- **Special funds from the Central Budget and various kinds of allowance and fiscal**

**reward for eco-sustainability technology and projects** are assigned to expedite the structural adjustment of the textile industry. During Y2006-Y2010, the government invested RMB 200 billion on energy conservation and emission as encouraging policies for the enterprises to implement related energy saving projects.

- **Taxation policies allow SMEs** to accelerate the speed of fixed asset depreciation resulted from technology improvement. **SMEs** expense on technology development are allowed to be rebated in calculating the amount of taxable income SMEs, importing equipment and related technologies, corollary components and spare parts for the purpose of constructing and developing projects encouraged by national policies, will be exempted from tariff and import value-added tax (VAT). **Special funds** were also arranged in the fiscal expenditure in supporting **SMEs** to better product quality and save energy through technology modification. The funds will also aim at backing the setting-up of **SMEs** public service technology platform, propping public technology development agencies that are devoted to providing technological services to SMEs.

***Main Problems of China's Textile Machinery Industry:*** Comparison shows wide gap between China's textile industry and its highly advanced international counterparts. It is by far unable to fully meet the needs of the domestic textile industry:

- **Innovation capability is weak.** The bulk of cotton, wool, and hemp, silk and other fiber processing equipments are conventional machinery. For high-end, differentiated, energy-saving products the textile industry still heavily rely on import with an volume up to USD 4 billions, sharing 40% of the domestic textile machinery market.
- **Steadiness of whole set machinery is not rather qualified,** and competence in manufacturing special parts and accessories is weak. USD 0.4 billion worth of auxiliary devices and spare parts were imported in 2008, accounting for 40% of the

domestic textile machinery parts market.

- The **technology of eco-sustainability, modularization, and automation** has not widely covered the related areas of the textile machinery industry.

***Textile Machinery Industry Development Goals:*** Elevate independent innovation capability and product quality; achieve breakthroughs in the technology for designing and manufacturing of knitting loom and shuttle-less loom; increase the market share of domestic-made textile machinery products to 70%; and develop industrial textile machinery and increase its share in the relative market to 30%; Significantly improve state of art of the manufacturing process; In the manufacturing process, rate of Major Pollutants emissions be decreased by 10% and the rate of material utilization be increased from the current 80% to 85%; rate of manufacturing equipment NC application for key enterprises be increased from the current level of 12%-15% to 20%, quality of certain major special parts, corollary components reach international advanced level.

## ■ **China National Textile And Apparel Council (CNTAC)**

- **Roles and Responsibilities:** China National Textile and Apparel Council (CNTAC): CNTAC is the national Federation of all textile-related industries, and is a non-profit organization formed on volunteer basis. The aim of CNTAC is to provide services in the modernization of China's textile industry. Its major responsibilities include: to set up rules and guidelines and supervise, monitor the overall development and performance of the industry, to coordinate with state government with study and research and consultation on development strategy, industrial policy, technical progress, to serve the textile industries on

all required aspects, etc.

➤ **Interviewee:** Yuzhou DU, President of CNTAC

➤ **Key Findings:**

***Industry Overview on Eco-sustainability:***

- The sustainable and rapid development of China's textile industry, characterized by low energy efficiency and high pollution, has posed serious challenge to the sustainability of environment and the industry itself.
- According to official statistics, the industry's total energy consumption reached 68.67 million tons of coal equivalents, annual water consumption amounted to 9.548 billion tons, ranking the second of all the industries on fresh water withdrawal, and wastewater discharge ranking sixth in China's various industries. While the printing and dyeing sector alone accounted for 80% of waste water discharge of the textile industry.

***Actions of Textile Industry on Eco-sustainability:***

- It is very important for the eco-sustainability of the textile industry to develop new processing techniques and equipment, and in the mean time abandon the outdated equipment with high energy consumption.
- For the Printing and Dyeing sector, new techniques and advanced equipment play a decisive role in energy conservation. At present, the sector's equipment is experiencing the problems of low thermal efficiency and high water consumption. The development of advanced, eco-sustainable techniques and equipments, improvement of the outmoded production capacity are currently of primary

importance to the Printing and Dyeing sector, as well as the Textile Machinery Manufacturing sector.

***Standards and Regulations:*** To achieve the cost reduction effects, the relevant state departments have enacted several standards and regulations to provide the basis for the implementation of eco-sustainability including: “Water Withdrawal Quota of Cotton Printing and Dyeing Products (GB/T18916.4-2002)”, “Textile Dyeing and Finishing Industry Waste Water Pollutants Discharge Standards”, “Clean production evaluation index system of printing and dyeing industry (Trial )” , “Cleaner production standard of textile industry (cotton printing and dyeing)” and “Printing and Dyeing Industry Wastewater Pollution Control Technology Policy ”.

#### ■ **China Dyeing and Printing Association (CDPA)**

- **Roles and Responsibilities:** CDPA is organized willingly by enterprises, research institutes and relevant organizations specialized in textile products. CDPA holds various types of activities including academic exchange, consultancy and technological training. The Association coordinates the relations among the textile enterprises and relevant organizations, provides information for them and pushes forward their development. With the principle of science, fairness, efficiency and service, the Association gives advice to the enterprises for their sustainable development, and strengthens the advancement of technology and the core competitive edge of the industry in China.

➤ **Interviewee:** Rexiong Zhu, Director of the Consulting Department

➤ **Key Findings:**

***Comment on “Green Label” Concept:*** There is no such concept for textile machinery existed yet in China. It is a brilliant idea that will for sure lead the future dynamics of the industry. There exists currently vast demand for eco-sustainable equipment in China’s textile industry. To save energy and reduce emission has become the primary concern of the textile industry, especially the printing and dyeing industry for sustainable development. Eco-sustainable textile machinery is a very effective approach to achieve the above goals. As end-users, textile enterprise will be eager to see such machines, and the “green” value of the textile machinery will be a critical factor to influence their buying-decisions.

***Overall Energy and Resources Consumption of Dyeing Industry:***

- Textile industry is heavily tasked with the improvement of eco-sustainability. Its energy consumption, water consumption, waste water discharge account for 4.3%, 8.5% and 10%, respectively, of the country's total industrial resources consumption.
- At present, compared with developed countries, China's textile industry’s energy, water consumption is 1 time higher. Printing and dyeing sector is the major source of inefficient water consumption and waste water discharge. Dyeing along accounts for 30-50% of the sector’s total water withdrawal.

***Emission Reduction Targets of China's Dyeing Industry:*** During the period of the 11th Five Year Plan, the Printing and Dyeing industry has successfully achieved the goals in

reducing the unit GDP energy consumption by 20%, water consumption of unit industrial added value by 30% and total Major Pollutant's emissions by 10%. Through 2009 to 2011, the industry-wide annual targets, viz. unit added-value energy consumption being reduced by 5%, unit industrial added-value water consumption being reduced by 7% and total Major Pollutants emissions being reduced by 7%, shall be fulfilled.

- **Energy Consumption:** According to the latest version of the " Conditions for Entry to Printing and Dyeing Industry," for newly constructed, renovated or expanded projects, integrated energy consumption of a hundred meters of cotton, hemp, chemical fiber and blended fabrics shall be less than 35 Kg of coal equivalent, while for the existing printing and dyeing enterprise, the criterion is 42 Kg of coal equivalent.
- **Sewage Discharge:** The COD content must be less than 1000mg/l before sewage can to be discharged into the Public Sewer Systems. The enterprise which fails to meet the requirement will be fined. Sewage, whether after Public Sewer Systems disposal or otherwise directly discharged into sea, rivers, its ultimate per liter COD content must be less than 150mg. The requirement on sewage discharge is more stringent in the 12th Five Year Plan period, according to the Development Planning. The acceptable ultimate COD content per liter of sewage shall be 80-90 mg, or less.
- **Waste Air:** Up to the present, clearly quantified target on waste air emission in textile industry is not available in China. There exists neither such target on carbon dioxide emission control. Standard and quantified target on Carbon Dioxide emission will be developed in the near future.

*Regulations and Standards on Energy and Water Consumption* includes Methods in Calculating Integrated Energy Consumption of Printing and Dyeing Enterprises and its Quota, Methods in Calculating Water Withdrawal of Weaving and Dyeing Products and its Quota, and Methods in Calculating Water Withdrawal of Knit Dyeing and Printing

Products and its Quota.

## ■ **Responsible Supply Chain Association (RSCA)**

- **Roles and Responsibilities:** The Responsible Supply Chain Association (RSCA): The RSCA is an industry-wide and professional body for the promotion of social responsibilities, which is directly under the administration of China National Textile and Apparel Council (CNTAC). It is composed of enterprises, companies, buyers, retailers and other interested parties within the entire textile supply chain, with an aim at utilizing resources and strengths of multi-stakeholders to promote CSR related ideas and concepts and assisting businesses in raising CSR awareness and improving management practice.
- **Interviewee:** Xiaohui Liang, Lead Researcher of Consulting Department
- **Key Findings:**

***Comment on “Green Label” Concept:*** It is foreseeable that “Green Label” will have a positive role to play as a marketing instrument for further promoting Italian textile machinery. Eco-sustainability is the overwhelming trend for China’s textile industry. CSC9000T or RSCA plays a very critical role in the institutionalization of such concept, and the adoption “Green Labeled” textile machinery can be one of the good options to implement eco-sustainability. Therefore, there is a possibility that RSCA cooperates with the Italian counterparts on the popularization of the “Green Label” concept through co-organized events and workshops to the textile and garment

**enterprises.**

***CSC 9000T Implementation Status:*** Currently there are 200 enterprise implementing CSC9000T (China Social Compliance 9000 for Textile & Apparel Industry). The 113 publicized enterprises consist of 67 garments producers, 27 weaving factories, 9 corporate groups, 7 printing and finishing companies and 3 new materials manufacturers.

***Other Environment Management standards in Application:*** The most widely applied environment management standards in China's textile industry include ISO14000 and Cleaner Production Standards. In terms of water and electricity, coal, oil and gas consumption are under the scan of ISO 14000 standards that enterprises must address.

***Benefit of Implementing CSC 9000T:***

- Assisting businesses in improving their management practice, especially in the CSR management areas of working conditions and HR to enhance core competence.
- Facilitating sustainable development of enterprises, promoting international reputation and image of the enterprises and enabling them to better integrate into the international supply chain.
- Reducing the enterprises operational risks
- Driving Factors for Energy Conservation and Emission Reduction
- Long-term national development strategy
- Policy orientation, law and regulations
- Increasingly stringent standards of international trade
- Internal needs of enterprises for long-term development (particularly for cost

reduction)

## 2. Key Findings: Fabric and Garment Manufacturers

### Survey Scope

- To acquire first-hand information on the ecologically sustainable manufacturing of China's textile industry, Topview spent two weeks contacting about 150 companies on the list of the TOP500 of Chinese Competitive Textile and Garment Enterprises (2009-2010) released by CNTAC. Through in-depth telephone interviews and on-site visits, Topview successfully generated 24 valuable interview results with interviewees distributed mainly in the sub-sectors of fabric, garment, home textile and textile raw material, among which, fabric enterprises make the largest proportion, taking up 41.7% of the total, and the number of garment enterprises ranks the second taking up 33.3% of the total.

No. of Company Contacted	156	Sub-sectors Distribution of the Valid Interviews				
		Total	Fabric	Garment	Home Textile	Textile Machinery
Valid Interview Results Acquired	24	24	10	8	5	1
Valid Ratio	15.4%	Ratio	41.7%	33.3%	20.8%	4.2%

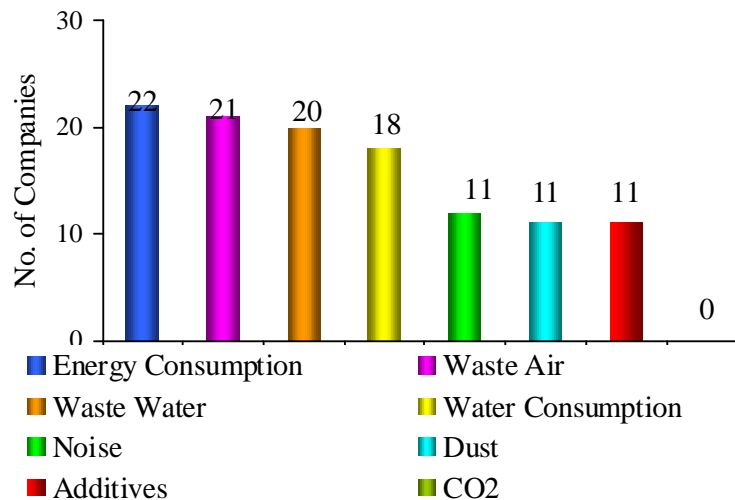
Note: The sub-sectors of the valid interviews are categorized according to the main business of the enterprises interviewed. Most of the enterprises produce more than one product category.

## **Key Survey Findings**

Based on the Client's requirement, the survey mainly concentrates on significant aspects related to eco-sustainability such as key control factors concerned and related limitation methods on environment protection and energy conservation, driving forces for implementing ecologically sustainable manufacturing, critical factors prioritized while purchasing textile equipment, as well as interest in low energy consumption machinery, etc. Below are the detailed data and analysis for the specific aspects according to the results of the interviews.

- ***Key Control Factors on Environment Protection and Energy Conservation:***  
Topview asked the interviewees about their opinions on key control factors for energy conservation and pollutants emission through eight aspects including energy consumption, water consumption, waste water, waste air, carbon dioxide, noise, dust, and additives. Most of the interviewees answered that they had controls on energy consumption, water consumption, waste air emission, and waste water discharge, some expressed they also had controls on noise, dust and additives, but no company monitored and controlled the emission of carbon dioxide. Although some interviewees said they knew about carbon foot print measurement, such as ISO14064, still no company actually adopted and implemented such measurement.

Table: Key Control Factors Concerned



Source: Topview Consulting

- 22 out of 24 companies, i.e. 91.7% of the total chose energy consumption as the key control parameter; 21 companies, 87.5% of the total chose waste air;
- 20 companies, 83.3% of the total chose waste water; 18 companies, 75% of the total chose water consumption;
- 12 companies, 50% of the total chose noise; 11 companies, 45.8% of the total chose dust and chemical additives; No company chose CO2.

- **Energy Consumption:** 91.7% of the interviewees selected energy consumption or electricity consumption, indicating almost every company has incorporated the energy or electricity conservation into their daily operation. And most of the interviewees expressed that, establishing the energy conservation programs are not only for fulfilling the targets set up by the government, but also for saving the operation cost and improving the net profit of the company. Mr. WU from *High Fashion Silk* said in Y2009, they invested RMB 46 million on energy saving programs including textile equipment upgrading (40 million), waste heat recycling (5 million), as well as application of frequency converting technology (1million).

- **Water Consumption:** 75% of the companies interviewed considered water consumption as one of the control factors. Some garment and home textile enterprises which purchase fabric from suppliers expressed that compared with fabric manufacturers their water consumption volume is very low, and the target set up by the government is not difficult to achieve. While for fabric manufacturing enterprises, they do put lots of investment on waste water treatment and recycling to reduce fresh water consumption. In Y2007 *Jiangsu Dan Mao Textile* spent RMB 3.17 million introducing a water recycling system which was able to purify 1000 tons of water generated from the production process. Now by using this system, the company can save 300,000 tons of fresh water each year, and the cost saved from industrial water consumption fee and waste water discharge fee can reach RMB 1 million every year. And Beijing Topnew Group upgraded their dyeing process in Y2009 from traditional overflow dyeing to air flow dyeing, by using the advanced air flow dyeing machine, the process was shortened, and the water consumption was reduced by 40%-50%.
- **Pollutants:** When asking about the control factors on pollutants emission, 87.5% and 83.3% of the interviewees selected waste air and waste water, 50% selected noise, and 45.8% selected dust. Since the Ministry of Environmental Protection and local Environmental Protection Bureaus have strict restrictions on pollutants emission, and industrial enterprises apply to the local Environmental Protection Bureaus each year for Pollutants Emission

Certificates, on which quantified targets about the emission of waste water, waste air, noise and dust are clearly regulated. Therefore, the ratio for different control factors reveals the significance and challenge for achieving the mandatory pollutants emission targets, revealing that compared to noise and dust, waste water and waste air emission control is far more difficult and important for the textile enterprises. The main pollutant targets for *Tiansheng Group* in Y2009 were waste water discharge: 9,122 tons per day, nitrogen oxides emission: 2,082 kg per quarter, SO<sub>2</sub> emission: 8,563 kg per quarter, and dust emission: 2,070 kg per quarter, and the waste discharge fee for the whole year was RMB 7.04 million.

- ***Carbon Footprint Measurement:*** No company has positive feedback when answered about carbon footprint measurement. Among the 24 valid interviews, not a single company has monitor and control on CO<sub>2</sub> emission, and no company is implementing carbon footprint measurement. The measurements on energy consumption and pollutants emission are not unified, and consequently difficult to compare the parameters between different enterprises. When mentioned about *ISO14064* and *PASA2050*, most of the interviewees expressed they have never heard of it. Through desk research, Topview learnt that *Jiangsu Liburui Garment Co., Ltd.* has passed the audit of ISO14064, but the company turned down the interview. Most of the interviewees said they refer to the Emission Standard of Air Pollutants for Coal-burning, Oil-burning and Gas-fired Boiler on waste air emission, and the standard only has specific

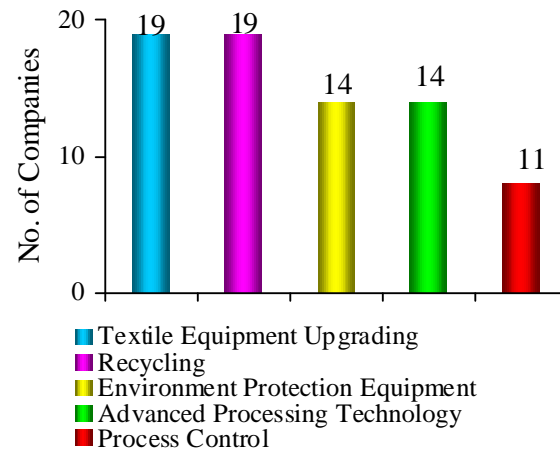
requirements on the emission of polluted air such as CO, NO<sub>2</sub> and SO<sub>2</sub>, etc.

➤ ***Sustainability Standards***: 22 companies have passed the audit of **ISO14000**, the environment management system. 9 of the companies interviewed said they had passed the **Cleaner Production Audit**, a management system generated by Ministry of Environmental Protection to limit energy consumption and pollutant emission; 10 companies said they were implementing the **CSC9000T**, an industry specific management system for social compliance for China's textile and garment industry, established and promoted by Responsible Supply Chain Association (RSCA) of the CNTAC, in which related control parameters on energy conservation and emission reduction are clearly required. But when being asked about Energy Management System, i.e. **ISO50001**, only a few enterprises have heard it, and no company is implementing the system right now. Although China has enacted the national standard- the **Energy Management System-Requirement** (GB/T23331-2009), it is still in trial run within seven industrial sectors including textile industry. As for chemical additives, Chinese enterprises refer to European Standards such as **REACH** and **Oeko-tex Standard 100**.

■ ***Limitation Methods for Pollutants and Energy Consumption***: Topview also asked the interviewees about the limitation methods for the control factors mentioned above, and the answers are categorized into five aspects, i.e. textile equipment upgrading, resource recycling, utilization of environment protection

equipment, advanced processing technology introducing and process control. Among these five methods, textile equipment upgrading and resource recycling are the most popular, and basically most of the budget for energy conservation and emission reduction is invested in these two methods.

Table: Limitation Methods Adopted



Source: Topview Consulting

- 19 companies, 79.2% of the total interviewees adopted Textile equipment upgrading and recycling as the limitation methods on pollutants and energy consumption;
- 14 companies, 58.3% of the total chose environment protection equipment and advanced processing technology; 8 companies, 33.3% of the total chose process control.

- **Textile Equipment Upgrading:** 19 out of the 24 companies, i.e. 79.2% of the total chose textile equipment upgrading. Textile equipment upgrading is most widely adopted because the government has taken a series of measures to enforce the progress of equipment upgrading so as to reduce electricity and water consumption, and improve the efficiency as well. For example, each year MIIT releases *Catalogue of Eliminated Backwards Products and*

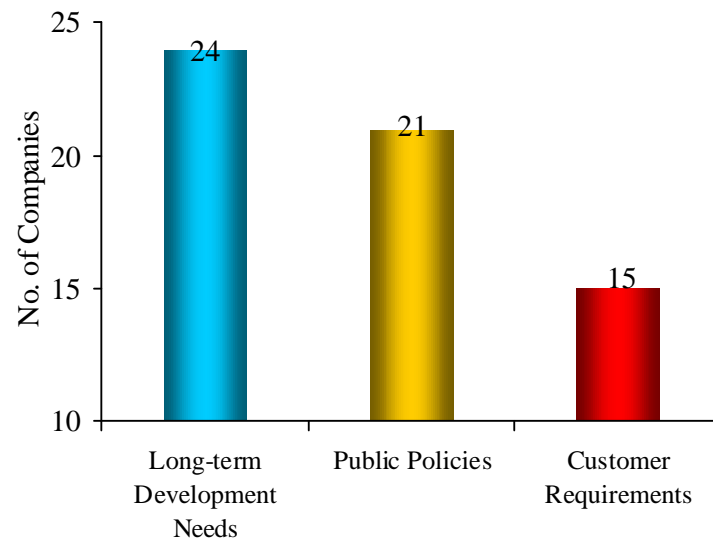
**Equipments** for textile industry to require the enterprises to implement accordingly. Besides, preferential policies such as special funds for purchasing low energy consumption and tax deduction for buying export advanced textile machinery are also enacted to accelerate the equipment upgrading. Among the 24 companies interviewed, 10 companies have received subsidies, 8 have enjoyed tax deductions, and 5 have successfully applied for special fund related to low energy consumption equipment. For example, **Shandong Ruyi** introduced Eco-bloc-X yarn package dyeing machine from THIES (Germany) to replace the domestic dyeing equipment with high water consumption and waste generation. By using this machinery the liquor ratio had decreased from 1:20 to 1:3.5, effectively reducing the water consumption. This project had acquired a RMB 0.5 million of award from the local government.

- **Recycling and Environment Protection Equipment:** 19 companies, 79.2% of the total, and 14 companies, 58.3% of the total adopted recycling and environment protection equipment as the key limitation methods for pollutant emission such as waste water decontamination and re-use as well as waste air filtration and heat recollection. These two methods are also combined together to get the best effectiveness. For example, **HIIT Corporation** upgraded its waste water treatment technology to improve the waste water re-use capability, and after the improvement, the volume of re-use water can achieve 2000t/d. Besides, the company also introduced waste heat recycling system of the setting machine in Y2010, and 60% of the heat can be recycled.

- ***Advanced Processing Technology***: 14 companies, 58.3% of the total chose advanced processing technology, which is also supported by advanced and upgraded textile equipment. This method is also greatly promoted by the government and industry associations because once the advanced processing technology is tested and matured, it can be implemented by the whole industry, and the effects on energy conservation and emission deduction is huge. Therefore, related rewards and preferential policies are also released to encourage technology innovation. It is also written in The ***Twelfth Five-year Plan Outline for Textile Industry's Scientific and Technological Progress*** that, three projects out of fifty are planned to develop key advanced technology on energy conservation and emission deduction should be implemented within the whole industry during the Twelfth Five-year period.
- ***Process Control***: 8 companies chose process control for energy conservation. This is the most cost effective method, but enough awareness of the employees on energy saving and complete management system and processes are necessary to successfully implement this method. For example, to arrange trainings for the employees on key control points identified for environment protection and energy conservation during the production process, as well as related working instructions for the limitation methods. Besides, related performance indicators system and reward system should also be considered to encourage the implementation of the limitation activities.

■ ***The Driving Forces for Sustainable Manufacturing:*** Topview asked the interviewees about their opinions on the driving forces for implementing sustainable manufacturing through three aspects, i.e. for the company's long-term development, for fulfilling public policies and for meeting customers' requirements. Most of the companies interviewed expressed that the three reasons are all driving forces for their efforts on energy conservation and emission reduction, but the significance varies according to the actual situations and development policies of different companies.

Table: The Driving Forces for Eco-sustainability



*Source: Topview Consulting*

- *All of the 24 companies interviewed expressed that they implemented the sustainable manufacturing because they believe it was necessary for the company's long-term development;*
- *21 companies, 87.5% of the total also think they do it for satisfying public policies;*
- *15 companies, 62.5% of the total expressed they implement sustainable manufacturing to meet customers' requirements as well.*

- ***Companies Long-term Development Needs:*** 100% of the companies interviewed believed they implemented eco-sustainable manufacturing because it was necessary for the company's long-term development, and it can be seen from the result of the interview that Chinese textile enterprises are fully aware of the importance of sustainable manufacturing, and they take measures to reduce the energy consumption and waste emission in consideration of the two reasons below:
- ***Cost Saving:*** In order to save the energy and resources, and reduce pollutant emission, the government also established standards on industrial electricity charges and waste water discharge fee. For example, the electricity fee in the peak period of a day is higher than in off-peak period, and if the volume of waste water discharge is higher than the required amount, the company should pay a fine for extra waste water discharged. In Y2009, the electricity consumption of ***New Wide Group*** was 103,111,349 KWH, and the volume of waste water discharge was 1,351,592 tons. The total cost for these two items was industrial electricity was RMB 9.2 million, and that was the result after the company implemented sustainable manufacturing.
  - ***CI and Branding:*** At present, the implementation of social responsibility of a company has become one of the important factors for the consumers to acknowledge its brand apart from the quality and price. They would rather spend more money to buy a “green product” than choose cheap goods but with high energy consumption and pollution. In recent years, Chinese textile industry has been vigorously implementing the CSC9000T, the social responsibility management system so as to

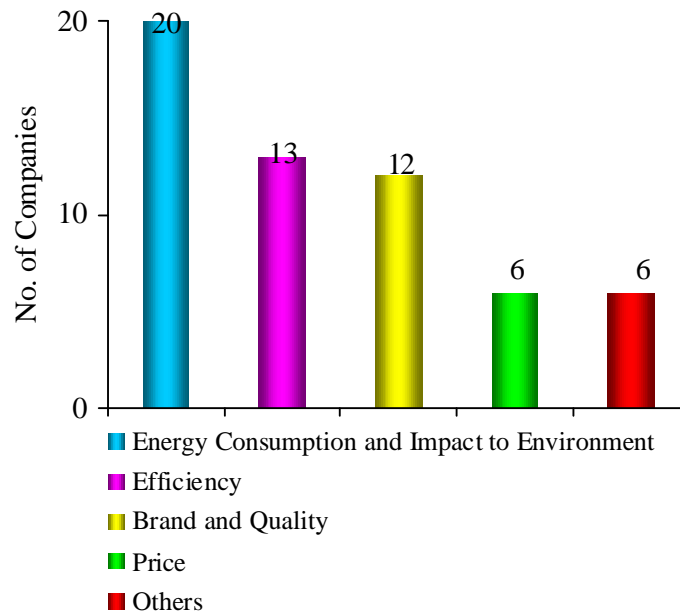
promote the brand construction of China's textile products, encouraging results have been achieved. Now this management system has been recognized by a number of regions all over the world.

- **Public Policies:** 87.5% of the companies interviewed expressed they implement eco-sustainable manufacturing to satisfy public policies. Confronted with huge challenge from the European and North American countries, Chinese government started to push the textile industry to accelerate the restructuring and focus more on energy conservation and environment protection. Since China released the energy conservation and emission reduction targets of the twelfth five-year period and made its commitment of reducing 40%-50% of the carbon emission by Y2020, the government has started to enhance the use of administrative, economic and legal means to continue to drive the enterprises in the energy conservation and environmental pollution control, for example the assignment of energy conservation and emission reduction targets to specific enterprises, the issue of the *Comprehensive Working Program on Energy Saving and Emission Reduction, Cleaner Production Promotion Law*, and *Sustainable Economy Promotion Law*, the collection of waste emission fee, fresh water utilization fee, etc. All these measures forced the enterprises to adopt related actions on sustainable manufacturing.

- **Customer Requirements:** 62.5% of the interviewees said they implemented eco-sustainable manufacturing to fulfill customers' requirements as well. Being a very important textile and garment supplier of the international market, Chinese textile industry is confronted with more and more rigorous entry standards from different regions such as Europe and North America. Recently those standards are more inclined to technical trade measures related to the environment protection and energy conservation. In Y2009, 24 notifications for the recall of Chinese textile and apparel products were released by the U.S., increased by 4.35%. And the recall cases of Chinese textile and apparel products released by the **RAPEX**, the rapid alert system for all dangerous consumer products with the exception of food, pharmaceutical and medical devices reached 213, an increase of 294.4% than in Y2008.
  
- It has become an international trend to label the carbon footprint on the products. So far, Wal-Mart and other large international companies have asked their suppliers to list the carbon footprint of the goods through the whole life-cycle from raw material, manufacturing, transportation & usage to disposal as a reference for consumers to choose environmentally friendly goods. And in Y2009 the European Commission modified the Eco-label Criteria for Textile products and required that to acquire the eco-label the textile product should fulfill related standard on eco-sustainability such as influence to climate change, energy and resources consumption, and waste generation, etc.

■ ***Critical Factors Prioritized While Purchasing the Textile Machinery:*** Topview discussed with interviewees about the prime procurement criteria while purchasing the textile equipment. And the answers include energy consumption and impact upon environment, efficiency, brand and quality, price, equipment adaptability, automation, and equipment life span and maintenance. Most of the interviewees expressed they would consider the equipment's performance on energy consumption and impact to environment before purchasing the machinery.

Table: Critical Factors Prioritized



Source: Topview Consulting

- *20 interviewees, 83.3% of the total said low energy consumption and environmental friendly, 13 interviewees, 54.2% of the total said high efficiency;*
- *12 interviewees, 50% of the total considered that brand and quality are important; 6 interviewees, 25% of the total also thought price is a critical factor;*
- *Three mentioned adaptability, two mentioned automation, and one mentioned equipment life span and maintenance.*

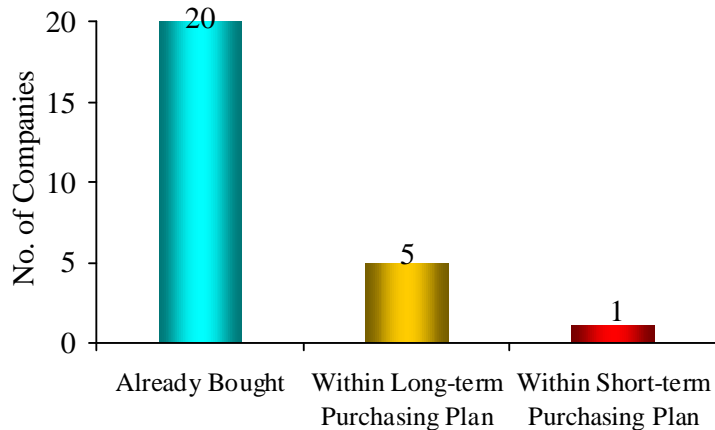
- ***Low Energy Consumption and Environmental Friendly***: 83.3% of the interviewees selected to prioritize energy consumption and impact to environment as one of the critical factors while purchasing the textile equipment, indicating most of the textile machinery end-users have already had enough awareness of the equipment's added value on energy conservation and emission reduction. In addition, Topview learnt from the interview that, most of the companies believed import textile machinery would have better performance on energy saving and environment protection such as low electricity consumption and water consumption, low waste water discharge, low noise, as well as low waste air and dust emission, etc. For example,
- ***High Fashion Silk*** purchased 4 textile equipment from Italy this year, and Mr. Wu, the production manager said advanced equipment with good performance on energy and water conservation and high efficiency is always popular, but domestic machinery still needs to be improved on such aspects compared with similar products imported from overseas. The company often spends a lot of time and efforts studying and researching before making purchase decisions; therefore, they have great interests in knowing detailed information about such advanced equipment.
  - ***WuJiang Fuhua Weaving*** said all the textile equipment used are imported from Japan and France. Recently the company has ordered 2,000 textile equipment from Japan, and the equipment has good performance on energy saving, waste water and waste air emission, as well as noise and dust generation.

➤ ***Other Factors:*** Apart from the level of energy consumption and waste emission, the equipment end-users also tend to take other important factors into consideration, such as the efficiency of the equipment, brand and quality, price, adaptability, product life span and maintenance, etc. Italian textile machinery and similar import equipment is also very competitive regarding most of these key factors mentioned above, which can be seen clearly from the import data below.

- ***Textile Machinery Import in Y2010:*** According to the China Customs, from January to August in Y2010, China imported textile machinery from 54 countries with a total value of US 2.64 billion, up by 63.13% than the same period of last year. The Top-5 export countries and regions include Japan, Germany, Italy, Taiwan and Belgium with a total trade value of US 2.22 billion, taking up 84% of the total, increased by 65.50%. Among the 54 countries, Japan ranks first in exports of the textile machinery to China with a total value of US 824 million, increased by 76.18%.

■ ***Interest in Low Energy Consumption Machinery:*** Topview asked the interviewees about the deployment of the low energy consumption machinery within the company. It is surprised that all the interviewees expressed they were already using such energy saving equipment, and some even said 100% of the equipment used in the company are low energy consumption equipment. In addition, six companies said they still planed to purchase such kind of equipment either in the long term or in the short term to help to company save cost and achieve the target on energy conservation and emission reduction.

Table: Interest in Low Energy Consumption Machinery



Source: Topview Consulting

- *20 companies, 83.3% of the total expressed that they have been using the low energy consumption machinery;*
- *5 companies, 20.8% of the total said they were very interested in the low energy consumption machinery, and it was within their long-term purchasing plan;*
- *1 company expressed they purchased such low energy consumption machinery every year, and it was within their short-term purchasing plan.*

- **Already Bought:** 83.3% of the interviewees expressed that they have been using such low energy consumption machinery, indicating the coverage rate for using energy saving and environmental friendly equipment is rather high in China's textile industry. And most of that low energy consumption machinery is imported from technology-developed countries such as Japan, Italy, Germany and France. From the interview, Topview learns that although China has the capability to produce low energy consumption machinery, the performance and popularity of such equipment still needs to be improved compared with import machinery, and Italian textile machinery has good reputation among Chinese textile machinery end-users in terms of equipment

stability, low electricity consumption, shortened process and low water consumption, etc.

- ***Within Long-term Purchasing Plan:*** Topview, as added-value, has successfully located five potential buyers who showed interests to the energy-efficient textile machinery with green label, and it is within their long-term purchasing plan to buy such equipment. It is highly recommended that further follow-ups and communications be arranged in the near future and keep them in the potential buyer list for the final deal. Topview is in the right position to bridge the business. The five companies include: ***Five Rings (Group) Shareholding Co. Ltd., Ningbo Youngor Worsted Spinning Weaving & Dyeing Co., Ltd., Nantong Dadong Co., Ltd., Shangdong Yinshilai Group CO., Ltp., TEVEL Group.***
  
- ***Within Short-term Purchasing Plan:*** Among the survey, Topview finally identified one textile enterprise, ***Beijing Topnew Group***, who regularly purchases new machinery on yearly basis, and it could be put as one of the primary potential buyers. Ms. Feng from the equipment department said the company made equipment upgrading plans at the end of each year, and purchase related low energy consumption machinery according to the plan and the annual energy conservation and emission reduction program. In Y2009, the company invested RMB 30 million on energy conservation and emission reduction programs.

## ***Section D: Case Studies***

Topview interviewed two textile enterprises, with one being large in size and the other being fast in growth. They embodied two most typical textile enterprises in China. Detailed questions concerning energy-conservation and emission-reduction were asked, and the findings can be carefully studied and taken as the reference for “green label” standard making.

### **1. Case Study I: New Wide Group**

#### **Company Profile**

- *New Wide Group* emerged from New Wide Enterprises Co. Ltd., was established in 1975, and devoted to the manufacture and research of various knitted fabrics with annual turnover of USD 0.4 billion. With 10,000 employees all over the world, and the monthly production capacity of 2,500 tons of knitted fabric, 1,000 tons of dyeing capacity, and 2.5 millions of garments manufacturing, New Wide Group has turned into an international enterprise.
- The company’s worldwide set-up includes overseas knitting and dyeing factories in Hong Kong, Kunshan, Shanghai, Beijing and garment factories in China, Lesotho, Kenya and Cambodia and branch offices in the U.S. As an international

textile and garment supplier, New Wide Group provides products and service for world famous brands and companies such as Puma, Adidas, Liz Claiborne, and Wal-Mart. It also strives to have its own brand with strong ODM ability.

### **Key Control Factors and Targets on Ecological Sustainability**

- The target on energy conservation and emission reduction for the company in Y2009 is, to reduce sewage displacement by 15%, reduce COD emission by 12%, reduce water consumption by 15%, reduce electricity consumption by 12%, and reduce steam consumption by 10%. 85% of the dust generated should be eliminated, and the elimination of SO<sup>2</sup> emission should be 100%. New Wide group successfully achieved the target with the actual consumption and emission listed below:

<b>The Company's Energy and Resources Consumption in Y2009</b>		
Energy and Resources	Total Volume	Target
Raw Water (ton)	955,478	Drop by 15%
Tap Water (ton)	41,860	
Electricity (kHz)	103,111,349	Drop by 12%
Steam	54,295	Drop by 10%
Natural Gas (m <sup>3</sup> )	2,549,480	\
Sewage	1,351,592	Drop by 15%
Ton of Coal Equivalent (TCE)	10,748	\
COD Emissions (T/A)	68	Drop by 12%

## **Limitation Methods and Achievements for Eco-sustainable Manufacturing**

New Wide Group invested RMB 4.74 million in Y2009 to implement energy conservation and emission reduction projects, which include the use of frequency conversion technology, introduction of the condensation and cooling water recycling system and boiler waste heat recycling system, development and optimization of the Refining & Dyeing Single Bath Process for cotton / OP fabric and Dyeing & Washing Single Bath Processes for polyester fabric, installation of waste gas purification device and waste heat recycling system for the finishing machine, utilization of natural gas for boiler fuel, etc.

- ***Electricity Consumption:*** By shortening the Refining & Dyeing and Dyeing & Washing Single Bath Processes for cotton/OP fabric and polyester fabric, the electricity consumption can be reduced by 20-30%. By implementing frequency conversion technology at each dye vat's power systems, the electricity consumption can be reduced by 30-35%. In addition, the company also adopted solar panels, wind power generators to cut the power use.
- ***Water Consumption:*** The utilization of the Condensation and Cooling Water Recycling system reduced the water consumption by 15%, and the development and optimization of the Refining & Dyeing Single Bath Process for cotton / OP fabric and Dyeing & Washing Single Bath Processes for polyester fabric reduced the water consumption by 20%-30%. The total volume of the recycling water

reached 446,000 tons, taking up 30% of the whole year's water consumption.

- ***Steam and Natural Gas Consumption:*** The energy efficient waste heat recycling system for the boiler can recover the heat of the dust and gas in the heat pipe, which can reduce 2,850 tons of steam consumption, shorten the heating time and improve the efficiency. The installation of the dust and gas waste heat recycling system in the finishing process can help save 142,066 m<sup>3</sup> of natural gas annually.
- ***Waste Water Discharge:*** The establishment of waste water adjustment and sedimentation tank can deal with 800 tons of waste water per day, and the company also invested RMB 0.8 million to install the online monitoring device. In addition, the Condensation and Cooling Water Recycling system can reduce 15% of waste water discharge, the Refining & Dyeing Single Bath Process for cotton / OP fabric can reduce 30% of waste water discharge, and the Dyeing & Washing Single Bath Processes for polyester fabric can reduce 5% of waste water discharge. In Y2009, the total waste water discharge was 1,351,592 tons, down by 15.2%, and the total payment for the waste discharge fee was RMB 2.7 million.
- ***Waste Air and Dust Emission:*** The installation of the Gas Purification System for the Finishing Machines (installation in process) helped to deal with hazardous substances such as dust and aldehyde. And the transformation of the boiler to use natural gas as the fuel successfully eliminated the emission of SO<sub>2</sub>.

## Case Study Summary

New Wide Group invested almost RMB 5 million on energy conservation and emission reduction. They made energy-saving efforts in different aspects including raw water, tap water, electricity, steam, natural gas, waste water and COD emissions. What's more, the company also adopted solar panel and wind power generators to cut the power use. It is believed that the larger textile producers with better overall business strength like New Wide Group have been already working on adopting energy-saving technology and machinery, and the expenditures would remain unchanged in the foreseeable future. With strong revenue performance and financial support, this type of the enterprises is early-adopters of more advanced technology and equipment to ensure itself the leading position in the textile industry, and they can be deemed as the focus of potential “green labeled” machinery buyers.

## 2. Case Study II: High Fashion Silk (Zhejiang) Co., Ltd.

### Company Profile

- *High Fashion Silk (Zhejiang) Co., Ltd.* is a respected silk textile and garment manufacturer servicing retailers and importers on a globally basis since its inception in 2002. The company specializes in upper tier, women and men product, woven silk and knitwear, sportswear, intimate apparel, neckwear and home

furnishings and textiles. The company has modeled itself after the finest manufacturing facilities in Italy, and offers Italian techniques and finishing capabilities in China on a low cost basis. Employing 2,000 staff and annual turnover of RMB 0.1 billion, the company has experienced rapid growth and earned a leadership role in the textile and garment manufacturing community in China and around the world.

### **Key Control Factor and Targets on Ecological Sustainability**

- The company has established specific requirements on eco-sustainable manufacturing through the four aspects listed below:
  - ***Waste Water:*** To be equipped with sufficient sewage treatment equipment, to test the water discharged regularly to ensure the pH value and COD content of the wastewater meet the second level requirement of the "***Integrated Wastewater Discharge Standard***"(GB8987-1996), i.e. pH value is 6~9, and COD content is below 120mg/L.
  - ***Waste Air and Dust:*** To eliminate outdated production capacity and purchase new advanced textile machinery with low waste air and dust generation. To regularly test the waste air and dust generated by the boiler to ensure the density of the SO<sub>2</sub> and dust meets the time period II second zone requirement of the "***Emission Standard of Air Pollutants for Coal-burning, Oil-burning and Gas-fired Boiler*** " (GB13271-2001), i.e. SO<sub>2</sub> density is below 900 mg/m<sup>3</sup> , and dust density is 120mg/m<sup>3</sup> .
  - ***Noise:*** To eliminate outdated production capacity and purchase textile machinery with low noise generation, and make sure the noise figure is in line with the third level requirement of the "***Emission Standard for Industrial Enterprises Noise at Boundary***"

(GB12348-2008), i.e. below 65 dB(A) during the day, and below 55 dB(A) at night.

- ***Energy Conservation and Emission Reduction:*** To implement Cleaner Production, enhance technological innovation, eliminate outdated technology and equipment, and purchase advanced textile equipment both home and abroad to reduce electricity, water and steam consumption.

### **Limitation Methods and Achievements for Eco-sustainable Manufacturing**

- ***Electricity Consumption:*** RMB 0.67million was invested to install the Terminal Electricity Economizer, and 510,000 kWh of electricity can be saved each year, reducing RMB 0.35 million of electricity fee. In addition, the frequency converting system adopted for the dyeing machine can adjust the power according to the actual output, and reduce 50,000 kWh of the electricity consumption each year.
- ***Water Consumption:*** RMB 0.5 million was invested to establish the waste water recycling system, saving 0.69 million tons of raw water each year, and the recycling ratio can achieve 40%. In addition, the textile equipment upgrading and utilization of advanced equipment also helped the company to save a great deal of water, and reduced waste water discharge as well; the cost saved on this program can reach RMB 1.47 million each year.
- ***Coal Consumption:*** The boiler waste heat recycling system can save 155 tons of ton-coal equivalent, down by 8-10%, saving RMB 0.1 million each year. Besides, the solar power and waste heat recycling system can also reduce 1500 tons of coal consumption.

- **Waste Air:** By using the solar power and waste heat recycling system; 30 tons of SO<sub>2</sub>, 3.75 tons of dust and 67.5 tons of CO<sub>2</sub> can be reduced each year.

<b>The Energy Conservation and Emission Reduction Measures Adopted</b>					
<b>No.</b>	<b>Equipment Introduced</b>	<b>Amount</b>	<b>Recycling Proportion</b>	<b>Energy or Resource Saving than Regular Equipment</b>	<b>Investment (RMB)</b>
1	Solar Power and Waste Heat Recycling System	6000	60%	1500 tons of coal, 30 tons of SO <sub>2</sub> , 3.75 tons of dust and 67.5 tons of CO <sub>2</sub> can be reduced each year	5 million
2	Ground Source Heat Pump Air Conditioning System	1000	\	40% of the electricity consumption can be saved	0.32 million
3	BF Series Cooling Fan with Low Noise and Low Energy Consumption	8	60%	the noise and 5-10% of the electricity consumption can be reduced	0.5 million
4	Recycling Water Spray System	80 tons	40%	0.69 million tons of raw water can be saved each year	\
5	Terminal Electricity Economizer	1	\	6% of the electricity can be saved	0.67 million
6	Energy Saving Lamp	7000	\	10% of the electricity can be saved	0.21 million
7	Dust Desulfurization Equipment		\	Dust Desulfurization Ratio: 50%	60 thousand
8	Chimney Waste Heat Recycling System		\	5% of the coal can be saved	78 thousand
9	KO Series Equipment Elimination	100	\	\	\
10	Outdated Weaving Machine Elimination	250	\	\	\
11	Advanced GD Twisting Machine	200	\	20% of electricity consumption, 10-15% of water consumption, and 15-20% of waste water generation can be saved	60 million
12	Advanced Rapier Dobbies	102	\		40.8 million
13	Advanced Jacquards	50	\		40 million
<b>Total Investment</b>					<b>147.78 million</b>

## **Case Study Summary**

High Fashion Silk (Zhejiang) Co., Ltd. is relatively a younger but fast-growing company with domestic and international businesses, and it is also a loyal follower of “Made-in-Italy” textile machinery, and spent more than a million of RMB on different energy-saving and emission reduction technology and equipment such as solar power & waste heat recycling system, ground source heat pump air conditioning system, cooling fan with low noise, recycling water spray system, terminal electricity economizer, energy saving lamp, dust desulfurization equipment, chimney waste heat recycling system, replacing outdated weaving machine, using advanced jacquards.

There are dozens of such kind of textile product producers in China and they are dynamic with ambitious goals to become the emerging challenger for the existing market dominators, so they have good appetite for better technology and machinery in order to be more competitive. Though spending less on energy-saving and emission-reduction technology compared to the larger enterprise, they could be the main buyers of the “green labeled” machinery in the future. To keep close attention on these types of textile enterprises is a wise choice.

## ***Section E: Conclusions and Recommendations***

### **1. Executive Summary**

Being the world's *largest exporter* of textile products, China is also the *largest market* in the developing countries at the same time. There are 54,100 larger textile enterprises in Y2010 with workforce up to 10.88 million workers across the country, which suggests textile industry is one of the *backbone industries* in China. The annual growth rate of output value from Y2006 to Y2010 averaged at 19.36%, and it is predicted that the output value of Y2010 may exceed Euro 440 billion. The development of the textile industry in the near future is still very promising thanks to the local people's pursuit of better life quality and increasing disposable income.

To ensure eco-sustainability, the textile industry has been promoting cleaner production and energy-efficiency all these years, but according to national statistics, the energy consumption level remains high and more efforts are expected to invest in the upcoming 5 years (Y2011-Y2015). With the enhanced awareness of energy conservation and environmental protection, the textile industry has attached more importance to *eco-sustainability* in various aspects including cost, export, corporate social responsibility and brand building, etc. Therefore, China's textile industry has established strategic action plans to implement *eco-sustainable manufacturing* of

textile products. Italian “green labeled” textile machinery is **one** of the *good options* for local fabric and garment producers to *reach the energy-conservation targets*. It has every reason to believe that the Chinese government and enterprises will show their respects to “green labeled” machinery from Italy.

It is confirmed by Topview’s interview on government/associations and enterprises that green textile technology or energy-efficient textile machinery is the key factors to keep sustained development of textile industry in the future, and the “green label” might be a good catalyst for Chinese textile products to be accepted by the international markets.

■ **From the Governmental Level:**

- *Eco-sustainable target in the “12<sup>th</sup> Five-year Plan”*. Enunciated in the country’s “12<sup>th</sup> Five-year Plan”, energy conservation and emission reduction has become a basic national policy and a guideline for long term, sustainable development. Besides, energy conservation and emission reduction target will also be assigned to individual enterprises, and 80% of enterprises will be put under monitoring to fulfill respective quantified targets.
- *Elimination of Outdated Capacity*. According to the recently released the “Notice of the State Council on Further Strengthening the Elimination of Backward Production Capacity”, for enterprises which failed to complete the

elimination, no credit support shall be provided by any financial institutions, no capacity expansion projects shall be approved by the government, and the production license and safety production license shall be withdrawn, and power supply shall be stopped if necessary. The acceleration of eliminating the outdated capacity and related measurers taken to ensure the implementation of the enterprises brought a great opportunity for expanding the market of the eco-sustainable textile machinery.

- ***Financial Incentives Supporting Eco-sustainability.*** The government is using the administrative, economic and legislative methods to ensure the accomplishment of related targets on energy conservation and emission reduction. For example the quantified energy saving and emission reduction targets assigned to emphasized enterprises, the adoption of “green credit”, the exploration on the carbon tariff concept and domestic carbon trading, the establishment of laws on sustainable development and enforcement mechanism, as well as related special fund and awards for purchasing low energy consumption equipment and adopting advanced technology on energy conservation and environment protection.
- ***Further Improvement of the Eco-sustainability Measurement Mechanism.*** As the indispensable underpinning of eco-sustainability, more effort will be put on the establishment of the standardization as a general reference and calculation measurement for enterprises’ energy management. Based on the current

situation of the lacking of energy and cost calculation measurement, the work of the energy management standards will focus on establishing energy consumption and cost calculation standard, and energy balance testing standard for emphasized industries including textile, coal, steel, construction material, and paper making, etc. In addition, China's Energy Management System-Requirement (GB/T23331-2009) has also been established and piloted with the seven emphasized industries with high energy consumption and high pollution including textile industry. This energy management system is intended to be used as a benchmark for the enterprises and to improve the energy management efficiency.

- ***The Existing Green Label in China:*** Currently there are two kinds of green labels existed in China. Although none of these labels are applicable for textile machinery so far, it reveals a trend for the demand of eco-sustainable certification and qualification, and related criteria and implementation methods can also be referred to for the eco-sustainable label of the Italian textile machinery.
  - ***China Environmental Labeling.*** Currently a total of 56 product categories can be certified for the qualification of such green label through individual criteria established as national standards.
  - ***Energy Efficiency Label.*** Regulations and criteria have been established for the administration and implementation. This label is used to identify the

energy efficiency level of the energy consumption equipment and provide related parameters on energy consumption for the consumer. Currently 25 kinds of equipment must be labeled before they can be put into the market.

➤ *Comment on the “Green Label” concept:*

- There is no such concept for textile machinery existed yet in China. It is a brilliant idea that will for sure lead the future dynamics of the industry, and it is foreseeable that “Green Label” will have a positive role to play as a marketing instrument for further promoting Italian textile machinery. The “green label” will also erect new standards for China textile machinery industry and bring it forward as well. The adoption “Green Labeled” textile machinery can be one of the good options to implement eco-sustainability. Therefore, there is a possibility that Chinese industry associations cooperate with the Italian counterparts on the popularization of the “Green Label” concept through co-organized events and workshops to the textile and garment enterprises. As end-users, textile enterprise will be eager to see such machines, and the “green” value of the textile machinery will be a critical factor to influence their buying-decisions.
- However, to be convincing, there must be clarified parameters, for instance, indicators such as energy consumption, water consumption, waste water discharge, green house gas emission, noise and dirt must be quantified. These quantified indicators will make the labeled machines comparable to the

non-labeled ones. In addition, promoting such “Green Label” will be a huge and systematic project, and various kinds of textile machineries will make it difficult to set up quantified standards.

■ **From the Machinery End-user Level:**

- ***Ever Increasing Awareness on Eco-sustainable Manufacturing.*** As one of the seven industries with high energy consumption and pollution, and one of the most important supplier of the international textile and garment market, China’s textile industry has been constantly receiving concept and information on the importance of energy conservation and emission reduction. Eco-sustainable development is considered to be a long-term development strategy for most of the textile enterprises, and the fulfillment of corporate social responsibility including specific requirement towards energy saving and environment protection are believed to be beneficial for the companies brand building.
- ***Requirements on Specific Parameters for Eco-sustainable Machinery.*** Through in-depth interviews with the textile machinery end-users, Topview found out, although most of the enterprises have already purchased and utilized such low energy and resources consumption equipment, they did not have a clear clue about the actual energy and resources saved and related cost reduced by using such equipment than using the regular machinery. It shows that there is not a unified calculating method or criteria for the end-users to refer to, so that

they can know clearly about the specific and quantified parameters of the machinery on electricity consumption, water consumption, steam consumption, and waste water discharge, etc., which can greatly help the enterprises on energy and environment management.

- ***Comments on China's Low Energy Consumption Textile Machinery.*** A few domestic printing and dyeing equipment manufacturers represented by Jiangyin Found Dyeing & Printing Machinery Co., Ltd. ([www.efuda.com.cn](http://www.efuda.com.cn)), Jiangsu Red Flag Dyeing Machinery Co., Ltd. ([www.redflagcn.com](http://www.redflagcn.com)), and Shaoyang Textile Machinery Co., Ltd. ([www.syefj.com](http://www.syefj.com)) have developed and produced a variety of eco-sustainable dyeing and printing equipment such as high temperature and pressure air flow dyeing machine, open-width continuous washing machine and open-width continuous pre-treatment machine, etc. However, compared with import equipment from Japan, Italy, Germany and France, the performance of the domestic equipment can still be further improved in terms of efficiency, electricity and water consumption, and water recycling function, etc.
- ***Comment on the "Green Label" concept:*** The "green label" of the textile machinery and its underlying criteria can help the company to monitor the energy and resource consumption and the influence on the environment during production, so as to provide evidence to the eco-sustainability of the production process and its products. While some interviewees expressed their concern that,

there are many categories and types of textile machinery, and even for the same equipment, the energy and resource consumption parameters may vary a lot according to different material processed. Therefore it will be difficult to calculate quantified and referable parameters for each type of textile machinery.

*According to the overall industrial backdrop and the interviewed feedback, the “green label” is a very good concept, and the “ecologically sustainable machinery” concept can facilitate its recognition and popularity in China. However, it is still the case that the Chinese enterprises are sensitive to the price, knowing that “the benefit comes, after all, from a price one has paid”. If the price difference of the “green labeled” textile machinery and “non-green-labeled” one is not that sharp, the Chinese textile enterprises would tend to buy the labeled machinery, and if the price gap is conspicuous, then they will be very reluctant to upgrade the existing machinery. To be more specifically, among the larger textile enterprises with strong financial strength, they are more likely to buy the “green labeled” textile machine because they are willing to pay the dues for gaining better enterprise image and improving their CSR status. To the contrary, the SMEs of textile industry usually take cost as their top concern to survive in Chinese textile market full of fierce competition.*

*All in all, the “green labeled” textile machinery is facing more opportunities rather than challenges in virtue of the government-given-pressures for enterprises on energy-conservation, increasing awareness of CSR and potential foreign trade challenge of “green barrier”.*

## 2. Suggestions and Recommendations

It is worthy of the efforts to cultivate local textile industry to accept the Italian “green labeled” machinery by constantly delivering the hints that Italian “green label” could be a long-term cost-effective solution to implement eco-sustainable manufacturing and fulfill the industrial policies and standards. Besides, it can also be the life-saving ticket for the local textile product producers to get through the trade tunnel blocked by “green barriers” in American and European countries because the “green barrier” is the real and looming threat confronting Chinese textile product exporters. The suggestions listed below can effectively help “green label” get widely acceptance by the local textile machinery end-users.

### **Maintain Close Relationship with Related Government Bodies**

China adopts different political and legal regime from the western countries and the understanding of the political-economic and cultural characteristics difference is crucial to ensure a successful presence and long-term development in China. China is making every effort to rule by law, but it is still the case that anything is possible if the government wants to make it happen.

- To get connection with the governments at various levels who are responsible to make the implementation regulations might greatly facilitate the “green label” marketing in China while authority-based regulations have mandatory effectiveness after all.

- If the “green label” standard includes most of the parameters stipulated in the existing laws and regulations concerning Chinese textile industry, the Chinese government would be more willing to accept and support it;
  - It is recommended that the “green label” standard be higher/stricter (and reachable by local enterprises) than the local one, and it will also greatly boost the possibility of recognition from Chinese government.
  - To lobby the government to grant tax/subsidy incentives to the enterprises using “green label” textile machinery will make the “green label” more attractive.
- 
- Accessibility of the incentives on taxation and subsidies not only requires profound knowledge and deep understanding of the policies set forth by different levels of government authorities, but also heavily depends on skills to build “guanxi” (networking) with relevant government, given that the incentives are sometimes ambiguously stipulated and there always exists certain flexibility for implementation, and this gives the possibility of applying incentives for those who decide to use Italian “green labeled” machinery.
  - To locate those who may influence the policy-maker and have full communications with them will keep the “green label” standard making on the right track. The ex-government official and opinion leader in prestigious university are the very persons the government tends to resort to when mapping out new general laws and industrial regulations.

## **Strategically Cooperate with Potential Business Partners**

Industrial associations are usually funded by the related government departments and their affiliated members. Medium and large enterprises normally join in the related industrial association. The association provides information service, consulting and advisory service for their members, and they are very active in organizing exhibitions, seminars, workshops and other promotional activities.

Co-operation with professional associations is important for popularizing the “green label” concept and representative textile machinery in China. When the associations believe a certain product is good, they will recommend the product to their members and clients. A commonly used approach is to convince a few researchers to publish articles in favor of the Italian low energy consumption textile machinery. Most associations have their own publications or websites to introduce new and advanced technologies, machinery and know-how.

- ***China National Textile and Apparel Council (CNTAC)***: CNTAC is the national Federation of all textile-related industries, and is a non-profit organization formed on volunteer basis. The aim of CNTAC is to provide services in the modernization of China's textile industry, and the responsibilities of CNTAC include:
  - Work out the guidelines & rules to supervise the performance of the industry, set up & improve the self-discipline working system, and protect the interests of the industry.

- Study and research the development and growing trend of the domestic and international textile industries, and participate in or provide consulting services for the various work in aspects of developing strategy, industrial policy, technological progress & upgrading, bridge the enterprises with the government, make recommendations & reports to the government, and provide information & consulting services for the enterprises.
- Carry out the international technical & economic co-operation and interchanges, conduct international visits, in-service education & training; and organize trade meetings, international conferences, and exhibitions to expand the markets.
- Participate in working out & amending the industrial standards and organize the relevant resources to implement these standards.
- Edit and print out various textile publications, hold various courses for professional training, and undertake the various tasks entrusted by government.

■ ***The Responsible Supply Chain Association (RSCA)***: RSCA is an industry-wide and professional body for the promotion of social responsibilities, which is directly under the administration of China National Textile and Apparel Council (CNTAC). It is composed of enterprises, companies, buyers, retailers and other interested parties within the entire textile supply chain, with an aim at utilizing resources and strengths of multi-stakeholders to promote CSR related ideas and concepts and assisting businesses in raising CSR awareness and improving management practice. The responsibilities of RSCA include:

- Focus on putting the CSR ideas and concept into practice so as to primarily protect workers' rights and enhance capacity building of businesses for sustainable development.

- Improve textile enterprises' awareness of social responsibility, and make enterprises aware the impact of social responsibility performance on business operations. Help the enterprises to understand the requirements of CSC9000T management system, and assist enterprises to establish, implement, maintain, and continually improve the CSC9000T management system.
  - Provide specific training or consulting services according to the actual requirements of enterprises on environment management, human resources management, occupational health and safety management, risk management, organizational culture management, etc. The purpose is to enhance the core competitiveness through improving the general management skills.
  - Promoted understanding and cooperation with international institutions and associations through different channels and ways to create a favorable environment on the international supply chain for the industry to fulfill its social responsibilities.
- ***China Textile Machinery Association (CTMA)***: CTMA is a social economic group constituted voluntarily by the manufacturers, enterprises and scientific research institutes in the textile machinery and accessories industry of China. CTMA is the only nationwide professional association in the textile machinery industry of China as well as a trans-regional and trans-departmental organization of the whole industry comprising various economic compositions. CTMA has a broad contact with the worldwide textile machinery industries and keeps friendly relationships with the chief textile machinery associations and manufacturers around the world. The responsibilities of CTMA include:

- Submit the proposals to the state government in terms of the planning, economic and technology policy, technical standards and economy legislation for the industry.
- Study and research the development trends of the domestic and overseas markets, summarize and exchange continuously the experiences of the management-system-reform and establishment of the modernizing for the industrial enterprises.
- Promote and spread the advanced method of management and scientific research results, industrial technology progresses and improve the industrial management standard.
- Establish the closed relations with international non-government organizations, carry out the international technical and economic cooperation and interchanges, sponsor and participate in the textile machinery exhibitions, provide consulting to enterprises on import and export, foreign capital introduction and utilization, advanced technology introduction and utilization, and unify the standpoints of enterprises at the initial stages.
- Organize to constitute the industrial regulations and conventions, and supervise the enterprises activities in according with the regulations and conventions.

The professional industrial associations are familiar with all the polices, laws and regulations related to energy conservation and environment protection, strategic cooperation between Italian textile machinery industry and Chinese associations can ensure the criteria of the “green label” to best fulfill the specific requirements. In addition, the various channels that those industrial associations possess to approach the targeted customer groups are extremely valuable for the popularization of the “green label” and related machinery in China.

## **Take Full Advantage of Effective Marketing Tools**

To appropriately choose the most effective marketing tools is also very crucial for quickly approaching the targeted customers at the most coverage and successfully delivering the “green label” concept. Since the “green label” and the low energy consumption machinery that the concept is attached to have a relatively concentrated and clear targeted audience, i.e. the textile and garment manufacturers, it is highly recommended that the marketing tools selected should be specialized and constantly used by the targeted audience. And as a reference, some of the useful approaches are listed below:

- ***Trade Shows:*** Trade shows represent a significant opportunity to enhance brand and product visibility, promote new and existing products, generate leads and drive incremental sales. In addition, show participation enables the company to stay on top of the latest industry trends, make key industry contacts, and further solidify relationships with current customers. By participating within the major domestic textile machinery trade shows, the message of the “green label” concept and representative low energy consumption and environmentally friendly equipment can be easily conveyed to a large amount of machinery end-users. Furthermore, it is also a great opportunity to set up “green labeled” textile machinery as the industry trend so as to initiate much more impact among the whole industry. The major textile machinery trade shows organized in China in Y2010 include:

- ITMA ASIA + CITME (Shanghai ) (<http://123.196.114.101/>)
- Canton Textile Machinery (Guangzhou ) ([www.cantontex.com.cn/en/default.asp](http://www.cantontex.com.cn/en/default.asp))
- China West International Equipment Manufacturing Exposition ([www.cwieme.com/xian/](http://www.cwieme.com/xian/))
- China (Qingdao) International Textile Equipment Exhibition (TEXqingdao)
- China (Chongqing) International Textile Equipment Exhibition
- China (Inner Mongolia) Textile Machinery and Knitting Equipment Exhibition
- Yiwu International Exhibition on Hosiery, Knitting, Dyeing & Finishing Machinery

■ **Internet:** The internet is becoming a more important source of information within China. According to the latest survey by the China Internet Network Information Center (CNNIC), the number of Internet users (those using the Internet for at least one hour per week) has surpassed 300 million in China. With the rapidly growing popularity of computers and the internet in China, many professional websites have increasingly become an important source for Chinese companies to obtain information on textile equipment in China. Some professional information providers are listed below:

- [ctei.gov.cn](http://ctei.gov.cn), sponsored by CNTAC
- [www.cntma.com](http://www.cntma.com), sponsored by CTMA
- [www.cttm.net](http://www.cttm.net), established by Zhejiang Huarui Information Technology Co., Ltd.
- [www.ttmn.com](http://www.ttmn.com), established by Wuhan Wangxin Technology Co., Ltd.
- [www.textile.hc360.com](http://www.textile.hc360.com), established by hc360.com

■ **Magazines and Newspapers:** The professional journals and magazines sponsored

and published by related industrial associations is a cost-effective way of marketing for the green label and low energy consumption machinery. Advertorial articles themed on Italian standard “green label” on textile industry media, seminar of green textile products and other dissemination and publicity tools can be good try to root the concept to the government that “green label” may help accelerate the pace of “local textile industry upgrading”; to the enterprises that “green labeled textile machinery” leads to cost-efficient, energy-efficient, production-efficient, and even market efficient results; and to the end-user that textile products made by “green labeled textile machinery” is the name of quality and provided by CSR-conscious enterprise. The leading magazines and newspapers for textile machinery industry include:

- China Textile, journal of CNTAC, directed and published by CNTAC
- China Textile Leader (CTL), sponsored by CNTAC and published by CTIC
- Textile Machinery, supervised by CNTAC and published by CTMA
- China Textile Machinery Information, internal publication of CTMA for its members
- China Textile News-Textile Machinery Weekly ([www.zgfzb.net.cn](http://www.zgfzb.net.cn))

*All those marketing approaches and market communication channels will provide great opportunities for promoting the “green label” and eco-sustainability concept to the targeted textile and garment enterprises, especially when the use of those marketing tools combines with the cooperation with related government bodies and associations to take advantage of related public polices and enlarge its influence.*

## Section F: Appendix

### 1. Interviewee Profiles

#### Government Bodies and Associations

Name	National Development and Reform Commission 中华人民共和国发展与改革委员会	
Contact Info	Name	Mr. LU
	Title	Chief of Energy Saving and Emission Reduction Department
	Tel.	+86 10 68505689
	Fax.	+86 10 68505689
	E-mail	
	Web.	<a href="http://hzs.ndrc.gov.cn/">http://hzs.ndrc.gov.cn/</a>
Add.	South 38, Yuetan Street, Beijing PC: 100824	

Name	Ministry of Industry and Information Technology 中华人民共和国工业和信息化部	
Contact Info	Name	Hongliang LI
	Title	Department of Energy Saving and Emission Reduction
	Tel.	+86 10 68205360
	Fax.	+86 10—68205360
	E-mail	
	Web.	<a href="http://jns.miit.gov.cn/">http://jns.miit.gov.cn/</a>
Add.	Xichangan St. 13, Beijing PC:10084	

Name	Ministry of Environmental Protection 中华人民共和国环境保护部	
Contact Info	Name	Mr. JIANG
	Title	Chief, Department of Environmental Technology
	Tel.	+86 10 6655 6220
	Fax.	
	E-mail	
	Web.	<a href="http://www.mep.gov.cn">http://www.mep.gov.cn</a>
	Add.	Xizhimennei Nanxiaojie 115, Beijing PC: 100035

	China National Textile And Apparel Council 中国纺织服装协会	
Contact Info	Name	Yuzhou DU
	Title	President of China National Textile and Apparel Council
	Tel.	+86 10 85229207
	Fax.	+86 10 65129545
	E-mail	<a href="mailto:cdpabeijing@sina.com">cdpabeijing@sina.com</a>
	Web.	<a href="http://www.cdpa.cn">www.cdpa.cn</a>
	Add.	Dongchangan St. 12, Beijing PC:

Name	China Dyeing & Printing Association 中国印染协会	
Contact Info	Name	ZHU Rexiong
	Title	Consulting Director
	Tel.	+86 10 85229329
	Fax.	+86 10 85229365
	E-mail	<a href="mailto:cdpabeijing@sina.com">cdpabeijing@sina.com</a>
	Web.	<a href="http://www.cdpa.cn">www.cdpa.cn</a>
	Add.	DongChangan St. 12, Beijing, China PC:

	The Responsible Supply Chain Association 中国纺织工业协会社会责任建设推广委员会	
Contact Info	Name	LIANG Xiaohui
	Title	Lead Researcher
	Tel.	+86 10 85229734
	Fax.	+86 85229733
	E-mail	<a href="mailto:info@csc9000.org.cn">info@csc9000.org.cn</a>
	Web.	<a href="http://www.csc9000.org.cn/en/">http://www.csc9000.org.cn/en/</a>
	Add.	RM 294, DongChangAn St. 12, Beijing PC: 100742

## Textile and Garment Manufacturers

*Note: “■” represents options selected by the interviewees.*

Company Profile	Five Rings (Group) Shareholding Co. Ltd. 陕西五环（集团）实业有限责任公司	
	Business Scope: Garment and Home Textile	Turnover: 1.6 Billion RMB
	Founding Year: 1957	Location: Shǎn-Xi
Interviewee Info	Name: Mr. XIAO Jian	Title: Deputy General Manager
	Tel.: +86 29 83585289	Fax. +86 29 83224230
	E-mail: whfz@whfz.com	Website: www.whfz.com/
	Address: West Street 158, Textile City, Eastern Outskirt of Xi'an, Shǎn-Xi Province. PC: 710038	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input checked="" type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input checked="" type="checkbox"/> Noise <input checked="" type="checkbox"/> Dust <input checked="" type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input checked="" type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input checked="" type="checkbox"/> Textile equipment Upgrading <input checked="" type="checkbox"/> Advanced processing technology <input checked="" type="checkbox"/> Process control <input checked="" type="checkbox"/> Environment protection equipment <input checked="" type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input checked="" type="checkbox"/> High efficiency <input checked="" type="checkbox"/> Price <input checked="" type="checkbox"/> Brand and quality <input type="checkbox"/> Others <u>Automation, labor and water efficiency</u>	
	5. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input checked="" type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	Sunvim Group Co., Ltd 孚日集团股份有限公司	
	Business Scope: Home Textile	Turnover: 3.2 Billion RMB
	Founding Year: 1987	Location: Shandong
Interviewee Info	Name: Ms. CHEN	Title: Assistant, Equipment department
	Tel.: +86 536 2308052	Fax. +86 536 2323019
	E-mail: office@sunvim.com	Website: www.sunvim.com
	Address: Furi Str. 1, Gaomi, Shangdong PC: 261500	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input checked="" type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input type="checkbox"/> Noise <input checked="" type="checkbox"/> Dust <input checked="" type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input checked="" type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input type="checkbox"/> Textile equipment Upgrading <input checked="" type="checkbox"/> Advanced processing technology <input type="checkbox"/> Process control <input checked="" type="checkbox"/> Environment protection equipment <input checked="" type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input checked="" type="checkbox"/> High efficiency <input type="checkbox"/> Price <input type="checkbox"/> Brand and quality <input type="checkbox"/> Others_____	
	5. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	Jiangsu Xinmin Textile Science & Technology Co., Ltd. 江苏新民纺织科技股份有限公司	
	Business Scope: Fabric and Garment	Turnover: 1.2 Billion RMB
	Founding Year: 1958	Location: Jiangsu
Interviewee Info	Name: Ms. XU	Title: Assistant, Technology department
	Tel.: +86 512 63550252	Fax. +86 0512 63555511
	E-mail: xh750131@sina.com	Website: www.xmtex.com
	Address: Wulong Road 22, Shengze Town, Wujiang City, Jiangsu Province	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input checked="" type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input type="checkbox"/> Noise <input type="checkbox"/> Dust <input checked="" type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input checked="" type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input type="checkbox"/> Textile equipment Upgrading <input checked="" type="checkbox"/> Advanced processing technology <input type="checkbox"/> Process control <input checked="" type="checkbox"/> Environment protection equipment <input checked="" type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input checked="" type="checkbox"/> High efficiency <input type="checkbox"/> Price <input type="checkbox"/> Brand and quality <input type="checkbox"/> Others_____	
	5. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	Ningbo Youngor Worsted Spinning Weaving & Dyeing Co., Ltd 宁波雅戈尔毛纺织染整有限公司	
	Business Scope: Fabric	Turnover: 0.45 Billion RMB
	Founding Year: 1979	Location: Zhejiang
Interviewee Info	Name: Mr. MAO	Title: Equipment Department
	Tel.: +86 574 88150177	Fax. +86 574 88150152
	E-mail: office@youngor.com.cn	Website: www.youngorfabric.com
	Address: West Section 1, Yinxian Road, Ningbo	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input checked="" type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input type="checkbox"/> Noise <input type="checkbox"/> Dust <input checked="" type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input checked="" type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input checked="" type="checkbox"/> Textile equipment Upgrading <input checked="" type="checkbox"/> Advanced processing technology <input type="checkbox"/> Process control <input checked="" type="checkbox"/> Environment protection equipment <input checked="" type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input type="checkbox"/> High efficiency <input type="checkbox"/> Price <input type="checkbox"/> Brand and quality <input type="checkbox"/> Others _____	
	5. Will you consider buying such low energy consumption machinery? <input type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input checked="" type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	V·GRASS FASHION CO.,LTD 维格娜丝时装股份有限公司	
	Business Scope: Garment	Turnover: 0.75 Billion RMB
	Founding Year: 2003	Location: Jiangsu
Interviewee Info	Name: Mr. HU Jinglai	Title: Dead of Product Management Department
	Tel.: +86 25 52098829	Fax. +86 25 52098863
	E-mail: hjl-589@126.com	Website: www.v-grass.net
	Address: Fangyuan South Road 66, Suyuan Avenue, Jiangning Development Area, Nanjing. PC. 211102.	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input checked="" type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input type="checkbox"/> Waste water <input type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input type="checkbox"/> Noise <input type="checkbox"/> Dust <input type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input checked="" type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input type="checkbox"/> Textile equipment Upgrading <input type="checkbox"/> Advanced processing technology <input type="checkbox"/> Process control <input type="checkbox"/> Environment protection equipment <input checked="" type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input checked="" type="checkbox"/> High efficiency <input type="checkbox"/> Price <input type="checkbox"/> Brand and quality <input type="checkbox"/> Others _____	
	5. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	Nantong Dadong Co., Ltd 南通大东有限公司	
	Business Scope: Home Textile	Turnover: 2.3 Billion RMB
	Founding Year: 1987	Location: Jiangsu
Interviewee Info	Name: Mr. LIU	Title: Head of Corporate Affairs Department
	Tel.: +86 513 88153109	Fax. +86 513 88153113
	E-mail: wxm@jsdd.com	Website: www.jsdd.com
	Address: Nanshi Road 18, Juegang, Rudong County. PC.:226400	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input type="checkbox"/> Noise <input type="checkbox"/> Dust <input type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input type="checkbox"/> Textile equipment Upgrading <input checked="" type="checkbox"/> Advanced processing technology <input type="checkbox"/> Process control <input checked="" type="checkbox"/> Environment protection equipment <input checked="" type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input checked="" type="checkbox"/> High efficiency <input type="checkbox"/> Price <input type="checkbox"/> Brand and quality <input type="checkbox"/> Others _____	
	5. Will you consider buying such low energy consumption machinery? <input type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input checked="" type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	High Fashion Silk (Zhejiang) Company Limited 达利丝绸(浙江)有限公司	
	Business Scope: Silk and Garment	Turnover: RMB 0.1 billion
	Founding Year: 2002	Location: Zhejiang Province
Interviewee Info	Name: Mr. WU	Title: Manager of Production
	Tel.: +86 575 86288018 Mobile: 13967590915	Fax.: +86 575 628 8088
	E-mail: public@dalifa.com	Website: ww.sinosilk.com
	Address: Nanyan Development Zone, Xinchang	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input checked="" type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input checked="" type="checkbox"/> Noise <input type="checkbox"/> Dust <input type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input checked="" type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input checked="" type="checkbox"/> Textile equipment Upgrading <input checked="" type="checkbox"/> Advanced processing technology <input type="checkbox"/> Process control <input checked="" type="checkbox"/> Environment protection equipment <input checked="" type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input type="checkbox"/> Low energy consumption and environmental friendly <input checked="" type="checkbox"/> High efficiency <input type="checkbox"/> Price <input type="checkbox"/> Brand and quality <input checked="" type="checkbox"/> Others <u>Automation</u>	
	5. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	Luthai Textile Co., Ltd (鲁泰集团)鲁丰织染	
	Business Scope: Fabric	Turnover: 0.41 Billion RMB
	Founding Year: 2004	Location: Shandong
Interviewee Info	Name: HE Zhenhua	Title: Production Manager
	Tel.: +86 13468424358	Fax. +86 533 6027801
	E-mail: hezhenhua@ltpc.com.cn	Website: lttc.com.cn
	Address: East Songling Road 81, Zichuan Zibo Shandong PC: 255100	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input type="checkbox"/> Noise <input type="checkbox"/> Dust <input type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input checked="" type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input checked="" type="checkbox"/> Textile equipment Upgrading <input type="checkbox"/> Advanced processing technology <input type="checkbox"/> Process control <input type="checkbox"/> Environment protection equipment <input checked="" type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input checked="" type="checkbox"/> High efficiency <input type="checkbox"/> Price <input type="checkbox"/> Brand and quality <input type="checkbox"/> Others_____	
	5. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	Shandong Ruyi Science & Technology Group 山东如意科技集团有限公司	
	Business Scope: Yarn, Fabric and Home Textile	Turnover: 7.5 Billion RMB
	Founding Year: 1972	Location: Shandong
Interviewee Info	Name: Mr. HAN	Title: Purchasing manager
	Tel.: +86 537 7973017 Mobile: +86 13562435172	Fax. +86 537 2316688
	E-mail: 13562435172@126.com	Website: www.chinaruyi.com/
	Address: Ruyi Industry Park, High-tech Area, Jining, Shandong	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input type="checkbox"/> Noise <input type="checkbox"/> Dust <input checked="" type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input checked="" type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input checked="" type="checkbox"/> Textile equipment Upgrading <input checked="" type="checkbox"/> Advanced processing technology <input checked="" type="checkbox"/> Process control <input checked="" type="checkbox"/> Environment protection equipment <input checked="" type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input checked="" type="checkbox"/> High efficiency <input type="checkbox"/> Price <input checked="" type="checkbox"/> Brand and quality <input checked="" type="checkbox"/> Others <u>operational life span and maintenance</u>	
	5. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	WuJiang Fuhua Weaving Co., Ltd. 吴江福华织造有限公司	
	Business Scope: Yarn and Fabric	Turnover: 2.5 Billion RMB
	Founding Year: 1999	Location: Jiangsu
Interviewee Info	Name: Mr. JIANG	Title: Enterprise Management Department
	Tel.: +86 512 63517394	Fax. +86 512 63518333
	E-mail: jdj66711@yahoo.com	Website: www.texfuhua.cn/
	Address: No.5, Area 2, NanHuan Road, Shengze, Wujiang,	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input checked="" type="checkbox"/> Noise <input checked="" type="checkbox"/> Dust <input type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input checked="" type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input checked="" type="checkbox"/> Textile equipment Upgrading <input type="checkbox"/> Advanced processing technology <input checked="" type="checkbox"/> Process control <input type="checkbox"/> Environment protection equipment <input type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input type="checkbox"/> Low energy consumption and environmental friendly <input type="checkbox"/> High efficiency <input type="checkbox"/> Price <input checked="" type="checkbox"/> Brand and quality <input type="checkbox"/> Others _____	
	5. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	ZHEJIANG KINGSAFE NEW TEXTILE GROUP CO., LTD. 浙江金三发新纺织集团有限公司	
	Business Scope: Yarn and Fabric	Turnover: 0.65 Billion RMB
	Founding Year: 1987	Location: Zhejiang
Interviewee Info	Name: Mr. XU	Title: Equipment Department
	Tel.: +86 572 6231139	Fax. +86 572-6230999
	E-mail: jsf@kingsaf.com	Website: www.kingsaf.com
	Address: Economic & Technological Development Zone, Changxing Country, Zhejiang	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input type="checkbox"/> Public policies <input type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input type="checkbox"/> Noise <input type="checkbox"/> Dust <input type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input checked="" type="checkbox"/> Textile equipment Upgrading <input checked="" type="checkbox"/> Advanced processing technology <input checked="" type="checkbox"/> Process control <input checked="" type="checkbox"/> Environment protection equipment <input checked="" type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input type="checkbox"/> High efficiency <input checked="" type="checkbox"/> Price <input checked="" type="checkbox"/> Brand and quality <input type="checkbox"/> Others_____	
	5. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	Shangdong Yinshilai Group CO.,LTP 淄博银仕来纺织（集团）有限公司	
	Business Scope: Yarn and Fabric	Turnover: 1.4 Billion RMB
	Founding Year: 2000	Location: Shandong
Interviewee Info	Name: Mr. CHEN	Title: Manager of Technology Department
	Tel.: +86 533 4656855/851	Fax. +86 533 7918121
	E-mail: ysltextile@163.com	Website: www.ysltex.com
	Address: Boshan Economic Development Zone, Zibo city PC: 255213	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input type="checkbox"/> Noise <input type="checkbox"/> Dust <input type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input checked="" type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input checked="" type="checkbox"/> Textile equipment Upgrading <input type="checkbox"/> Advanced processing technology <input type="checkbox"/> Process control <input type="checkbox"/> Environment protection equipment <input type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input type="checkbox"/> Low energy consumption and environmental friendly <input checked="" type="checkbox"/> High efficiency <input type="checkbox"/> Price <input checked="" type="checkbox"/> Brand and quality <input checked="" type="checkbox"/> Others <u>Adaptability</u>	
	5. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	Jodoll Group 乔顿集团	
	Business Scope: Garments	Turnover: 1.5 Billion RMB
	Founding Year: 1996	Location: Zhejiang
Interviewee Info	Name: Mr. ZHEN	Title: Product manager
	Tel.: +86 577 86536170	Fax. +86 0571 88199053
	E-mail: info@jodoll.com	Web-site: www.jodoll.com.cn
	Address: Jodoll Industrial Park, Lanjiang Road 125, Wenzhou Economy and Technology Development Zone PC: 325011	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input checked="" type="checkbox"/> Noise <input checked="" type="checkbox"/> Dust <input type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input checked="" type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input checked="" type="checkbox"/> Textile equipment Upgrading <input type="checkbox"/> Advanced processing technology <input checked="" type="checkbox"/> Process control <input checked="" type="checkbox"/> Environment protection equipment <input checked="" type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input type="checkbox"/> High efficiency <input checked="" type="checkbox"/> Price <input checked="" type="checkbox"/> Brand and quality <input type="checkbox"/> Others _____	
	5. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	HIIT Corporation 海天轻纺	
	Business Scope: Yarn, Fabric and Garment	Turnover: 0.6 Billion RMB
	Founding Year: 1994	Location: Fujian
Interviewee Info	Name: HUANG Bingju	Title: Secretary to General Manager
	Tel.: +86 595 2291853	Fax. +86 595 22910899
	E-mail: htt@htt.cn	Website: www.htt.cn
	Address: East Beach Industrial Park, Quanzhou PC:362000	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input checked="" type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input checked="" type="checkbox"/> Noise <input checked="" type="checkbox"/> Dust <input type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input checked="" type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input checked="" type="checkbox"/> Textile equipment Upgrading <input type="checkbox"/> Advanced processing technology <input checked="" type="checkbox"/> Process control <input type="checkbox"/> Environment protection equipment <input checked="" type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input checked="" type="checkbox"/> High efficiency <input checked="" type="checkbox"/> Price <input checked="" type="checkbox"/> Brand and quality <input type="checkbox"/> Others_____	
	5. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	Shenzheng Fuanna Bedding and Furnishing Company Limited. 深圳市富安娜家居用品	
	Business Scope: Home Textile	Turnover: 0.64 Billion RMB
	Founding Year: 1994	Location: Guangdong
Interviewee Info	Name: Mr. JIANG	Title: Manger of Product Department
	Tel.: +86 755 26055333	Fax. +86 755-26055116
	E-mail: info@fuanna.com.cn	Website: www.fuanna.com
	Address: Fuanna Industry Buiding, Nanguang Road, Nanshan District, Shenzhen	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input type="checkbox"/> Public policies <input type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input type="checkbox"/> Waste water <input type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input type="checkbox"/> Noise <input type="checkbox"/> Dust <input type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input checked="" type="checkbox"/> Textile equipment Upgrading <input type="checkbox"/> Advanced processing technology <input checked="" type="checkbox"/> Process control <input type="checkbox"/> Environment protection equipment <input type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input type="checkbox"/> Low energy consumption and environmental friendly <input type="checkbox"/> High efficiency <input type="checkbox"/> Price <input checked="" type="checkbox"/> Brand and quality <input checked="" type="checkbox"/> Others <u>Adaptability</u>	
	5. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	Topnew Group 北京铜牛集团有限公司	
	Business Scope: Garment	Turnover: 2.4 Billion RMB
	Founding Year: 1952 年	Location: Beijing
Interviewee Info	Name: Mr. FENG	Title: Engineer, Equipment Department
	Tel.: +86 61502465	Fax. +86 10 65004430
	E-mail: fym2004713@126.com	Website: www.topnew.cn
	Address: Jia 9, Jintai Alley, Chaoyang District, Beijing	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input checked="" type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input checked="" type="checkbox"/> Noise <input checked="" type="checkbox"/> Dust <input checked="" type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input checked="" type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input checked="" type="checkbox"/> Textile equipment Upgrading <input checked="" type="checkbox"/> Advanced processing technology <input type="checkbox"/> Process control <input checked="" type="checkbox"/> Environment protection equipment <input checked="" type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input type="checkbox"/> High efficiency <input type="checkbox"/> Price <input type="checkbox"/> Brand and quality <input checked="" type="checkbox"/> Others <u>Adaptability</u>	
	5. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input checked="" type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	XINLANG SINOER GROUP 新郎希努尔集团股份有限公司	
	Business Scope: Garment	Turnover: 1 Billion RMB
	Founding Year: 1993	Location: Shandong
Interviewee Info	Name: Mr. CHEN	Title: Enterprise Management Department
	Tel.: +86 536 6325325	Fax. +86 536 6053150
	E-mail: sinoer@sinoer.cn	Website: www.sinoer.cn
	Address: Xinlang Industrial Park, Outer ring, Zhucheng	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input checked="" type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input checked="" type="checkbox"/> Noise <input checked="" type="checkbox"/> Dust <input type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input checked="" type="checkbox"/> Textile equipment Upgrading <input checked="" type="checkbox"/> Advanced processing technology <input type="checkbox"/> Process control <input checked="" type="checkbox"/> Environment protection equipment <input type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input checked="" type="checkbox"/> High efficiency <input checked="" type="checkbox"/> Price <input checked="" type="checkbox"/> Brand and quality <input type="checkbox"/> Others_____	
	5. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	New Wide Group (Shanghai) 旭荣集团 (上海)	
	Business Scope: Fabric and Garment	Turnover: RMB 2.65 billion
	Founding Year: 1975	Location: Shanghai
Interviewee Info	Name: Xiaoqin HUANG	Title: Enterprise Management Department
	Tel.: +86 21 54453377-8386	Fax. +86 21 54453477
	E-mail: jean.huang@newwide.com	Website: www.newwide.com
	Address: 1FL, UNIT 9, NO.159, TIANZHOU RD., SHANGHAI PC: 200233	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input checked="" type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input checked="" type="checkbox"/> Noise <input checked="" type="checkbox"/> Dust <input checked="" type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input checked="" type="checkbox"/> Water consumption (Steam consumption)	
	3. Which are the main limitation methods implemented? <input checked="" type="checkbox"/> Textile equipment Upgrading <input checked="" type="checkbox"/> Advanced processing technology <input type="checkbox"/> Process control <input type="checkbox"/> Environment protection equipment <input checked="" type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input type="checkbox"/> High efficiency <input checked="" type="checkbox"/> Price <input checked="" type="checkbox"/> Brand and quality <input type="checkbox"/> Others_____	
	5. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	TEVEL Group 江苏堂皇集团有限公司	
	Business Scope: Home Textile	Turnover: 1.67 Billion RMB
	Founding Year: 1986	Location: Jiangsu
Interviewee Info	Name: Mr. LIN	Title: Department of quality control
	Tel.: +86 511 86639739	Fax. +86 511 86639999
	E-mail: nwp2008@yahoo.cn	Website: www.tevel.cn
	Address: Tanghuang Industrial Zone, Danyang	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input checked="" type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input type="checkbox"/> Waste water <input type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input checked="" type="checkbox"/> Noise <input type="checkbox"/> Dust <input type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input checked="" type="checkbox"/> Textile equipment Upgrading <input type="checkbox"/> Advanced processing technology <input type="checkbox"/> Process control <input type="checkbox"/> Environment protection equipment <input type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input type="checkbox"/> High efficiency <input type="checkbox"/> Price <input type="checkbox"/> Brand and quality <input type="checkbox"/> Others_____	
	5. Will you consider buying such low energy consumption machinery? <input type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input checked="" type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	Zhejiang Huafon Spandex Co., Ltd 浙江华峰氨纶股份有限公司	
	Business Scope: Chemical Fiber and Fabric	Turnover: 1.2 Billion RMB
	Founding Year: 1999	Location: Zhejiang
Interviewee Info	Name: Ms. ZHANG	Title: Enterprise management department
	Tel.: +86 577 65178888	Fax. +86 577 65537858
	E-mail: huafeng@spandex.com.cn	Website: www.spandex.com.cn
	Address: Shengcheng Industrial Park, Ruian	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input type="checkbox"/> Noise <input checked="" type="checkbox"/> Dust <input checked="" type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input checked="" type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input checked="" type="checkbox"/> Textile equipment Upgrading <input checked="" type="checkbox"/> Advanced processing technology <input type="checkbox"/> Process control <input type="checkbox"/> Environment protection equipment <input checked="" type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input type="checkbox"/> High efficiency <input type="checkbox"/> Price <input type="checkbox"/> Brand and quality <input type="checkbox"/> Others_____	
	5. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	Advancetex Fashion Garment Manufacturing (Huizhou) Ltd. 大进制衣厂(惠州)有限公司	
	Business Scope: Garments	Turnover: 1.6 Billion RMB
	Founding Year: 1982	Location: Guangdong
Interviewee Info	Name: Laura	Title: Enterprise management department
	Tel.: +86 572 2788249	Fax. +86 752 2788265
	E-mail: advmfghz_laura@glorisun.com	Website: www.advgm.com.cn
	Address: East Road 10, Yunshan, Jiangbei, Huizhou, Guangdong PC: 516003	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input type="checkbox"/> Public policies <input checked="" type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input type="checkbox"/> Noise <input checked="" type="checkbox"/> Dust <input checked="" type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input checked="" type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input checked="" type="checkbox"/> Textile equipment Upgrading <input type="checkbox"/> Advanced processing technology <input type="checkbox"/> Process control <input type="checkbox"/> Environment protection equipment <input checked="" type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input type="checkbox"/> High efficiency <input type="checkbox"/> Price <input checked="" type="checkbox"/> Brand and quality <input type="checkbox"/> Others_____	
	5. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	Jiangsu Dan Mao Textile Co, Ltd 丹毛纺织	
	Business Scope: Fabric	Turnover: 0.4 billion RMB
	Founding Year: 1980	Location: Jiangsu
Interviewee Info	Name: Mr. ZHANG	Title: Manager of Quality Department
	Tel.: +86 511 86476177	Fax.: _86 511 86473978
	E-mail: zyf@danmaotex.com	Website: www.danmaotex.com
	Address: North Lvmeng Rd No. 2, Lvcheng, Danyang	
Questions Asked	1. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	2. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input checked="" type="checkbox"/> Noise <input type="checkbox"/> Dust <input checked="" type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input checked="" type="checkbox"/> Water consumption	
	3. Which are the main limitation methods implemented? <input checked="" type="checkbox"/> Textile equipment Upgrading <input checked="" type="checkbox"/> Advanced processing technology <input checked="" type="checkbox"/> Process control <input checked="" type="checkbox"/> Environment protection equipment <input checked="" type="checkbox"/> Recycling	
	4. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input checked="" type="checkbox"/> High efficiency <input type="checkbox"/> Price <input type="checkbox"/> Brand and quality <input type="checkbox"/> Others_____	
	5. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	Jingwei Textile Machinery Company Limited 经纬纺织机械股份有限公司	
	Business Scope: Textile Machinery	Turnover: 3.6 billion RMB
	Founding Year: 1995	Location: Beijing
Interviewee Info	Name: Mr. JIN	Title: Quality Management Department
	Tel.: +86 10 84534078	Fax. +86 10 84534135
	E-mail: zyf@danmaotex.com	Website: www.jwgf.com
	Address: 7/FI, No.1 Shanghai Center,39 Liangma Qiao Road, Chaoyang, Beijing PC: 100125	
Questions Asked	6. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input checked="" type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	7. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input checked="" type="checkbox"/> Noise <input type="checkbox"/> Dust <input checked="" type="checkbox"/> Chemical additives <input type="checkbox"/> Energy consumption <input checked="" type="checkbox"/> Water consumption	
	8. Which are the main limitation methods implemented? <input type="checkbox"/> Textile equipment Upgrading <input checked="" type="checkbox"/> Advanced processing technology <input type="checkbox"/> Process control <input checked="" type="checkbox"/> Environment protection equipment <input checked="" type="checkbox"/> Recycling	
	9. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input checked="" type="checkbox"/> High efficiency <input type="checkbox"/> Price <input type="checkbox"/> Brand and quality <input type="checkbox"/> Others_____	
	10. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

Company Profile	Zhejiang Tiansheng Holding Group Co., Ltd. 浙江天圣控股集团有限公司	
	Business Scope: Chemical Fiber and Fabric	Turnover: 5.79 Billion RMB
	Founding Year: 1997	Location: Zhejiang
Interviewee Info	Name: Mr. SHEN	Title: Working party on corporate responsibility
	Tel.: +86 575 84887256	Fax. +86 575 84887256
	E-mail: zy.zl123@163.com	Website: www.zjts.com
	Address: Shanyin West Road 19, Keqiao Kexi Industrial Park, Shaoxing PC: 312030	
Questions Asked	11. Which are the driving forces for sustainable manufacturing? <input checked="" type="checkbox"/> Public policies <input checked="" type="checkbox"/> Customer requirement <input checked="" type="checkbox"/> Company's long-term development	
	12. Which are the key environmental parameters considered? <input checked="" type="checkbox"/> Waste water <input checked="" type="checkbox"/> Waste air <input type="checkbox"/> CO2 <input checked="" type="checkbox"/> Noise <input checked="" type="checkbox"/> Dust <input type="checkbox"/> Chemical additives <input checked="" type="checkbox"/> Energy consumption <input checked="" type="checkbox"/> Water consumption	
	13. Which are the main limitation methods implemented? <input checked="" type="checkbox"/> Textile equipment Upgrading <input type="checkbox"/> Advanced processing technology <input type="checkbox"/> Process control <input checked="" type="checkbox"/> Environment protection equipment <input checked="" type="checkbox"/> Recycling	
	14. What factors will be prioritized when purchasing the textile machinery? <input checked="" type="checkbox"/> Low energy consumption and environmental friendly <input type="checkbox"/> High efficiency <input type="checkbox"/> Price <input checked="" type="checkbox"/> Brand and quality <input type="checkbox"/> Others_____	
	15. Will you consider buying such low energy consumption machinery? <input checked="" type="checkbox"/> Already bought <input type="checkbox"/> Within short-term purchasing plan <input type="checkbox"/> Within long-term purchasing plan <input type="checkbox"/> Not interested	

## **2. Useful Information**

### **Laws and Regulations**

**Law of the People's Republic of China on Promotion of Cleaner Production (Order of the President No.72)**

**Law of the People's Republic of China on Promotion of Cleaner Production**

*(adopted at the 28th Meeting of the Standing Committee of the Ninth National People's Congress on June 29, 2002)*

#### *Chapter I*

#### **General Provisions**

**Article 1** This Law is enacted for the purpose of promoting cleaner production, increasing the utilization ratio of resources, reducing and preventing pollutant-generating, protecting and improving the environment, protecting human health, and promoting the sustainable development of the economy and society.

**Article 2** For purposes of this Law, cleaner production means, by continuous adopting measures to improve designing, use cleaner energy and raw materials, introduce advanced techniques and equipment, improve management and make comprehensive use of resources as well as other measures, to reduce pollution from its source, increase the utilization ratio of resources, reduce or prevent the generation and discharge of pollutants in the course of production, services and

use of products, in order to alleviate or eliminate harm to human health and the environment.

**Article 3** Within the territory of the People's Republic of China, units engaged in production and service activities and the departments engaged in administration of such activities shall, in accordance with the provisions of this Law, organize efforts to implement cleaner production.

**Article 4** The State encourages and promotes cleaner production. The State Council and the local people's governments at or above the county level shall incorporate cleaner production into their plans for national economic and social development and plans for environment protection, resources utilization, industrial development, regional development, etc.

**Article 5** The administrative department for the economy and trade under the State Council shall be responsible for organizing efforts to coordinate the work of promoting cleaner production nationwide. The administrative departments under the State Council for environment protection, planning, science and technology, agriculture, construction, water resources and technical supervision over quality shall, within their respective functions and responsibilities, be responsible for the relevant work of promoting cleaner production.

The local people's governments at or above the county level shall be responsible for directing the work of promoting cleaner production within their own administration areas. The administrative departments for the economy and trade under the said people's governments shall be responsible for organizing efforts to coordinate the work of promoting cleaner production within their own administrative areas. The administrative departments under the said people's governments for environment protection, planning, science and technology, agriculture, construction, water resources and technical supervision over quality shall, within their respective functions and responsibilities, be responsible for

the relevant work of promoting cleaner production.

**Article 6** The State encourages scientific research, technological development and international cooperation in the field of cleaner production, organizes efforts to disseminate knowledge about cleaner production and spreads the use of technologies for cleaner production.

The State encourages public organizations and the general public to participate in the promotion of, education in, popularization and implementation of and supervision over cleaner production.

## *Chapter II*

### **Popularization of Cleaner Production**

**Article 7** The State Council shall formulate financial and taxation policies for the benefit of implementation of cleaner production.

The State Council, the relevant administrative departments under it and the people's governments of provinces, autonomous regions and municipalities directly under the Central Government shall formulate industrial policies and policies for technological development and popularization for the benefit of implementation of cleaner production.

**Article 8** The administrative departments for the economy and trade under the local people's governments at or above the county level shall, together with the relevant administrative departments for environment protection, planning, science and technology, agriculture, construction, water resources, etc., formulate plans for popularization of cleaner production.

**Article 9** The local people's governments at or above the county level shall make rational plans for the economic layout within their own administrative areas, readjust industrial structures, develop cycling economic sectors and promote cooperation among enterprises in the comprehensive use of resources and waste materials and in other fields, in order to realize highly effective use and recycling of resources.

**Article 10** The administrative departments for the economy and trade, environment protection, planning, science and technology, agriculture and other relevant administrative departments under the State Council and under the people's governments of provinces, autonomous regions and municipalities directly under the Central Government shall organize efforts to support the establishment of an information system for cleaner production and a system for technical consultancy, in order to provide information and services in respect of the methods and technologies for cleaner production, supply and demand of recyclable waste, policies for cleaner production, etc.

**Article 11** The administrative department for the economy and trade under the State Council shall, together with the related administrative departments under the State Council, regularly publish directories on technologies, techniques, equipment and products for cleaner production.

The administrative departments for the economy and trade, environment protection, agriculture and construction and other departments concerned under the State Council and under the people's governments of provinces, autonomous regions and municipalities directly under the Central Government shall organize efforts to compile guidebooks and technical manuals for cleaner production in respect of certain trades or regions, for the purpose of guiding the implementation of cleaner production.

**Article 12** With respect to out-dated production technologies, techniques, equipment and products which cause waste of resources and serious pollution of the environment, the State applies a system of elimination within a time limit. The

administrative department for the economy and trade under the State Council shall, together with the other related administrative departments under the State Council, compile and publish catalogues of technologies, techniques, equipment and products to be eliminated within a time limit.

**Article 13** The relevant administrative departments under the State Council may, where necessary, grant approval to marks for products made for the benefit of environment and resources protection, such as energy- or water-conservation products and products made out of recycled waste, and they shall lay down corresponding standards according to State regulations.

**Article 14** The administrative departments for science and technology and other relevant administrative departments under the local people's governments at or above the county level shall provide guidance to and support research in and development of technologies for cleaner production and products conducive to protection of the environment and resources and the demonstration and wide use of technologies for cleaner production.

**Article 15** The administrative department for education under the State Council shall incorporate the courses of cleaner production technology and management into the related systems of higher education, vocational education and technical training.

The relevant administrative departments under the local people's governments at or above the county level shall organize efforts to disseminate knowledge about cleaner production and conduct training in this area, in order to enhance the awareness of the importance of cleaner production among government functionaries, enterprise managers and the general public and train managerial and technical personnel for cleaner production.

The press, publishing, radio, films, television and cultural institutions and relevant public organizations shall give play

to their own advantages and make a success of promotion for cleaner production.

**Article 16** People's governments at various levels shall give first priority to purchasing energy- and water-conservation products and products made out of recycled waste which are conducive to protection of the environment and resources.

People's governments at various levels shall, through promotion and education or by other means, encourage the general public to purchase and use energy- and water-conservation products and products made out of recycled waste which are conducive to protection of the environment and resources.

**Article 17** The administrative departments for environment protection under the people's governments of provinces, autonomous regions and municipalities directly under the Central Government shall exercise strict supervision over the implementation of cleaner production and they may, in light of the need to promote cleaner production and the discharge of pollutants by enterprises, regularly publish, through the principal local media, name lists of the enterprises which cause serious pollution by exceeding the norms specified for the pollutants discharged or for the total amount of the pollutants discharged, providing the basis for public supervision over the enterprises' implementation of cleaner production.

### *Chapter III*

#### **Implementation of Cleaner Production**

**Article 18** For new construction, reconstruction and expansion projects, their impact on the environment shall be assessed, the use of raw materials, consumption and comprehensive use of resources, generation and disposition of pollutants shall be analyzed and expounded and employment of technologies, techniques and equipment for cleaner

production, which serve to make highly effective use of resources and generate less pollutants, shall be given first priority.

**Article 19** In the course of technological updating, enterprises shall adopt the following measures for cleaner production:

- (1) replacing highly toxic and harmful raw materials with nontoxic and harmless or less toxic and harmful ones;
- (2) replacing techniques and equipment which serve to make less effective use of resources to generate greater amount of pollutants with ones which serve to make highly effective use of resources and generate pollutants;
- (3) making comprehensive or cycle use of solid waste and waste water and heat discharged in the course of production; and
- (4) adopting technologies for prevention and control of pollution which help keep the pollutants discharged and within the norms specified by the State or local authorities and keep the total amount of the pollutants discharged within the control norms specified by the State or local authorities.

**Article 20** In the designing of products and packages, consideration shall be given to their effects on human health and the environment during their life cycles, and priority shall be given to options for products and packages that are toxicant-free, harmless, easily dissolved or recycled.

Enterprises shall properly pack their products, refraining from overusing the packages and preventing the generation of package waste.

**Article 21** Enterprises producing large mechanical and electrical equipment, motor-driven means of transport and other products designated by the administrative department for the economy and trade under the State Council shall, in adherence to the technical specifications laid down by the administrative department for standardization under the State Council or the institutions authorized by the department, indicate the standard brand of the material composition on the principal component parts of the product.

**Article 22** Agricultural producers shall use chemical fertilizers, pesticides, agricultural film and feed additives in a scientific way and improve planting and breeding technologies, so as to produce quality and harmless agricultural products, turn agricultural waste into resources, and prevent the agricultural environment from pollution.

Toxic and harmful waste is prohibited to be used as fertilizers or for cultivating new farmland.

**Article 23** Service enterprises providing food and drinks, entertainment or hotel services shall use energy- and water-conservation and other technologies and equipment conducive to environment protection and shall refrain from using or use less consumer goods which lead to waste of resources and pollution of the environment.

**Article 24** For construction projects, the designing, construction and decoration materials, construction component and accessory parts and equipment, which are energy- and water-conserving and conducive to environment protection, shall be adopted or used.

Construction and decoration materials shall conform to the norms of the State. Production, marketing and use of such materials, the toxic and harmful substances which contain exceed State norms, are prohibited.

**Article 25** In prospecting and exploiting mineral resources, the methods, techniques and technologies which are

conducive to rational use of resources, environment protection and prevention of pollution shall be adopted for better use of resources.

**Article 26** Enterprises shall, where feasible in financial and technological terms, retrieve wastes and waste heat discharged in the course of production and services, or transfers them to other enterprises or individuals that have the ability of using them.

**Article 27** Enterprises producing and marketing products or packages included in the catalogue of products or packages for compulsory recycling shall recycle the scrapped products and used packages. The catalogue of products and packages for compulsory recycling and the specific measures for compulsory recycling shall be compiled and formulated by the administrative department for the economy and trade under the State Council.

With regard to the products and packages listed in the catalogue of products and packages for compulsory recycling, the State adopts economic measures favorable to their recycling; the administrative departments for the economy and trade under the local people's governments at or above the county level shall regularly inspect the recycling of such products and packages and make the result of inspection known to the public. The specific measures shall be formulated by the administrative department for the economy and trade under the State Council.

**Article 28** Enterprises shall monitor the consumption of resources and discharge of waste in the course of production and services and, where necessary, examine whether their production and services conform to the requirements of cleaner production.

Enterprises that discharge pollutants in excess of the norms specified by the State or local authorities or of the control norms for the total amount of pollutants discharged approved by the local people's governments concerned shall

conduct examination for cleaner production.

Enterprises that use toxic or harmful raw materials in production or discharge toxic or harmful substances in the course of production shall conduct regular examination for cleaner production and report the results to the administrative departments for environment protection and for the economy and trade under the local people's governments at or above the county level where the enterprises are located.

The measures for examination for cleaner production shall be formulated by the administrative department for the economy and trade under the State Council, together with the administrative department for environment protection under the State Council.

**Article 29** Enterprises that have succeeded in keeping the pollutants they discharge within the norms specified by the State and the local authorities of their own free will, sign agreements on further conservation of resources and reduced amount of pollutants discharged with the administrative departments for the economy and trade and for environment protection, which have jurisdiction over them. The said departments shall, through the principal local media, make public the names of the enterprises and their achievements in conserving resources and preventing and controlling pollution.

**Article 30** Enterprises may, on the principle of voluntariness and in accordance with the State regulations on verification by environment management system, apply for verification to the verification authority authorized by the government department for supervision and control over verification and approval and go through the verification for environment management, so as to raise their level of cleaner production.

**Article 31** According to the provisions in Article 17 of this Law, enterprises included in the name list of the enterprises

which cause serious pollution shall, in compliance with the regulations of the administrative department for environment protection under the State Council, make public their discharge of the main pollutants to accept public supervision.

#### *Chapter IV*

### **Incentive Measures**

**Article 32** The State establishes a commending and awarding system for cleaner production. The people's governments shall commend and award units and individuals that achieve remarkable successes in their efforts to bring about cleaner production.

**Article 33** Projects designed for research, demonstration and training in cleaner production, key technological updating projects of the State for cleaner production, and other technological updating projects clearly stated in the agreements on voluntary reduction of pollutants discharged, as prescribed in Article 29 of this Law, shall be included in the projects for which special funds are arranged by the State Council and the finance department at the same level as the local people's government at or above the county level in support of their technological updating.

**Article 34** From the funds established for developing small and medium-sized enterprises in accordance with State regulations, an appropriate amount shall, where necessary, be set aside to support such enterprises in their efforts to engage in cleaner production.

**Article 35** Where enterprises manufacture products out of waste and obtain raw materials out of recycled waste, the taxation authority shall, in accordance with relevant State regulations, reduce their value-added tax or exempt them

from such tax.

**Article 36** Enterprises may incorporate into their operational cost the fees paid for examination and verification regarding cleaner production and for training in this respect.

## *Chapter V*

### **Legal Responsibility**

**Article 37** Where an enterprise that, in violation of the provisions in Article 21 of this Law, fails to indicate the composition of product materials or indicates the said composition untruthfully, the administrative department for quality and technical supervision under the local people's government at or above the county level shall instruct it to rectify within a time limit; if it refuses to do so, it shall be fined not more than RMB 50,000 Yuan.

**Article 38** Where an enterprise, in violation of the provisions in the second paragraph of Article 24 of this Law, produces or markets construction and decoration materials, the toxic or harmful substances which contain exceed State norms, it shall be investigated for administrative, civil or criminal responsibility in accordance with the provisions in the law on product quality and the relevant civil and criminal laws.

**Article 39** Where an enterprise, in violation of the provisions in the first paragraph of Article 27 of this Law, fails to fulfill the obligation of recycling scrapped products or used packages, the administrative department for the economy and trade under the local people's government at or above the county level shall instruct it to rectify within a time limit; if it refuses to do so, it shall be fined not more than 10,000 Yuan.

**Article 40** Where an enterprise, in violation of the provisions in the third paragraph of Article 28 of this Law, fails to

conduct examination for cleaner production, or to provide truthful report on the result of the examination which it conducts, the administrative department for environment protection under the local people's government at or above the county level shall instruct it to rectify within a time limit, if it refuses to do so, it shall be fined not more than 10,000 yuan.

**Article 41** Where an enterprise, in violation of the provisions in Article 31 of this Law, fails to make public its discharge of pollutants or fails to do so in compliance with the requirements specified, its discharge shall be made public by the administrative department for environment protection under the local people's government at or above the county level, and it may also be fined not more than 10,000 Yuan.

#### *Chapter VI*

#### **Supplementary Provisions**

**Article 42** This Law shall go into effect as of January 1, 2003.

*Notice: All copyrights of the English version of the Orders of the President of the People's Republic of China released on gov.cn belong to the Legislative Affairs Commission of the Standing Committee of the National People's Congress of the People's Republic of China.*

## **Law of the People's Republic of China on Conserving Energy**

### **Law of the People's Republic of China on Conserving Energy** (adopted on November 1, 1997)

(Adopted at the 28th Meeting of the Standing Committee of the Eighth National People's Congress on November 1, 1997)

#### **CHAPTER I GENERAL PROVISIONS**

**Article 1** This Law is formulated in order to promote energy conservation by all sectors of the society, increase the efficiency in the use of energy and its economic results, protect the environment, ensure national economic and social development, and meet the people's needs in everyday life.

**Article 2** The term "energy" as used in this Law refers to coal, crude oil, natural gas, power, coke, coal gas, heat, processed oil, liquefied petroleum gas, biomass energy and other resources from which useful energy can be derived directly or through processing or conversion.

**Article 3** The term "energy conservation" as used in this Law means: enhancing management in the use of energy; adopting measures which are technologically feasible, economically rational, and, by reducing loss and waste at every stage from production through to consumption of energy, environmentally and socially acceptable in order to use energy more efficiently and rationally.

**Article 4** Energy conservation is a long-term concept of strategy of the State for national economic development. The State Council and the people's governments of provinces, autonomous regions, and municipalities directly under the Central Government shall strengthen their efforts in energy conservation; readjust in a rational way the industrial structure, pattern of enterprises, product mix and pattern of energy consumption; facilitate technological progress for energy conservation; reduce energy consumption per unit output value and per unit product; and improve the

exploitation, processing, conversion, transmission and supply of energy so as to gradually increase the utilization rate of energy and promote the development of the national economy in an energy-efficient manner. The State encourages the development and utilization of new and renewable resources of energy.

**Article 5** The State formulates policies and plans for energy conservation, which shall be incorporated into plans for national economic and social development so as to ensure the rational utilization of energy resources and coordinate energy conservation with economic development and environmental protection.

**Article 6** The State encourages and supports research and dissemination of science and technology for energy conservation and makes greater efforts to publicize and educate the people in the importance of energy conservation, spreading scientific knowledge about energy conservation among all the people so as to enhance their awareness of the need.

**Article 7** All organizations and individuals shall fulfill their obligation to conserve energy and have the right to report against any waste of energy. The people's governments at all levels shall give rewards to any organizations or individuals that achieve outstanding successes in energy conservation or in research or dissemination of science and technology for energy conservation.

**Article 8** The administrative department for energy conservation under the State Council shall be in charge of supervision over and administration of the work for energy conservation throughout the country. The relevant departments under the State Council shall exercise supervision and administration in the work within the scope of their functions and responsibilities respectively. The administrative departments for energy conservation under the local people's governments at or above the county level shall be in charge of supervision over and administration of the work for energy conservation in their respective administrative areas. The relevant departments of the local people's governments at or above the county level shall exercise supervision and administration in the work within the scope of their functions and responsibilities respectively.

## **CHAPTER II ADMINISTRATION OF ENERGY CONSERVATION**

**Article 9** The State Council and the local people's governments at all levels shall strengthen leadership in energy

conservation, making plans for, coordinating, supervising, inspecting and promoting the work of energy conservation every year.

**Article 10** The State Council and the people's governments of provinces, autonomous regions, and municipalities directly under the Central Government shall, according to the principle of making efforts simultaneously to conserve energy and exploit it while giving first priority to the former, decide on the optional energy conservation and exploitation projects for investment and work out plans for such investment on the basis of a comparative demonstration in terms of technology, economy and environment with regard to energy conservation and exploitation.

**Article 11** The State Council and the people's governments of provinces, autonomous regions, and municipalities directly under the Central Government shall allocate funds for energy conservation in funds for capital construction and technical upgrading to support rational utilization of energy and exploitation of new and renewable energy resources. People's governments at the municipal and county levels shall allocate funds for energy conservation according to their actual conditions in order to support rational utilization of energy and exploitation of new and renewable energy resources.

**Article 12** Special demonstration of rational use of energy shall be included in the feasibility study reports of fixed assets projects for investment. The fixed assets projects for investment shall be designed and constructed in conformity with the standards for rational use of energy and for energy conservation design. Organs authorized with the power of examining and approving construction projects according to law may not approve the construction of projects which fail to conform to the standards for rational use of energy and for energy conservation design or accept such projects when completed.

**Article 13** It is prohibited to construct new industrial projects that are technically outdated, highly energy-consuming, and prodigiously wasting energy. The administrative department for energy conservation under the State Council shall, together with the other relevant departments under the State Council, prepare a catalogue of highly energy-consuming industrial projects that are prohibited from being constructed and shall formulate specific measures for implementation.

**Article 14** The administrative department for standardization under the State Council shall formulate the national standards for energy conservation. In the absence of the national standards mentioned above, the relevant departments

under the State Council may formulate according to law trade standards for energy conservation and submit them to the administrative department for standardization under the State Council for the record. Standards for energy conservation shall be technically advanced and economically rational and be subject to continued improvement.

**Article 15** The administrative department for energy conservation under the State Council shall, together with the relevant departments under the State Council, exercise strict supervision over the trades and professions that turn out widely used energy-using products in large quantities and urge them to adopt energy-conserving measures, make efforts to improve product design and manufacturing technology and gradually reduce energy consumption per unit product in respective trades and professions.

**Article 16** The administrative department for energy conservation of the people's governments at or above the provincial level shall, together with the relevant departments of the corresponding governments, set quotas for energy consumption per unit product for products which consume excessive amounts of energy in the course of production. The quota for energy consumption per unit product shall be set in a scientific and rational manner.

**Article 17** The State applies an elimination system for outdated and highly energy-consuming products and equipment. A catalogue of highly energy-consuming products and equipment to be eliminated shall be decided on by the administrative department for energy conservation under the State Council together with the relevant departments under the State Council and made known to the public. The said departments shall likewise formulate specific measures for implementation.

**Article 18** Enterprises may, on a voluntary basis and in accordance with the State regulations regarding certification of product quality, apply to the administrative department for supervision over product quality under the State Council or to the certification agencies confirmed by the organs authorized by the said department under the State Council for certifying the quality of their energy-using products in terms of energy conservation. After being proved qualified, the enterprises shall obtain the certificates for the quality of their energy-using products in terms of energy conservation and have labels bearing such certificates affixed to their energy-using products or to the packaging thereof.

**Article 19** The statistics institutions of the people's governments at or above the county level shall, together with the relevant departments of the corresponding governments, compile accurate statistics on energy consumption and

utilization and regularly issue statistics bulletins about energy consumption per unit product for major energy-consuming products, etc.

**Article 20** The State shall exercise strict administration of energy conservation in key energy-using units. The following are key energy-using units: (1) units that consume an annual total of energy equaling over 10,000 tons of standard coal each; and (2) units that consume an annual total of energy equaling between 5,000 and 10,000 tons of standard coal each, as determined by the relevant department under the State Council or the administrative departments for energy conservation of the people's governments of provinces, autonomous regions, and municipalities directly under the Central Government. The administrative departments for energy conservation of the governments at or above the county level shall see to it that the relevant departments exercise supervision over and conduct inspection of energy utilization in the key energy-using units, and they may entrust units that are technically qualified with the test and measurement of energy conservation. The administrative department for energy conservation under the State Council shall, together with the relevant departments under the State Council, set the requirements and formulate measures for energy conservation and administration in the key energy-using units.

### **CHAPTER III RATIONAL USE OF ENERGY**

**Article 21** Energy-using units shall, in accordance with the principle of rational use of energy, exercise strict administration of energy conservation, formulate and implement technical measures for energy conservation in respective units so as to reduce energy consumption. Energy-using units shall conduct education in energy conservation and train the employees concerned for the purpose. Employees who have not received any education or training in energy conservation shall not be allowed to operate energy-consuming machines.

**Article 22** Energy-using units shall improve their quantitative management in respect of energy, and establish a sound system of energy consumption statistics and of energy utilization analysis.

**Article 23** Energy-using units shall establish a responsibility system for energy conservation and grant rewards to collectives and individuals that achieve successes in energy conservation.

**Article 24** Units that manufacture energy-consuming products shall comply with the quota set for energy consumption

per unit product according to law. Units that use energy exceeding the quota for energy consumption per unit product to a serious extent shall be required to solve the problem within a time limit. This shall be determined by the administrative departments for energy conservation of the people's governments at or above the county level within the limits of authority as prescribed by the State Council.

**Article 25** Units or individuals that manufacture or sell energy-using products or use energy-using equipment shall stop producing and selling such products and using such equipment, which the State has formally decided to eliminate, within the time limit set by the administrative department for energy conservation together with the relevant departments under the state Council, and they may not transfer such equipment to any other users.

**Article 26** Units and individuals that manufacture energy-using products shall have the norm for energy consumption clearly indicated on the labels affixed to their products or in the specifications thereof.

**Article 27** Units and individuals that manufacture energy-using products may not use labels bearing forged certificates for the quality of their energy-conserving products or labels bearing the certificates for the quality of another's energy-conserving products.

**Article 28** Key energy-using units shall, in accordance with the relevant regulations of the State, regularly submit reports on their utilization of energy. These reports shall include information on energy consumption, energy efficiency, analysis of the benefits derived from energy conservation and the measures taken for energy conservation.

**Article 29** Key energy-using units shall establish positions for administration of energy, appoint employees to such positions from among the ones who have the expertise for and practical experience in energy conservation and who have the technical title at or above the level of engineer, and report the matter to the administrative department for energy conservation and the relevant departments of the people's government at or above the county level. Energy administrators shall be responsible for supervision over and inspection of their own units' utilization of energy.

**Article 30** Employees of any units as well as other rural and urban residents who use such energy as electricity, coal gas, natural gas and coal produced by enterprises shall have the amount used measured and pay for it in accordance with State regulations. Such energy may not be used without compensation and no payment shall be made at a lump

rate.

**Article 31** Units producing and supplying energy shall provide energy to energy-using units in accordance with the provisions of laws, regulations and contracts.

#### **CHAPTER IV BETTERMENT OF ENERGY CONSERVATION TECHNOLOGY**

**Article 32** The State encourages and supports the development of advanced technology for energy conservation, determines the priority and direction for the endeavor, establishes and keeps improving the service system for such technology, and fosters and standardizes the market for it.

**Article 33** The State coordinates efforts for scientific research of key energy conservation projects and demonstration projects of energy conservation and recommends energy conservation projects for dissemination, providing guidance for enterprises, institutions and individuals to employ advanced techniques, skills, equipment and material for energy conservation. The State formulates preferential policies in support of projects for demonstration and dissemination of energy conservation.

**Article 34** The State encourages the introduction of advanced energy conservation technology and equipment from abroad and prohibits the introduction of outdated energy-using technology, equipment or material from abroad.

**Article 35** The funds allocated by the State Council and the people's governments of provinces, autonomous regions, and municipalities directly under the Central Government for scientific research shall include funds for conserving energy, which shall be used for research in advanced technology for energy conservation.

**Article 36** People's governments at or above the county level shall coordinate the efforts of the relevant departments to promote, in accordance with the State's industrial policy and policy for energy conservation technology, scientific and rational specialized production that meets the requirements of energy conservation.

**Article 37** In designing and constructing buildings, energy-conserving building structures, materials, appliances and products shall be employed according to the provisions of relevant laws and administrative rules and regulations in

order to improve thermal and insulating performance and reduce energy consumption for heating, cooling and lighting purposes.

**Article 38** People's government's at all levels shall, in accordance with the principles of suitability to local conditions, provision of multiple forms of energy to complement each other, comprehensive utilization and stress on benefits, enhance development of energy in rural areas and exploit and utilize methane, solar energy, wind energy, hydro energy, geothermal energy, and other renewable and new energy resources.

**Article 39** The State encourages the development of the following universal energy conservation technologies: (1) promote the wide use of cogeneration of heat and power and district heating, increase the utilization rate of heat and power units, develop heat-cascading technology, combined heat, power and cooling technology and combined heat, power and coal gas technology, and increase the efficiency of thermal energy application in an all-round way; (2) gradually achieve more-efficient operation of electric motors, fans, pumping equipment and systems; develop adjustable speed motor drives for energy conservation and electric-electronic power saving technology; develop, produce and disseminate the use of high-quality and low-cost energy-efficient appliances and equipment; and increase the efficiency of electric power; (3) develop and disseminate the use of clean coal technologies, including fluidized bed combustion, smokeless combustion, and gasification and liquefaction, that are suited to domestic coals in order to increase coal utilization efficiency; and (4) develop and disseminate other universal energy-efficient technologies that are proved mature and yield remarkable benefits.

**Article 40** Each trade and profession shall work out policies for energy-efficient technology for its own trade or profession, develop and disseminate new energy-efficient technologies, techniques, equipment and materials, restrict or eliminate energy-consuming outdated technologies, techniques, equipment and materials.

**Article 41** The administrative department for energy conservation under the State Council shall, together with the relevant departments under the State Council, formulate both general technical norms, requirements and measures for energy conservation and specific ones for different trades and professions, and modify them in keeping with economic growth and progress in energy conservation technology with the aim of increasing energy utilization rate, reducing energy consumption and gradually bringing China's energy utilization up to the advanced international level.

## CHAPTER V LEGAL RESPONSIBILITY

**Article 42** Where a highly energy-consuming industrial project, the construction of which is formally prohibited by the State, is put up in violation of the provisions of Article 13 of this Law, the administrative department for energy conservation of the people's government at or above the county level shall submit its proposal to the people's government to which it belongs that the government shall, in line with the limits of authority as prescribed by the State Council, order suspension of production or use of the project.

**Article 43** Where an enterprise that manufactures energy-consuming products uses energy exceeding the quota set for energy consumption per unit product, in violation of the provisions of Article 24 of this Law and to a serious extent, and fails to solve the problem or meet the requirements within the time limit, the administrative department for energy conservation of the people's government at or above the county level may submit its proposal to the people's government to which it belongs that the government shall, in line with the limits of authority as prescribed by the State Council, order suspension of production for consolidation or closedown.

**Article 44** Where an enterprise that, in violation of the provisions of Article 25 of this Law, produces or sells energy-using products which the State has eliminated by official order, the administrative department for supervision over product quality of the people's government at or above the county level shall order that it stop producing or selling such products, confiscate such products and the illegal gains there from and impose a fine of not less than one time but not more than five times the illegal gains; and the administrative department for industry and commerce of the people's government at or above the county level may revoke its business license.

**Article 45** Where an enterprise uses, in violation of the provisions of Article 25 of this Law, energy-using equipment which the State has eliminated by official order, the administrative department for energy conservation of the people's government at or above the county level shall order that it stop using such equipment and have the equipment confiscated; if the circumstances are serious, the said department may submit its proposal to the people's government to which it belongs that the government shall, in line with the limits of authority as prescribed by the State Council, order suspension of operation for consolidation or close-down.

**Article 46** Where a unit or individual, in violation of the provisions of Article 25 of this Law, transfers eliminated

energy-using equipment to another user, the administrative department for supervision over product quality of the people's government at or above the county level shall confiscate its or his illegal gains and impose a fine of not less than one time but not more than five times the illegal gains.

**Article 47** Where a unit or individual, in violation of the provisions of Article 26 of this Law, fails to clearly indicate the norm for energy consumption in its or his product specifications or labels, the administrative department for supervision over product quality of the people's government at or above the county level shall order that it or he make amends within a time limit and may impose a fine of not more than 50,000 Yuan. Where a unit or individual, in violation of the provisions of Article 26 of this Law, indicates the norms for energy consumption, in its or his product specifications or labels, that do not conform to the actual conditions of the products, the unit or individual concerned shall, in addition to being punished in accordance with the provisions of the preceding paragraph, bear civil liabilities in accordance with the provisions of relevant laws.

**Article 48** Where a unit or individual, in violation of the provisions of Article 27 of this Law, uses labels bearing forged certificates for the quality of their energy-conserving products or labels bearing the certificates for the quality of another's energy-conserving products, the administrative department for supervision over product quality of the people's government at or above the county level shall order that it or he publicly make amends and shall confiscate its or his illegal gains and may also impose a fine of not less than one time but not more than five times the illegal gains.

**Article 49** Any State functionary who, in the work of energy conservation, abuses his power, neglects his duty or engages in malpractices for personal gain to such an extent as to constitute a crime shall be investigated for criminal responsibility according to law. If it does not constitute a crime, he shall be given administrative sanctions.

## **CHAPTER VI SUPPLEMENTARY PROVISIONS**

**Article 50** This law shall go into force as of January 1, 1998.

## Industrial Standards

### 1. Calculation Method of Water Usage in Woven Fabrics Wet Processing and Unit Consumption Quota

**Quota standard of unit Water consumption for Printing and Dyeing Products:**

**Quota Standard of per Hundred Loom-state Fabric, weight of 10.01-14.00 Kg (Table 1)**

Product Category	Pure Cotton				Polyester Cotton			
	Bleaching	Single-colored Fabric	Multi-colored Fabric	Finishing	Bleaching	Single-colored Fabric	Multi-colored Fabric	Finishing
<b>Water Consumption Quota</b>	1.209	2.434	3.193	1.044	0.955	2.244	2.852	0.639

Product Category	Raised Cashmere			Synthetic Fiber			Pure Chemical Fiber		
	Bleaching	Single-colored Fabric	Multi-colored Fabric	Bleaching	Single-colored Fabric	Multi-colored Fabric	Bleaching	Single-colored Fabric	Multi-colored Fabric
<b>Water Consumption Quota</b>	0.678	1.866	2.844	0.497	1.715	2.644	0.264	1.394	1.819

**Quota Standard for per Hundred Loom-state Fabric, weight of 20.01-22.00 Kg (Table 2)**

Product Category	Pure Cotton	
	Bleaching	Finishing
<b>Water Consumption Quota</b>	4.081	2.045

**Quota Standard for per Hundred State-loom Fabric, weight of 24.01-26.00Kg (Table 3)**

Product Category	Corduroy		
	Bleaching	Single-colored Fabric	Multi-colored Fabric
<b>Water Consumption Quota</b>	2.477	4.586	5.642



### 3. Calculation Method of Water Usage in Knitted Goods Wet Processing and Unit Consumption Quota

#### Quota Standard of Unit Water Withdrawal for Knitting, Printing and Dyeing Products

M<sup>3</sup>/Ton

A Level			B Level		
Category		Quota	Category		Quota
Bleaching	Chemical Fiber	92.00	Bleaching	Chemical Fiber	105.30
	Cotton	116.00		Cotton	160.65
	Mercerized Cotton	139.20		Mercerized Cotton	184.44
Dyeing	Light Colored Chemical Fiber	117.00	Dyeing	Light Colored Chemical Fiber	150.00
	Light colored Cotton	141.60		Light colored Cotton	186.00
	Light Colored Mercerized Cotton	165.20		Light Colored Mercerized Cotton	210.79
	Dark Colored Chemical Fiber	141.60		Dark Colored Chemical Fiber	198.80
	Dark Colored Cotton	168.00		Dark Colored Cotton	238.85
	Dark Colored Mercerized Cotton	192.01		Dark Colored Mercerized Cotton	264.67
Printing	Chemical Fiber Direct Printing	174.00			
	Cotton Direct Printing	213.50			
	Mercerized Cotton Direct Printing	237.90			
	Cotton Dark Color Resist and Discharge Printing	285.95			

\* A Level: for enterprises established after July 1, 1998.

B Level: applied to enterprises established before or on July 1, 1998.

#### 4. Cleaner Production Standard-Textile Industry (Dyeing and Finishing of Cotton)

Levels (international advanced/ national advanced/ basic)	L1	L2	L3
<b>Resource and Energy Consumption Parameters</b>			
<b>1. Water Consumption</b>			
woven printing & Dyeing Fabric / (t / 100m) <sup>1</sup>	≤2.0	≤3.0	≤3.8
Knitted printing & Dyeing Fabric / (t / t) <sup>2</sup>	≤100	≤150	≤200
<b>2. Electricity Consumption</b>			
woven printing & Dyeing Fabric / (kWh / 100m) <sup>3</sup>	≤25	≤29	≤30
Knitted printing & Dyeing Fabric / (kWh / t) <sup>4</sup>	≤800	≤1,000	≤1,200
<b>3. Coal Equivalent Consumption</b>			
woven printing & Dyeing Fabric / (kg / 100m) <sup>5</sup>	≤35	≤50	≤60
Knitted printing & Dyeing Fabric / (kg / t) <sup>6</sup>	≤1,000	≤1,500	≤1,800
<b>Pollutants Generation Parameters</b>			
<b>1. Waste Water Generation</b>			
woven printing & Dyeing Fabric / (t / 100m) <sup>7</sup>	≤1.6	≤2.4	≤3.6
Knitted printing & Dyeing Fabric / (t / t) <sup>8</sup>	≤80	≤120	≤160
<b>2. COD Generation</b>			
woven printing & Dyeing Fabric / (kg / 100m) <sup>9</sup>	≤1.4	≤2.0	≤2.5
Knitted printing & Dyeing Fabric / (kg / t) <sup>10</sup>	≤50	≤75	≤100

### 5. Cleaner Production Standard-Chemical Fiber industry (Spandex)

Levels (international advanced/ national advanced/ basic)	L1	L2	L3
<b>Resource and Energy Consumption Parameters</b>			
Levels (international advanced/ national advanced/ basic)	L1	L2	L3
1. Raw Water Consumption (t / t)	≤40	≤60	≤110
2. Energy Consumption (tce / 1,000 yuan of output value)	≤0.5	≤1.0	≤1.2
<b>Pollutants Generation Parameters</b>			
<b>1. Waste Water</b>			
Waste Water Generation (t / t)	≤15	≤35	≤70
COD <sub>cr</sub> Generation (kg / t)	≤6.0	≤28	≤140
DMF or DMAc Generation (kg / t)	DMAc≤4	DMF≤11 DMAc≤8	DMF≤25 DMAc≤20
<b>2. Waste Air</b>			
DMF or DMAc Generation (kg / t)	DMAc≤2	DMF≤20 DMAc≤5	DMF≤30 DMAc≤8
SO <sub>2</sub> (kg / t)	≤12	≤20	≤30
Dust (kg / t)	≤2	≤3	≤5
<b>3. Solid Waste</b>			
Waste Fiber (kg / t)	≤10	≤20	≤25
Waste Liquid (kg / t)	≤15	≤20	≤40
Waste Residue (kg / t)	≤8	≤15	≤20

### 6. Cleaner Production Standard-Chemical Fiber industry (Polyester Fiber)

Levels (international advanced/ national advanced/ basic)	L1	L2	L3	
<b>Resource and Energy Consumption Parameters</b>				
<b>1. Raw Water Consumption (t / t)</b>				
PET	≤0.90	≤1.50	≤1.70	
<b>2. Comprehensive Energy Consumption (kg coal equivalent / t)</b>				
Polyester	≤4.0	≤7.0	≤12.0	
Continuous PET	≤150	≤165	≤180	
Non-continuous PET	≤165	≤180	≤200	
Polyester (long fiber)	≤220	≤270	≤330	
Polyester (industrial long fiber)	≤360	≤380	≤400	
Polyester (short fiber)	≤160	≤180	≤200	
Chip Spinning	≤250	≤270	≤300	
<b>Pollutants Generation Parameters</b>				
<b>1. Waste Water Generation (t / t)</b>	PET	≤0.30	≤0.70	≤0.90
	Polyester	≤1.2	≤1.4	≤1.6
<b>2. COD<sub>cr</sub> Generation (kg / t)</b>	PET	≤2.3	≤4.0	≤4.8
	Polyester	≤1.8	≤2.0	≤2.3
<b>3. VOC Generation (kg / t)</b>	PET	≤0.35	≤0.40	≤0.45
	Long Fiber	≤0.04	≤0.06	≤0.10
	Short Fiber	≤0.54	≤0.77	≤0.90
<b>4. SO<sub>2</sub> (kg / t)</b>	≤0.70	≤0.90	≤1.20	
<b>5. Waste Fiber (kg / t)</b>	≤10	≤20	≤25	

## 7. Effluent Standards of Water Pollutants for Dyeing and Finishing of Textile Industry

Unit: mg/L (exception: PH and Chroma)

No.	Pollutants	Effluent Standards	Location of pollutant emission and monitoring
1	pH	6~9	Discharge Pipe of the Waste Water Treatment Facilities
2	CODcr	80	Discharge Pipe of the Waste Water Treatment Facilities
3	BOD5	20	Discharge Pipe of the Waste Water Treatment Facilities
4	SS	60	Discharge Pipe of the Waste Water Treatment Facilities
5	Chroma (Colority-Dilution Method)	60	Discharge Pipe of the Waste Water Treatment Facilities
6	Ammonia	12	Discharge Pipe of the Waste Water Treatment Facilities
7	TN	15	Discharge Pipe of the Waste Water Treatment Facilities
8	TP	0.5	Discharge Pipe of the Waste Water Treatment Facilities
9	Chlorine Dioxide	0.5	Discharge Pipe of the Waste Water Treatment Facilities
10	Sulfide	Not Allowed	Discharge Pipe of the Equipment or Workshop
11	Hexavalent Chromium	Not Allowed	Discharge Pipe of the Equipment or Workshop
12	Aniline	Not Allowed	Discharge Pipe of the Equipment or Workshop
Water Discharge Basis per Unit Product (m <sup>3</sup> / t)		210 <sup>(1)</sup>	Discharge Pipe of the Waste Water Treatment Facilities
Note (1): The weight of the textile depends on the length, width and thickness of the product. For conversion please refer to the provisions of FZ/T01002-91, Appendix B.			

### 8. Emission Standard of Air Pollutants for Coal-burning Oil-burning Gas-fired Boilers

**Table I: Maximum Allowable Emission Limits of Boiler Soot and Blackness Concentration**

Type of Boiler		Applicable Zone	Dust emission concentration (mg / m <sup>3</sup> )		Dust Blackness (Lindeman Black Grade)
			Time Period I	Time Period II	
Coal-burning Boiler	Natural Ventilation Boiler (<0.7 MW<1 t / h>)	Zone I	100	80	1
		Zone II, III	150	120	
	Other Types	Zone I	100	80	1
		Zone II	250	200	
Zone III	350	250			
Oil-burning Boiler	Light Diesel Oil, Kerosene	Zone I	80	80	1
		Zone II, III	100	100	
	Other Fuel Oil	Zone I	100	80*	1
		Zone II, III	200	150	
<b>Gas-fired Boilers</b>		Zone I, II, III	50	50	1

**Table II: Maximum Allowable Emission Concentration of Boiler Sulfur Dioxide and Nitrogen Oxides**

Type of Boiler		Applicable Zone	SO <sub>2</sub> Emission Limits (mg / m <sup>3</sup> )		NO <sub>2</sub> Emission Limits (mg / m <sup>3</sup> )	
			Time Period I	Time Period II	Time Period I	Time Period II
<b>Coal-burning Boiler</b>		Zone I, II, III	1200	900	/	/
<b>Oil-burning Boiler</b>	Light Diesel Oil, Kerosene	Zone I, II, III	700	500	/	400
	Other Fuel Oil	Zone I, II, III	1200	900*	/	400*
<b>Gas-fired Boilers</b>		Zone I, II, III	100	100	/	400

**Table III: The Initial Emission Limits of coal-fired boiler soot and blackness concentration**

Type of Boiler		Aar (%)	Initial Emission Limit (mg / m <sup>3</sup> )		Dust Blackness (Lindeman Black Grade)
			Time Period I	Time Period II	
<b>Layer-burning Boiler</b>	Natural Ventilation Boiler (<0. 7 MW<1 t / h>)	/	150	120	1
	Other Types (≤2. 8MW<4t / h>)	Aar≤25%	1800	1600	1
		Aar>25%	2000	1800	
	Other Types (>2. 8MW<4t / h>)	Aar≤25%	2000	1800	1
Aar>25%		2200	2000		
<b>Fluidized Bed Combustion Boiler</b>	Circulating Fluidized Bed Boiler	/	15000	15000	1
	Other Types	/	20000	18000	
<b>Spreader-stoker-fired Boiler</b>		/	5000	5000	1

**Note: New heavy oil and residual oil-fired boilers are not allowed to be established in Zone I.**

----- END OF THIS REPORT-----