

ASIAN 2006
DECENT WORK
DECADE 2015

亚洲体面劳动十年2006-2015



国际劳工组织

MOHRSS

人力资源和社会保障部

Study on Green Employment in China

Institute for Labor Studies

Ministry of Human Resources and Social Security



*Green Jobs
in China*

Green Jobs in China 中国绿色工作

Study on Green Employment in China

Institute for Labor Studies
Ministry of Human Resources and Social Security

ILO Office for China and Mongolia March 2010

Contents

Executive Summary	3
Chapter 1. Background	7
1.1 International context.....	7
1.2 National context.....	7
1.3 Current research.....	8
1.3.1. Research on the green economy	8
1.3.2. Relevant research abroad	9
1.3.3. Relevant research at home	9
1.4 Objectives and framework.....	9
Chapter 2. Definition of green jobs in China	11
2.1 Current definitions	11
2.2 Definition of green jobs in China	11
2.2.1. Theoretical definition	11
2.2.2 Policy definition	13
2.2.3. Categories of green jobs	14
Chapter 3. Legal, institutional and policy environment for the development of green jobs.....	15
3.1 Environmental protection legislation	15
3.2 Relevant industrial policy.....	15
3.2.1. Policies to develop renewable energy and optimize China’s energy structure	15
3.2.2. Addressing outdated capacity	16
3.2.3. Pollutant and emission reduction and promoting technological innovation in conventional industry ..	17
3.2.4. Saving energy, improving energy-efficiency and reducing pollutants	17
3.2.5. Promoting recycling pilot projects, achieving clean production and reducing emissions	17
3.2.6. Increasing the level of resource use	18
3.2.7. Strengthening the management of environmental pollution.....	18
3.2.8. Developing the environmental protection industry.....	18
3.2.9. Reducing GHG emissions in agriculture and the countryside	19
3.2.10. Promoting tree planting and enhancing the capacity of carbon sinks.....	19
3.3 Relevant economic policy	19
3.3.1. Fiscal policy	19
3.3.2. Tax policy.....	20
3.3.3. Financial policy.....	20
Chapter 4. The current status of green jobs in China.....	23
4.1 Employment in environment protection industries	23
4.2 Employment in renewable energy	25
4.3 Impacts of the thermal power industry’s “upgrade the large and suspend the small” policy	25
4.4 Green employment in the forestry industry	26
Chapter 5. The transition of the power industry to green employment	31
5.1 Characteristics of the power industry	31
5.2 Methodology.....	31
5.3 Background of the survey group and the transition to a green economy	32
5.3.1 Employment background of surveyed enterprises.....	32
5.3.2 Employment impacts of the green transition of power industry enterprises	34
5.3.3 Effect of the financial crisis on the companies	35
5.4 The general workplace composition in the surveyed companies	35
5.4.1. Demographic information.....	35
5.4.2. Worker’s education and skills	37
5.4.3 Employee status	39

5.4.4. Job seeking and job changing	41
5.5 Different frontline worker’s working conditions in power generation industry.....	42
5.5.1. Working hours and time arrangements	42
5.5.2 Wages and benefits	43
5.5.3 Social security	44
5.5.4. Working environment	46
5.6 labour Relations.....	53
5.7 Training at different power enterprises.....	53
5.7.1 Changing skill requirements in the power sector.....	53
5.7.2 Training programmes	54
5.7.3 Employee satisfaction with training programmes.....	55
5.8 Job security, job satisfaction and worker concerns.....	56
5.9 Summary of key findings of the power sector study	59
5.9.1 Power industry restructuring and the impacts on employment	59
5.9.2 Environmental protection measures in the power industry and the impact on employment	60
5.9.3 Comparison of employment in the wind and coal power sectors	61
Chapter 6. The principles and policy suggestions for green job development	63
6.1 The guiding ideology and basic principles for the promotion of green employment.....	63
6.1.1. Promotion of green employment through classification	63
6.1.2. Industrial, environmental and employment policies are equally important and should be considered concurrently	63
6.1.3. Focusing on the effects on employment of low-carbon, sustainable development	64
6.1.4. Policies that promote green employment require further scrutiny of the concept of green employment	64
6.1.5. Industry-specific green job promotion policies.....	64
6.2 Policy suggestions for the promotion of green employment.....	64
6.2.1. Ensure green employment is developed through legal channels	65
6.2.2. Policy measures for promoting green employment	66
6.2.3. Develop a green skills development plan for the promotion of green employment	69
6.2.4. Strengthening the protection of green workers’ rights.....	70
6.2.5. Working with social partners to promote green employment	70
6.2.6. Improving publicity and creating an atmosphere for the development of green employment	71
6.2.7. Improving the environment for promoting green development	71
Bibliography	72

Executive Summary

In China, green employment can be defined as work in industries, sectors, enterprises, and positions which have low input, high output, low consumption, low emissions, recyclability and sustainability. This study presents both the current situation and potential for green employment in China, as well as results of surveys conducted in eight companies in the power industry. The overall purpose of the study is to make policy recommendations for China's transition toward green employment.

Green Employment in China – the position now

Green employment has been developing for a long time in China and has already come of scale. In 2008, three million people were employed in environmental protection-related industries and by the end of 2007, jobs in new-energy, forestry, parks, solar water heaters and a range of recycling industries totaled around 17.2 million. China has made a great contribution to global green employment, either in aggregate or in terms of growth rate.

In the transformation to a green and low carbon economy, many non-green business opportunities have disappeared or will disappear. For example, enterprises that develop natural forestry resources will face serious employment issues; the closure of small thermal generator units will leave 500,000 people unemployed; millions of jobs in the non-timber paper pulp and paper industry will be affected; and employment in traditional energy industries will significantly contract. The number of new jobs created through new-energy technologies is limited and the direct employment effects of energy efficiency in buildings, transportation, and agriculture are not yet clear. The outlook for direct employment creation in the transition to a green and low carbon economy is not optimistic, and any positive employment effects can mainly be expected through indirect job creation.

Generally speaking, while green employment in China is still in its early stages, and faces the challenges associated with structural unemployment, there is still huge potential for green jobs in the path to developing a green and low carbon economy.

Industrial Policies Affecting Green Business

China has gradually developed a legal framework for environment and resource protection, and has launched policies regarding green industries including:

- Developing renewable energies and optimizing the energy structure;
- Eliminating outdated production capacity;
- Facilitating the technical reconstruction of traditional industries;
- Saving energy and improving energy efficiency;
- Piloting a circular economy and achieving clean production;
- Improving the comprehensive utilization of resources;
- Strengthening the control and governance of environmental pollution;
- Developing the environmental protection industry;
- Reducing greenhouse gas emissions in agricultural and rural areas;
- Promoting planting and reforestation and improving carbon absorption.

China has accumulated a degree of experience in formulating policies to promote green employment. China will also draft and improve policies relating to finance and taxation, and establish laws, systems and policies which are preferential to the development of green employment.

The transformation of Chinese power enterprises toward Green Employment

The power industry is the lifeline of Chinese economy. While the industry is an employer of millions of workers, it is

also a large-scale emitter of greenhouse gases, and a key industry targeted for regulation under China's environmental protection policies. The research team conducted interviews and questionnaire surveys of the management and employees at eight thermal and wind power plants in Inner Mongolia and Tianjin. The purpose of the enterprise survey was to gain understanding of the influence that structural adjustment in the power sectors has on employment in order to make policy recommendations for the promotion of green employment. The survey results found that:

- Structural adjustments in the power sector have significant impacts on employment in the sector. Investment in large power generation units and the phasing out of small units will lead to lay-offs in the thermal power industry, but at the same time new jobs are emerging in the wind energy sector and in local value chains linked to production and maintenance of desulphurization equipment.
- Small thermal power plants are facing huge challenges as desulfurization equipment and technologies increase operating costs.
- The policy to phase out small thermal power generation units and the application of new low carbon technologies puts older workers most at risk of losing their jobs; older workers also have most difficulty in finding re-employment. Sufficiency of skills and need for further training were major concerns expressed by workers in all age groups.
- Generally speaking, restructuring in the power sector has positive impacts on employment conditions and work in the sector. Wind power plants and new thermal generator units have considerably safer and healthier working conditions than old thermal units, where occupational diseases are common.

Policy Recommendations

Green employment promotion will be the direction of future development, as it offers great potential for sustainable development and the creation of decent jobs. In light of China's position today, green employment should be promoted in line with the following principles: 1) the promotion of the green economy should take the employment effects into full consideration; 2) the promotion of green jobs needs to take the diversity of different kinds of green jobs into account, with the government playing an active role and fully utilizing market forces; 3) the policy coherence between industrial, environmental protection, and employment policies is essential in green jobs promotion and each policy area should be given the same amount of importance; and 4) special policies for promoting the development of green employment should be formulated commensurate with industry strengths.

In regard to specific policies, this study puts forward the following eight recommendations:

1. Use legal means to protect the development of green employment

- Conduct employment assessments of industrial and environmental protection policies;
- Amend and improve relevant laws, make employment assessments a legally enforceable part of industrial and environmental protection policies

2. Strengthen policy support promoting the development of green employment

- Establish a greening mechanism for the human resources market;
- Make existing employment policies green;
- Create a batch of green jobs using supportive policies;
- Develop green jobs as part of construction and development projects being carried out in rural and western China;
- Support small green enterprises to create jobs

3. Establish a green skills development plan to promote the development of green jobs

- Investigate the current status of green employment in China and establish a list of green jobs;
- Establish plans to upgrade technology and skills in green industries;
- Make current entrepreneurship training green;

- Strengthen training that targets jobs transformation as part of the industry shift towards green employment;
- Carry out an accreditation of qualifications relating to green jobs and verify green skills;
- Establish a system for green job skills which covers different types of workers

4. Strengthen the protection of worker rights and interests in green jobs

5. Work with social partners to promote green employment: the development of green employment must occur by way of consensus between the government, employers and workers

6. Strengthen promotional activities, creating an atmosphere where the whole society advocates the development of green jobs

7. Improve the environment for promoting the green development of enterprises

- Improve environmental protection standards;
- Adopt incentives and punitive measures to facilitate the sustainable development of enterprises;
- Continuously improve financing mechanisms supportive of green development

Research Team

This research is conducted by the research team of Institute for Labor Studies, Ministry of Human Resources and Social Security. Team leader: You Jun; team members: Zhang Libin, Yin Manxue, Liao Jun, Li Hong, Sun Yuxiang, Yuan Xiaohui.

Chapter 1. Background

1.1 International context

For a long time the UN has attached great importance to global environmental and ecological sustainability and recently climate change became a key issue. Since the financial crisis of 2008, the UN has considered green policy as an important impetus for economic recovery. During the greening process, technology, systems and the economy have formed the major points for discussion with less focus on issues relating to society and employment.

The Green Jobs Initiative is a global partnership established in 2007 between the International Labour Organization (ILO), the United Nations Environment Program (UNEP), and the International Trade Union Confederation (ITUC) with the International Organization of Employers (IOE) joining in 2008. The initiative was launched to promote opportunity, equity, and a just transition process and to encourage governments, employers, and workers to collaborate on coherent policies and effective programs that will support a green economy, with green jobs and decent work for all. Green employment is an entirely new research area, with awareness of the issue changing rapidly at the global level. As a country with a huge labour force, China's effort in promoting green jobs has captured the world's attention.

1.2 National context

The Chinese government attaches great importance to environmental and ecological issues, focusing on environmental protection in the process of promoting employment. In 1984, the Chinese government issued *The Ruling on Environmental Protection Work*, stating that promoting and improving the Chinese people's living and natural environments, preventing pollution and environmental damage is a fundamental part of national policy in the move toward modernization. In 2006, the State Council issued *The Ruling on Implementing a Scientific Approach to Development to Strengthen Environmental Protection*, stating that the country's economic and social development should be coordinated with environmental protection, a commitment to strengthening environmental protection, promotion of the recycling industry, development of environmental and related industries, the nurturing economic growth and increasing employment. Protecting the environment has promoted the development of the green economy, in turn increasing employment.

The development of green jobs aligns with the Chinese government's development strategy. In 2003, the government proposed a comprehensive, coordinated and sustainable scientific approach to development. The building of a harmonious socialist society has formed part of the six characteristics identified by the Chinese government in moving towards a society in which productivity will be developed, the prosperity of the people will increase, and in which home and work life can be enjoyed. In 2006, the government set about enhancing resource efficiency and enhancing the environment as one of the nine objectives of building a harmonious society. This proposed change to the pattern of economic growth brings along improvement to the quality of development, promotion of development based on energy efficiency, clean energy and safety, in order to achieve comprehensive and sustainable development of economy and society. Therefore, in pursuit of an environmentally friendly society, changes made to the production and consumption patterns will drive the creation of green jobs. The government is also keenly aware of green jobs and has taken many measures to promote green job development and protect the rights of workers. This is in line with international trends.

In fact, green occupations in China have made a tremendous contribution to global green employment in terms of volume and growth. For example, the number of workers in the solar water heater industry has reached 600,000, accounting for 96% of the global total¹. It is estimated that there are ten million people engaging in recycling business in China and approximately 700,000² workers in the home appliances recycling. Six major forestry projects in China

¹ Constance Thomas, Green Jobs—International strategy and pilot programme in China. International Forum on China Green Economy 6-7 Nov, 2009, Beijing.

² Constance Thomas, Green Jobs—International strategy and pilot programme in China. International Forum on China Green Economy 6-7 Nov, 2009, Beijing.

will also create 20 million job opportunities³. At the global level, 50% of the new construction is carried out in Asia. Improving the energy efficiency in the construction sector will further create job opportunities. On the other hand, shifts in the labour market will create unemployment. For example, closing down small thermal power plants will result in 500,000 people losing their jobs. If the pulp and paper industry switches to using non-wood materials it will also result in thousands of lost jobs.

China also has many other intervention practices to promote green jobs. In the early 1990s, China issued specific policies on employment of workers from five industries like coal and forestry, regarding cities with energy and resources crisis, for enterprises dislocated in the three gorges areas, and for workers who lost jobs due to bankrupted enterprises. In addition, there were also policies on promoting self-employment and enterprise development. The most comprehensive policy was one on a more positive employment policy system aiming to solve the unemployment problem of the SOEs, including a human resources policy, reemployment policy for laid-off workers, policy on adjusting labour relations, policy on improving employment insurance, etc.

In summary, China's strategy on developing green jobs is in line with international trends. The speed of development is fast and the policies are many. In the important period leading up to the drafting of China's twelfth Five Year Plan, it is necessary to clarify the scope of green jobs in China; further promote the principle and development of green jobs at all levels; and evaluate current policies to enrich and improve policies relating to employment. In the meantime, under the backdrop of global climate change, China, as a developing country needs to take a responsible approach to address the issue of employment during the transition to green economy.

1.3 Current research

Research on green jobs is still a new concept in China and no outcomes or findings are readily available. Existing research mainly falls within the following categories:

1.3.1. Research on the green economy⁴

Although green jobs are a new topic, much research has been done on the green economy.

The greening of the economy refers to the process of reconfiguring businesses and infrastructure to deliver better returns on natural, human and economic capital investments, at the same time reducing greenhouse gas emissions, extracting and using fewer natural resources, creating less waste and reducing social disparities. Therefore, the green economy is considered to be able to both create green jobs, ensure real, sustainable economic growth, and prevent environmental pollution, global warming, resource depletion, and environmental degradation.

The UNEP led Green Economy Initiative (GEI) is designed to assist governments in "greening" their economies by reshaping and refocusing policies, investments and spending towards a range of sectors, such as clean technologies, renewable energies, water services, green transportation, waste management, green buildings and sustainable agriculture and forests.

Environment policies on promoting the green economy mainly include: increasing the environmental access threshold; optimizing industrial construction; strengthening the capacity of the administration to enforce the environmental legal and regulatory framework; incorporating environmental protection into production, transportation, redistribution and consumption processes; plan and implement environmental economy policies to create incentive mechanisms helpful to environment protection.

³ Constance Thomas, Green Jobs—International strategy and pilot programme in China. International Forum on China Green Economy 6-7 Nov, 2009, Beijing.

⁴ Environment policies on actively promoting green economy, by Xia Guang, International Forum on China's green economy, November 2009.

1.3.2. Relevant research abroad

In 2008, the ILO, in cooperation with UNEP, IEO and ITUC, issued a report describing green employment as “The trend towards decent work in a sustainable, low-carbon world”. The report was the first ever comprehensive paper on green jobs which summarized green jobs as having the following characteristics:

- 1) Scarcity of resources, deterioration of the environment and climate change has posed serious threats to the sustainable development of the human society. Pursuing coordinated sustainable development of the environment, economy and society has become the only option for mankind, involving a transition to a green low carbon economy. This will bring with it tremendous job opportunities.
- 2) Green jobs are decent jobs in all economic sectors that will improve the environmental footprint. The concept of Green Jobs is based on two dimensions, decent work and the impact on the environment. The concept of Green Jobs is therefore a dynamic process with differences between countries where different green jobs have different impacts on protection and restoration of environmental quality.
- 3) The transition to a green low carbon economy will entail job substitution and job losses while also creating new job opportunities.
- 4) Green jobs can be found and created in all industries and sectors. Green jobs are found, for instance, in the areas of renewable energy, construction, transportation, basic industry, agriculture and forestry.
- 5) Green jobs can be found in every corner of life. They can be created in the background of all occupations, technology and educational level.
- 6) Green jobs can originate from internal shifts within one sector or industry. Most green jobs are based on conventional professions and occupations with specific changes in the content and capabilities of the job. Even most green jobs created entirely through technological and industrial innovation will have supply chains linked to conventional industries such as steel and manufacturing, but the content of the jobs will undergo change with new technical and performance requirements.
- 7) Skills gaps and shortages are common constraints of the development of green economy. Narrowing the skills gap and predicting future demand are fundamental to the transition toward a green low carbon economy.

1.3.3. Relevant research at home

At the time this report was prepared, there had been no studies of green employment in China. Relevant research mainly discussed the employment impacts of the transition to a low carbon economy. This included quantitative research on the impact on employment of environment related policies in the power generation and the forestry sectors.

Research on the green economy also provided theoretical calculations on green jobs and low carbon employment. Research on green jobs also provided comprehensive and inspirational references for this study.

1.4 Objectives and framework

The objective of conducting the China green jobs study is to be able to make well-informed policy recommendations for the promotion of green jobs, focusing on green job creation in the context of active employment policies. This objective is set amongst a larger view to promoting environmentally sustainable employment policies. In protecting the environment, new green jobs opportunities should be developed while stabilizing current green job opportunities. During the process of a industrial restructuring and transition towards the green economy, China ought to safeguard legal rights of workers. In optimizing the positive impact and reducing the negative impact of the environment on employment, measures should be taken to put the unemployment rate in a controllable range and pursue an environmentally sustainable society and economy. Based on the current situation and research available in China, this purpose of this study is to answer the following questions:

1. What are green jobs? The concept of green jobs is new to China. Clarifying the green job concept means promotion of the green employment and establishing a research base.
2. What is the picture of green jobs in China? Green employment is comprehensive and involves all sectors

and areas of the economy. This is the premise for a study of green employment. For example, there are many industries in China such as agriculture, fishery and tourism which depend heavily on climate and the environment. The livelihoods of workers in such sectors are hugely affected by the environment.

3. What is the impact of green jobs on workers? In the context of developing measures to adapt to climate change, investment in certain sectors will create more opportunities for people susceptible to losing their jobs. Transformation toward more sustainable production may cause huge changes to the labour force in terms of short term demand. Some workers will have to adapt to new production techniques and technologies and learn new skills or face the prospect of losing their jobs. New energy and industrial policies can bring about opportunities for green jobs.
4. How to promote the development of green jobs and safeguard employment rights of workers? To appropriately manage employment transition, workers must be provided with training or retraining plans so that they can be qualified to engage in environment friendly jobs or alternately receive some kind of financial compensation. Some cities helped older workers find reemployment in water resource protection, city greening projects, afforestation, sand management and developing agricultural industrialization. Another example of a reemployment channel is via cooperation between trade union and companies.

Chapter 2. Definition of green jobs in China

2.1 Current definitions

Green jobs are an entirely new research area, with knowledge of the topic growing rapidly across the globe. Currently, there are several internationally recognized definitions for green jobs.

The International Labour Organization (ILO) defines Green jobs as decent jobs created in economic sectors and activities, which will reduce environmental impact and ultimately achieve sustainable development in environment, economy and society.

In the UNEP/ILO/ITUC/IOE report entitled *Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World*, green jobs are defined as work in agriculture, industry, service and management that are helpful to protect or restore environmental quality. Green jobs are jobs which, for instance, help reduce consumption of energy and raw materials (dematerialize the economy), reduce greenhouse gas (GSG) emissions (decarbonize the economy), protect and restore ecosystems or, minimize and prevent waste generation and pollution.

The Minnesota Green Jobs Task Force defined green jobs as employment and entrepreneurial opportunities that are part of the green economy, including the four industry sectors of green products, renewable energy, green service and environmental conservation. Green products refer to products produced with reduced environmental impact and improved resource and energy efficiency. They are mainly produced in construction, transportation, consumption and industry sectors. Renewable energy includes solar power, wind, hydropower, geothermal energy and bio-fuel. Green services refer to industries or sectors that provide all kind of services to help enterprise improve their environmental foot-print and produce eco-friendly products, including services to sectors like energy infrastructure and energy efficiency, agriculture, recycling and waste management. Environmental conservation refers to activities, including non-profit making activities, and business related to the preservation of biodiversity and endangered species, the protection of eco-systems, air, water and land resources.

The definitions used by the ILO and UNEP highlight the decent work and environmental dimensions of the concept of green jobs. The UNEP report emphasizes the industrial and technological features of green jobs. The Task Force definition refers to employment in the green sectors. All these definitions while providing a definition of green jobs from different angles, do not fully explain the scope and characteristics of the term.

2.2 Definition of green jobs in China

2.2.1. Theoretical definition

‘Green’ indicates that the environment is in a sound condition. In order to achieve sustainable development, it is necessary to ensure the environmental sustainability of the economy and the world in which we live. It also causes for reliance on environmentally sustainable production and production methods which includes the development of eco-friendly industry, technologies and production techniques and life styles. From a practical point of view, the greening process includes six aspects. First is to develop more industries with less environmental impact, such as eco-agriculture, eco-tourism, renewable energy, the services industry, high-level new technology, forestation, etc. Second is to restrict the development of energy intensive industries (EIIs) which have huge impacts on the environment such as fossil-fuel based energy generation, metallurgy, building materials and light industries like paper making. Third is to green production through developing efficient production techniques, reducing or substituting the use of toxic and harmful substances, improving the efficiency and recycling of materials, preventing contamination of the environment and soil and water decontamination. Fourth is construction and maintenance of green public facilities in the city and countryside and the protection and administration of the public environment. Fifth is the protection and preservation of ecosystems and the environment, while sixth is the development of green services around green economy, including

green credit, green technology, green facilities, green insurance, green certification, etc.

All jobs that are able to make economic activities and living environment greener and more environment-friendly are green jobs. Green jobs have the following characteristics.

- Green jobs emphasize the environmental function of employment, meaning employment that is helpful to protect or restore environmental quality. Green jobs also emphasize the employment potency of environmental protection. General labour attribution is not the main focus.
- From an environmental view, green jobs have four characteristics. One is to reduce consumption of energy and raw materials (dematerialize the economy). Two is to avoid GHG emission (decarbonize the economy). Three is to protect and restore ecosystems (environmental economy). Four is to minimize waste and pollution (ecological economy).
- Ways to embody the above mentioned four characteristics are to: At the macro level, adjust economic production structure, use new renewable energy and raw materials, develop low-carbon and circular economies and environmental protection industries, etc. At the micro level, methods include improving production technology and providing appropriate services, etc.
- Green jobs are not jobs that have no environmental impact but those jobs that have less impact than average or can improve the quality of the environment i.e. green jobs have different degrees of 'green' such as dark green and light green. In a similar way, non-green jobs are classified as black or brown.
- The proportion of green jobs to total employment is related the level of form of development level. The development of green jobs cannot surpass historical limitations and must be pursued step by step.
- Evaluating green jobs standards is a relative process and is related to the specific characteristics of the environmental standards. Non-green jobs in developed countries might be classified as green jobs in developing countries. Green jobs might become non-green jobs as the economy develops In short, green jobs are considered to be very dynamic.
- Green jobs can be found in any industrial sector, dispersed across mining, conversion, transportation, industrial consumption, waste generation, and consumables etc. Great potential exists in green jobs in sectors such as construction, production, technology, equipment, light industry and services. Based on amounts of GHG emissions, the degree of reliance on natural resources, and contributions made to the economy and on employment and income, the *Low Carbon Report* believes that green jobs are mainly concentrated in six economic sectors: the renewable energy sector including wind power, solar power and bio-energy, construction, transportation, basic industry, agriculture and forestry.
- At the same time, there is an imbalance of green jobs within industry, professions and inter-professional level. Green jobs also show the imbalance between industries, professions and departments. Tertiary industry is normally greener than secondary industry. Of the 19 national economic sectors, agriculture, water resources, electricity, manufacturing, construction, and transportation are less green. In manufacturing sector, electricity, steel, building materials, electrolytic aluminum, ferroalloys, calcium carbide, hard coke, coal, flat glass and light industry (paper making, chemical, dyeing) are less green.
- In green jobs can be found workers with all kinds of occupations, skills and educational levels. labourers, skilled workers, entrepreneurs, highly educated technicians, engineers and managers can all be green job holders. Green jobs provide opportunities for managers, scientists, technicians as well as all other workers. Disadvantaged groups like young people, women, farmers, villagers and the poor can also find opportunities in green occupations.
- Green jobs do not necessary indicate new jobs. Some green jobs are entirely new while most green jobs are based on changes in the content and capabilities required for conventional profession and occupations Even green jobs created utterly through technological and industrial innovation have supply chains made up by conventional industries like steel and mechanical parts, the jobs of which need to undergo adaptation to new technical and performance requirements. In short, green jobs are either newly formed or created based on current jobs.
- The creation of green jobs will create direct, indirect and induced job opportunities. Direct green jobs are job opportunities in enterprises in environment protection and, equipment such as sewage and waste management. More indirect green jobs can be found indifferent industries and enterprises. Lifting environmental protection

standards will affect all sectors including production and consumption. Policy, research, finance (credit, insurance, and securities), supervision and trade also generate indirect employment. Therefore, studies into green jobs need to consider direct, indirect and induced employment.

- Green jobs require technological innovation. Technology gaps and skills incompetence will hinder the development of the green economy. The weakest point in the production chain will determine the level of a product's performance. Without qualified entrepreneurs and skilled workers, the technology and investment available cannot be used to achieve desired environmental and economic performance. The need to reduce the technological gap and predict the future is the basis for the transition to a green low-carbon economy. Simply stressing on hi-end technology and education will only result in imbalance of labour market. Therefore, to train green collar workers is important. Evaluate the potential of green jobs and monitor the process will benefit the mid and long term vocational training and education system, building connections between technological innovation and policy and investment.
- Small enterprises and local communities can create many green jobs.
- The development of green jobs includes four situations: some new jobs appear, some current jobs disappear, some jobs are substituted, and some jobs have more technological needs. These will have impact on the volume, structure, increment, and pattern of employment.
- Green job is actually an easy name without any significant meaning. The purpose or the fundamental meaning of promoting green jobs lies in two aspects: one is to draw attention to the importance of greening process's impact on increasing employment and creating decent jobs. The other is to promote green economy through green jobs. At certain extent, these two parts supplement each other.
- Based on China's basic policy of building ecological civilization and the fact that China is still in the middle level of industrialization and urban-rural dichotomy labour movement, we should firmly implement the green jobs strategy, integrate green jobs into the current strategy of expanding employment, issue relevant policy measures and promote green jobs during the process of expanding employment.
- From the perspective of human resources, green jobs strategy have three objectives. One is to expand employment with green jobs, not to deteriorate unemployment to a level that might threat economic and social development. Second is to promote the protection of workers' rights in the green jobs development. Third is to promote green economy through human resources development.

2.2.2 Policy definition

According to China's economic and social development plan and relevant annual government, industrial and institutional plans and policy measures, the definition of green jobs in China is employment in industries, professions, departments and enterprises that on an average social level have low input, high output, low consumption, low emissions, recyclability, and are sustainable. This is in line with China's development strategy to build a resource efficient and environment friendly society.

Low input and high output refer to employment generated by improving management levels and enhancing production efficiency. Enhancing production efficiency refers to minimizing resources used in production, conserving energy and being environment conscious. Production efficiency is the main driver of shifting economic growth from an extensive to intensive level. This will play a fundamental and decisive role in the overall economy and should become the driving force of green jobs. Low consumption and emissions refer to employment that is created through energy and resources saving and waste reducing by improving technological level. This is the basis for green jobs. Recyclability and sustainability are not only based on renewability and economic and social sustainability, but also refer to employment related to recycling economy, pollution management and ecological environment protection.

This definition is based on the current stage of China's economic and social development, present challenges and strategies for overcoming them and policy measures, all of which are in line with the global trend. China is a developing country with mid-low income levels, in the middle of industrialization and urbanization. The major problems faced by China are having the resources necessary to sustain the population, environmental pressures, the pattern of overwhelming economic growth and low productivity factors. China's Eleventh Five Year Plan states that in order to achieve coordinated sustainable development between the population, resources and the environment,

a resource-efficient and environment-friendly society must be built. Shifting economic growth and enhancing input-output ratios are part of a strategy to conserve resources, protect the environment, and reduce pollution and emissions: the combination of adaptation and mitigation. Low input, high output, low consumption, low emissions and recyclability summarize China's economic development strategy and define the category of green jobs in China. In addition to the UNEP/ILO definition, this definition also stresses low input, recycling and sustainability which embodies the characteristics of current Chinese economic development and the ideals of promoting sustainable environmental development.

2.2.3. Categories of green jobs

Green jobs are those related to the development of a low carbon, environmentally friendly economy. Jobs related to reducing the environmental footprint of different sectors include jobs that help to reduce and prevent pollution, treat contaminated resources, and preserve resources. Jobs related to the development of a low carbon economy help change production and consumption patterns by reducing the emissions of GHGs and increasing the capacity to capture them. The concept of low carbon development comes 20 years after the concept of environment protection. The idea and approaches to low carbon development and environmental protection are entirely different, as is employment in these two areas.

Low carbon development will provide global environmental benefits, whereas pollution control mainly provides local environmental benefits. Reducing emissions is beneficial for low carbon development, but this is not 100% low carbon. On the other hand, climate change has little effect on environmental pollution therefore the effects of low carbon development on environmental protection are also not significant. Therefore, jobs in the environmental protection sector are not necessarily low carbon jobs and low carbon jobs are not necessarily jobs in environmental protection. . While employment in these sectors overlap, the difference must be made. Climate change mitigation is centrally placed within today's international and national environmental agenda, as a result, low carbon employment is receiving more attention. As a general rule, green jobs include both jobs in low carbon development and environment protection employment. Neither can be neglected.

Chapter 3. Legal, institutional and policy environment for the development of green jobs

From pollution control and ecological restoration to building eco-societies and mitigating the effects of industrialization, the Chinese government is making three ideological changes: one is the transition from emphasizing economic growth and neglecting environment protection to stressing both; second is the parallel development of environment protection and economic growth; and the third is the transition away from protecting the environment purely through administrative means to solving environmental problems in combination with legal, economic and technological channels⁵. These transitions provide the background for the development of green jobs.

3.1 Environmental protection legislation

On September 13 1979, the Eleventh plenary session of the fifth National People's Congress passed the People's Republic of China (trial) Environmental Protection Law, the first law on environment protection in China. Since then, the legal system for environment and resources protection has gradually been formulated. Major legislations are listed below:

Ecological and natural resources protection laws include:

The *Land Management Law, Water Law, Forest Law, Grasslands Law, Soil and Water Conservation Law, Wildlife Protection Law*.

Laws relating to **environment pollution management and pollution control**, mostly in relation to air, water, solid waste, noise, radiation and standards on environment quality and emissions, include: the *Solid Waste Pollution Prevention and Control Law, Water Pollution Prevention and Control Law, Air Pollution Prevention Law, Water Pollution Control Regulation*.

The third category of law relates to **resources saving and comprehensive utilization of resources** like the *Energy Conservation Law*.

The fourth category relates to **promoting recycling and clean production** such as the *Clean Production Promotion Law, Renewable Energy Law, Circular Economy Promotion Law*.

The final and fifth category of law relates to **administrative regulations issued by State Council and Administrative Ministries**, such as the *Environmental Impact Assessment Law, Environmental Protection Supervision Rules for Construction Projects, Rules on Classification and Approval of Assessment Documents for the Environmental Impacts of Construction Projects*.

3.2 Relevant industrial policy

Green development will eventually impact on industrial policy. Relevant industrial policies include the following:

3.2.1. Policies to develop renewable energy and optimize China's energy structure

The following policies and plans propose optimizing and developing China's energy structure and optimizing the system for energy production and consumption: the *Energy Conservation Law, Eleventh Five-Year Plan – Outline for Economic and Social Development, Plan of Energy Efficiency and Emissions Reduction, Eleventh Five-Year Plan for Environmental Protection, National Climate Change Program, Climate Change Policies and Actions, and the New Energy Development Plan*.

⁵ Building ecological civilization: the foundation and essence of environmental protection, by Zhou Shengxian. Documents of the Fifth international forum on environment and development in China.

Policies to develop renewable energy and optimize China's energy structure refer to those that accelerate technological innovation in thermoelectricity generation; optimize the thermal power structure, remove old small thermal power units, develop high efficiency and clean power generation technology; accelerate the development of renewable energies like hydro power, solar power (solar water heaters, solar stoves), and biogas which have mature technology are strong in market competition, promote the industrial development of renewable energy technologies like wind power, biomass energy, solar power, bio liquid fuels (ethanol fuel with non-food raw materials, bio diesel, Household Biogas pool, biogas projects with large scale animal farming, solid fuel with biomass from agriculture and forestry) nuclear power. The policies promote the clean usage of coal, the use of coal-bed and coal-well gas, and studies on CO₂ capture and storage technologies.

China's energy strategy proposes that by around 2010, renewable energy will be used as a supplementary energy source, accounting for 10% of energy consumption; by 2020, a substitute energy source, at around 15% of consumption; by 2030, a mainstream energy source, making up 25% of consumption; and become the leading energy source by 2050, supplying 40% of China's energy.

Renewable energy is a hi-tech and emerging growth industry which will boost development of equipment manufacturing industries, benefit industrial structural adjustment, promote the transformation of economic growth, expand employment, save energy and reduce emissions.

3.2.2. Addressing outdated capacity

In 2006, the State Council issued a *Notification on Accelerating Structural Adjustment for Overcapacity Industries*. The notice set stricter standards on environment, security, energy consumption, water consumption, resources quality and use and technology and raised entry barriers. It also set out to rid industry of businesses with backward production by closing down a range of small enterprises (small thermal power, steel, cement and coal plants), and promoting technological innovation to reform and improve conventional industries through enhancing technology, improving products, environmental protection, safety assurance, reducing energy consumption and promoting effective energy use.

13 sectors including electricity, steel, building materials, electrolytic aluminum, ferroalloys, calcium carbide, coke, coal and glass are key areas targeted for reducing energy consumption, pollution and emissions. In January 2007, the State Council circulated the SDRC and State Energy Bureau's *Opinions on Accelerating the Shut-down of Small Thermal Power Generating Units* in support of large new power generation projects with large capacity, high indicators, low consumption and fewer emissions and the close down of small inefficient thermal power stations. In 2007, SDRC signed liability contracts with 28 provinces on closing plants with outdated production facilities; closing shaft-kiln cement plants; removing outdated production techniques in the nonferrous metal sector including copper, lead, zinc smeltery and small pre-baked anode electrolytic aluminum factories; eliminating the production of paper making, ethanol, MSG, citric acid, low energy-efficient refrigerators (including freezers), leather, button alkaline manganese batteries containing mercury and filament lamps in the light industries sector; speeding up the shut-down of high-polluting dye businesses and outdated dyeing, chemical fiber, cotton and wool spinning factories in the textiles sector; The petrochemical sector should remove outdated refinery equipment low in efficiency and quality and less than one million tons. The agricultural chemicals sector must stop producing high toxic and high-risk products such as calcium carbide and carbinol.

In November 2007, the Eleventh Five-Year Plan on National Environmental Protection proposed that new projects must meet set conditions and emission levels and set out industry-wide environmental protection conditions for projects in sectors like steel, non-ferrous metal, building materials, power plants, light industry (paper making, chemical, dyeing). New projects that increase emissions will be disallowed in sectors which are already at their environmental limits. Industry with production and products with high energy consumption, that generate heavy pollution and use outdated technology will be forced to close down.

During the Eleventh Five-Year Plan, 50 million KW small thermal power units were shut down. Massive reductions to industrial capacity by way of 89.17 million tons in the refinery sector and 77.76 million tons in steel production

were made, affecting 917 enterprises. The shutdown of industrial capacity to manufacture 250 million tons of cement, 300,000 tons of copper, 400,000 tons of zinc, 800,000 tons of small pre-roasted vat electrolytic aluminum, two million tons of paper, 30 million low efficiency fridges, 30 million pieces of hide, nine billion button alkaline manganese batteries containing mercury, 600 million filament lamps, one million tons of alcohol, 120,000 tons of gourmet powder, 50,000 tons of citric acid, and 2.3 million chemical fibers was implemented. In Shanxi province alone, the closure of enterprises with outdated production in steel, coal carbonization, thermal power and small coal mines affected 130,000 workers. In 2007, 33 steel companies were shut down in Hebei province, affecting over 20,000 workers.⁶

3.2.3. Pollutant and emission reduction and promoting technological innovation in conventional industry

In June 2007, the State Council issued the *Comprehensive Plan to Save Energy and Reduce Emissions*, listing 45 policy measures to save energy and reduce emissions. The policies measures relating to technological innovation of traditional industries are as the following:

Accelerate the desulphurization of current facilities for thermal power units, enhancing desulphurized unit's capacity to 213 million kW. Newly built or expanded coal power plants must build desulphurized facilities and reserve places for denitration. Further promote projects in coal washing and clean-burning coal technologies. Strengthen the paper making, brewing, chemical, textile and dyeing industry's waste water and pollution management and technological innovation.

3.2.4. Saving energy, improving energy-efficiency and reducing pollutants

The State Council's 2006 decision on strengthening energy conservation and the 2007 work program to save energy and reduce emissions proposed specific measures for energy conservation in industry, transportation and construction. Efforts towards industrial energy conservation need to focus on enterprises like steel, non-ferrous metals, coal, power generation, petrochemicals, chemical production, building materials and enterprises that consume over 10,000 tons of coal; energy-efficiency conservation needs to be promoted in construction, developing energy-efficient and economic land use; adopting the standard of 50% energy-efficiency for new residential and public buildings; and 65% energy efficiency for regions where conditions permit and those cities under the direct control of the central government. China needs to actively promote the building of a comprehensive energy-saving transportation system; accelerate the development of railway and canal transportation; prioritize public and rail transportation; accelerate the process of removing outdated trains, cars and ships; encourage the development of energy-saving and environment-friendly transport; and develop and promote cars with alternative and clean fuel. The final measure promotes the guiding of commerce and civil society in energy conservation and the establishment of ten key energy saving projects.

3.2.5. Promoting recycling pilot projects, achieving clean production and reducing emissions

The government designed and implemented the *Promotion of Clean Production Law*, the *Solid Waste Pollution Prevention Law*, the *Promotion of Recycling Law*, *Rules on Managing Daily Waste*, *Regulations on Recycling and Handling Electronic Products*, as well issuing the *Interim Provisions on Promoting Industrial Structure Adjustment*, *Opinions on Accelerating the Development of the Recycling Economy*, *Guiding Opinions on the Comprehensive Use of Resources during the Eleventh Five-Year Plan*, the *Notice of Energy Conservation and Emission Reductions*, the *Eleventh Five-Year Plan for National Environmental Protection*, and *Policies and Actions Addressing Climate Change*, etc. All of these documents proposed the general ideas, short-term objectives, basic approach and policy measures for

⁶ SEPA, SDRC, and SSB jointly issued Status of the National Environmental Protection Industry Bulletin in April 2006, implemented by environmental protection association. The survey was one-off all-round one, starting from 2004, carried out between February to August 2005, covering SOEs engaging in environmental products production, comprehensive use of resources, environmental protection service, and clean products production and non state owned enterprises and entities with annual income over 2 million RMB in all 31 provinces apart from Taiwan, Hong Kong and Macau.

developing the recycling industry as well as releasing an index system.

Chapter six of the Eleventh Five-Year Plan for national economic and social development released in 2006, described the plan for developing China's recycling industry. The plan was based on energy saving to gradually set up a system mobilizing the whole society to recycle. *The Comprehensive Notice of Energy Conservation and Emission Reductions* proposed to strengthen recycling waste water in sectors such as steel, power generation, chemicals and coal mining.

Currently the government has set up areas to pilot recycling projects with 36 pilot products.

3.2.6. Increasing the level of resource use

The objectives of comprehensively using resources are to achieve the speedy development of resource utilization industries by 2010; to improve largely the efficiency of resource use and achieve a 60% usage rate for industrial hard waste; to gradually raise the proportion of products which maximize the use of resources in the production; and establish a number of enterprises of a certain scale that are high-tech, have efficient resource use and are low polluters.

The key areas for comprehensive resource use include the comprehensive utilization of mining resources, renewable resources and waste from agriculture and forestry. Key projects with comprehensive resource use during the Eleventh Five-Year Plan include: projects that comprehensively utilize mineral resources, large hard waste resources and renewable metal processing resources; the industrialization of renewable resources such as discarded home appliances and old tires; and projects recycling renewable resources and agricultural waste such as straw, manure and wood. The Plan also promotes the comprehensive use of construction waste.

3.2.7. Strengthening the management of environmental pollution

The implementation of hazardous waste, medical waste disposal and garbage disposal projects promote the comprehensive utilization of waste. By the end of the Eleventh Five-Year plan, 30 upgraded disposal centers for dangerous waste and 3000 disposal centers for medical wastes will be built as well as projects for technical and other support totaling 15 billion Yuan.

In waste water handling, the first need is to accelerate the construction of city waste water processing and recycling projects. By 2010, the processing rate for city waste water will account for 70% with all cities required to build their own waste water processing facilities. In order to achieve this goal, firstly the scale of processing capacity must be increased to 50 million t/d. To do this, improvements must be made to current water processing factories and pipelines combined with investment of 210 billion Yuan. Secondly the processing of industrial waste water must be strengthened. The key will be to control waste water discharge and reduce the overall volume of key state owned industries, which account for 65% of industrial emissions.

3.2.8. Developing the environmental protection industry

The Eleventh Five-Year Plan proposed to develop large scale high efficiency clean power generating facilities and equipment for environmental protection and the comprehensive use of resources. These are the key areas necessary to revitalize the facilities manufacturing industry. The Plan proposed to develop equipment manufacturing for environmental protection based on the needs of key environmental protection projects; to actively develop a service industry prioritizing environmental impact assessment, environmental project service; environmental technology research and development; and environmental venture investment. For example, in the area of comprehensive resource utilization, the key is to promote unconventional water resources like treated wastewater, renewable water, slightly salty water, sea water desalinization, and saving water through highly efficient cooling methods. In terms of recycling, there should be a push to recycle cars, old tires, old home appliances, electronic wastes and the reuse of mine tailings. In the area of the construction and operation of pollution control facilities and consulting services, the key is to promote the market for the construction and operation of environmental facilities such as city waste water,

wastes, dangerous wastes etc, processing industrial waste water on a large scale, desulfurization of power plants, and to develop technological consulting and management services for environment protection. Currently, the SDRC is drafting an energy-saving environmental protection plan.

3.2.9. Reducing GHG emissions in agriculture and the countryside

Reducing GHG emissions in agriculture and the countryside needs to be brought about through continuing the promotion of high yield rice products and semi draught planting technology with low emissions; adopting scientific irrigation technology; strengthening ecological agriculture in farming-intensive regions; increasing the management of animal waste, waste water and solid waste; promote the use of biogas; and controlling the growth of methane pollution.

3.2.10. Promoting tree planting and enhancing the capacity of carbon sinks

Achievement of this goal requires reform and improvements to current industrial policy, focusing on key forestry ecological construction projects; ongoing tree planting; promoting natural forestry resource protection; replanting grassland and forest areas; managing the cause of sand storms in Beijing and Tianjin; supporting forestry systems; promoting the development of wildlife protection and natural protection zones as well as focusing on constructing a biomass forestry base. The goal is to reach 20% forest coverage by 2010 and the carbon sink capacity increase 50 million ton CO₂ on the basis of 2005.

The Eleventh Five-Year Plan set out an important binding target to reduce energy consumption per unit of GDP by 20% compared to 2005 levels by 2010. The Plan's quantitative targets relating to resources, the environment and ecology include significant improvements to resource efficiency and include the following targets: a 30% drop in water consumption per unit of industrial added value, an increase by 0.5 of the efficiency index for agricultural irrigation, the rate of comprehensive utilization of industrial solid waste to increase to 60%, the amount of cultivated land to be maintained at 120 million hectares, maintenance of water levels, improvements to energy and key mineral resources, controlling the deterioration of the environment, emissions of sulfur dioxide and COD drop 10% based on 2005 levels, strengthening of pollution management of key rivers; accelerating the processing of city waste water and waste; the rate of harmless disposal of city daily wastes to drop no less than 60% by 2010, the proportion of renewable energy in the overall energy supply structure to reach 10%, the emission of nitrous oxide remains the same 2005 levels; the growth of methane emissions is maintained; forest coverage reaches 20%, carbon sink capacity increases by 50 million tons of CO₂ on the basis of 2005 levels, and GHGs are controlled.

3.3 Relevant economic policy

Economic policy is an important leverage for promoting environment protection. The Chinese government is actively improving relevant policy measures to promote environment protection.

3.3.1. Fiscal policy

Fiscal expenditure includes direct investment, financial subsidies, public green procurement, and financial transfer payment to environmental protection by the government.

Direct investment in environmental protection is investment into managing environmental pollution. The Chinese government has set up a fund for environmental management and has also supported a number of key projects in ecological construction and pollution management through national bonds, using the money to control sand storms in Beijing and Tianjin, set up environmental protection facilities in west region, control pollution in three rivers and lakes, recycle waste water, industrialize of recycled waste and treated water, engage in environmental pollution management in Beijing, and subsidize programs that benefit forest ecology. Since 1998, the central government has increased financial assistance to China's underdeveloped central and western regions, combining ecological construction

and rural infrastructure with industrial growth, and implementing afforestation and grasslands policy, adjusting the structure of agriculture and increasing farmers' income.

At present, the most widely used subsidies for environmental protection include subsidies for pollution management (electricity price subsidies for desulfurization processes), ecological construction projects (forming part of the climate adaptation measures and programs which are important providers of green jobs), clean production projects, environmental research, and for the production of environmental-friendly products.

The Chinese government issued the *Government Procurement Law* in January 2003, followed by *Opinions on the Implementation of Government Procurement of Energy-saving Products* by the Finance Ministry and SDRC, the first specific policy regulations on government procurement which promotes energy conservation and environmental protection.

3.3.2. Tax policy

Value-added Tax (VAT): The government's tax policy encourages comprehensive utilization of resources: waiving, halving or returning VAT for products of enterprises that comprehensively use resources; waiving VAT for enterprises who recycle and on-sell waste materials, deducting paid VAT for enterprises that buy in waste and recycled products. The government also has tax incentives for clean energy and environmental protection products, waiving or halving VAT for wind power generation and the 23 products across 14 categories relating to wall materials including non-clay brick, construction blocks, and building boards. The government also encourages preferential measures for waste water processing. From July 2001, governments and administrative agencies at all levels waiving VAT for waste water fees collected by water plants.

Consumption tax: From 1 January 2009, the tax on oil products underwent a reform. This will be beneficial to both the development of low emission cars and in the long term for the industrialization process of new- energy cars.

Income tax: The government will waive or deduct income tax within five years of enterprises starting to use waste materials as a raw material in production. It will also waive tax for enterprises that are producing environmental protection facilities and products which are encouraged by the government, as well as introducing a tax credit for investment and an accelerated depreciation policy for environmental protection facilities.

Resources tax: The government introduced a resources tax in April 1988 and expanded the range of products included by the tax in 1994. Currently, the government researching a carbon tax policy; tax refund rescissions for enterprises that export resource-based products like refined mineral products and crude oil; reducing the tax refund rate on copper, nickel, ferroalloy, coking coal, hard coke, etc to 5%; significantly reducing or rescinding tax refund for resource based products with high energy consumption and high pollution. There are also measures to protect the environment written into property tax, city land use tax, vehicle and vessel use tax, and contract tax, etc.

3.3.3. Financial policy

30 July, 2007, former SEPA, in cooperation with the China People's Bank, and CBRC, issued *Opinions Regarding the Implementation of Environmental Policies and Regulations* requiring the People's Bank and CBRC to work with environmental agencies to guide financial institutions at all levels to introduce different credit policies for enterprises that are forbidden, have been shut down or have restrictions. In particular new loans could not be provided for projects which have not met environmental approvals.

December 2007, Ministry of Environmental Protection and CIRC joint issued the *Opinions Regarding Environmental Pollution Liability Insurance*, formally launching the green insurance system. The Opinion proposed to form the environmental pollution liability insurance mechanism based on China's situation during the eleventh five-year plan, starting pilot program in key sectors like production, operation, storage, transportation, dangerous chemical products and enterprises like petrochemical and dangerous waster processing companies that might easily occur pollution accidents. After 2012, the mechanism will be promoted nationwide.

February 2009, Ministry of Environmental protection proposed to strengthen the environment entrance level, gradually cancel relevant subsidies and tax preferential policies that might be harmful to environmental protection. In addition, the ministry will further expand the green trade policy, regularly announcing public notice of enterprises pollutant emission. Enterprises that do not meet the standards will be prohibited to export. This policy will be expanded from citric acid and electrolytic aluminum industries to include other pollutant-intensive industries.

Chapter 4. The current status of green jobs in China

Green jobs have already had a long period of development in China. Environmental protection started in China in the 1970s and tree planting commenced with the establishment of the PRC and has been in effect every year since. The solar power industry began in the 1990s and operates on a large scale today and developments in wind power and biomass occurring over the past few years. Management and control of industrial waste has been strengthened and high polluting and high energy consumption sectors have been eradicated. The circular economy and recycling of waste materials are also areas where enterprises have been developing steadily. Throughout this process, there a certain scale of green jobs has been established along with associated industry practices and experience.

4.1 Employment in environment protection industries⁷

Over the past few years, China has increased investment in infrastructure and environmental protection facilities, creating demand within environmental protection industries. Environmental protection industries have become an important part of the national economic structure. According to Status of the National Environmental Protection Industry Bulletin, environmental protection industries not only include industries providing products and technological services in the narrow sense such as in pollution control, emission reduction, pollution management and waste processing, but also can be considered in the broader sense to included environment-friendly technologies and products, energy saving technologies, ecological design and environmental services in a production cycle. According to the Bulletin, there were 1.595 million employees in the environmental protection industries in 2004.

	Total	Environmentally-Friendly products	Resource utilization	Environmental protection services	Clean products
Number of companies	11623	1867	6105	3387	947
Number of employees	1,595,000	168,000	959,000	170,000	233,000
Annual income (billion RMB)	457.21	34.19	278.74	26.41	117.87
Average number of employees	137	90	157	50	246
Average income per capital	290,000	200,000	290,000	160,000	510,000

Table 4.1 The structure of environmental protection in 2004

There are a total of 5,501 environmentally-friendly products across 594 categories, most in water and air pollution processing facilities. The average number of employees in enterprises producing environmentally-friendly products was 90, with an average income of 200,000 Yuan per employee.

Industries engaging in comprehensive resource utilization⁸ mainly focus on recycling renewable resources and solid waste materials. The average number of employees per enterprise was 157 with an average per capita income of 290,000 Yuan.

⁷ SEPA, SDRC, and SSB jointly issued Status of the National Environmental Protection Industry Bulletin in April 2006, implemented by environmental protection association. The survey was one-off all-round one, starting from 2004, carried out between February to August 2005, covering SOEs engaging in environmental products production, comprehensive use of resources, environmental protection service, and clean products production and non state owned enterprises and entities with annual income over 2 million RMB in all 31 provinces apart from Taiwan, Hong Kong and Macau.

⁸ Comprehensive use of resources refers to the processing of waste resources and waster materials to produce all kinds of products. It includes comprehensive development and use of associated mines during mining, recycling and use of waster residue, water, gas, surplus heat and pressure during production, recycling and renewable use of all waste materials during production and consumption.

Among employees in environmental protection service industries⁹, 16,000 are engaging research and development of environmental technologies and products, 53,000 are engaging designing and constructing environmental projects, 52,000 are engaging in facilities operation of pollution management (daily waste water, industrial waste water, dedusting and desulfuration, industrial exhaust gas, daily wastes, dangerous waste processing, automatic continuous monitoring and other facilities), 27,000 are working in environmental monitoring, and 15,000 are working in environmental consulting services. The environmental service mainly focuses on services for environmental project design and construction and facilities operation for pollution management. The average number of employees for each entity is 50, with 160,000 Yuan per capita income.

The survey included nine clean products¹⁰, organic food and other products, low toxic or harmful products, low emission products, low noise products, bio-degradable products, energy-saving products and water-saving products etc. This included 1492 products in 52 categories, mostly made up of energy-saving products, low toxic or harmful products, low emission products and organic food. The average number of employees in each enterprise was 246 with per capita income of 510,000 Yuan.

Wuhan was the first city to open a supermarket for electronic waste promoting electronic waste pollution prevention and resource recycling.

In 2006, a report by the Hubei Development and Reform Commission stated that Hubei was in the phase of rapidly eliminating old electronic appliances. The province had a total of 300,000 TV sets, 200,000 fridges and 300,000 washing machines needing to be disposed of. Electronic waste contains high amounts of lead, tin, mercury and other toxic and harmful chemicals. If not disposed of responsibly, it could cause contamination of soil and water. . Electronic waste was considered the next environmental killer after chemical engineering, metal melting, paper making, and dyeing. Currently in 90% of cities, abandoned old home appliances are taken by mobile vendors who dismantle, burn or bury them, causing serious pollution.

Electronic waste contains much higher levels of metal than mines. In a professional processing factory, 350kgs of zinc oxide, 300kgs of manganese and 5kgs of nickel alloy can be extracted from a one ton dry battery which costs 2,000 Yuan and generates no waste water or waste solids. The metals extracted can be re-sold as raw materials. Plastics generated by the extraction process can be reprocessed into finished products. Electronic waste can be recycled infinitely. Old and discharged electronic appliances contain 30% metal.

Due to the lucrative business potential, Hubei province opened the first electronic waste supermarket, recycling old home appliances at a price of two Yuan per kilogram. The supermarket was a way to test a new model for recycling waste with government guidance, using market forces, and social participation. In two years time, Wuhan will set up 300 supermarkets. If the electronic object is over 10 kg, a hotline can be called and the object collected.

Although the recycling price is not competitive in comparison with mobile vendors, with the pilot program deepening, the government may introduce subsidies. Moreover, according to the Circular economy Promotion Law and Waste Electrical and Electronic Product Recycling Regulations, the government will centralize the recycling of waste electric and electronic products and enterprises and consumers will have to pay for processing them. By then, the economic profits for enterprises will be more profound.

Source: People's Daily International edition, March 19, 2009

⁹ Environmental protection service refers to service trade related to environmental protection. The survey mainly covered research and development of environmental technologies and products, design and construction of environmental projects, environmental monitoring, environmental consulting, facilities operation for pollution control, environmental trade and financial service.

¹⁰ Clean products refer to environmental-friendly products in the production circle (production, consumption, recycling and reusing of a new product). Such products have features of ordinary products and also meet environmental protection standards during production, use and handling. In comparison with ordinary products, they have the environmental function of low toxic and harm and resources saving.

The environmental protection industry has huge market potential. With the development of national environmental protection, more jobs can be created within the industry. According to the Association of Environmental Protection Industries, they industry currently has over three million employees. The UNEP predicts that wastes processing and recycling will be very effective in lowering the impact of heavy industries, creating 12 million jobs, among which 10 million are in China. China has the world's biggest cement and steel company, which therefore has huge green employment potential.

4.2 Employment in renewable energy¹¹

The development of renewable energy is a fundamental part of China's national strategy. Renewable energy is a new industry, whose development will inevitably lead to increases in employment. According to related researches by the Energy Institute of the State Development and Reform Committee, by the end of 2007, the number of people working in the new energy industry was 1.1 million, mainly spread across solar power, wind power and biomass energy industries. Only very few worked in other industries.

Solar power boiler	Photovoltaic power	Solar Power	Wind power	Biomass energy	Others	Total
800,000	100,000	150	20,000	200,000	1,000	1,121,000

Table 4.2 Workers in the renewable energy industry

According to comparative studies¹², the creation of a direct work post requires investment of RMB 1.15 million in wind power, and RMB 910,000 in photovoltaic power, RMB700,000 in solar thermal utilization, RMB 140,000 in biomass energy. In general, the input required for renewable energy employment is much higher than that for conventional industry. For a developing country such as China, such positions are created at too high a cost. The primary energy source in China is coal. In 2005, primary energy consumption consisted of 68.9% coal, 21.0% oil and the remaining 10.1% from natural gas, hydraulic power, nuclear power, wind power and solar power. In worldwide primary energy consumption for the same year, coal only accounted for 27.8%, oil 36.4% and natural gas, hydraulic power, nuclear power etc accounted for 35.8%. China is a developing country, far from being fully industrialized, urbanized and modernized. In achieving these development goals, China's future energy demands must be rationalized. This is a process critical to all countries on the path to development. At the same time, in the near future it will be difficult to make major changes to the key role coal plays in China's energy structure. This is despite the prospect that China's percentage of renewable energy could reach 20% by 2020, with the number of new jobs created estimated to reach 2.2 million. However, unlike the US, the employment opportunities from renewable energy and conventional industry are not expected to be reversed. For a long time conventional energy industries will still dominate industry.

4.3 Impacts of the thermal power industry's "upgrade the large and suspend the small" policy

In the process of developing renewable energies and through policies such as shutting down backward industry, China will improve efficiency, save energy and reduce emissions. In particular, the power industry is a big contributor to energy saving and emission reductions. Such environmental measures while protecting the environment have negative impacts on employment. The taskforce on Low Carbon Development and Employment from the Chinese Academy of Social Science, conducted studies on data and statistics from the Development and Reform Committee as well as from 12 power plants in Jiangxi and Shanxi provinces. From this data it was estimated that the shutting down of small thermal power plants had the following employment impacts:

553 small thermal power units were shut down in 2007, involving 14,380,000KW and 122,500 workers, of which 91,000 were incumbent workers, and 31,500 were retired workers. Therefore, an average of 6.2 workers needs redeploying in the shutting down of every 1,000KW of small thermal power capacity. The numbers of workers affected across the nation by the shutdown of small thermal power unit were:

¹¹ Related energy researches by the State Development and Reform Committee.

¹² Peter Poschen. China Green Employment Forum, 30 March 2009.

(1) Numbers of workers affected during 2003-2008: 38,090,000KW x 6.2 workers/KW = 236,158

(2) Number of workers potentially impacted during 2009-2020: 59,800,000KW x 6.2 workers/KW = 370,760

During 2003 to 2020 period, 607,000 workers are expected to be retrenched. If more plants with large capacity (such as 125 MW or 200 MW) are closed in the future, the total number of employees let go will increase.

On the other hand, new-built large units could absorb 58,500 workers. Approximately 31,800 workers are hired directly after the installation of desulphurization facilities in coal-fired units so the net employment effect of the industry's "Upgrade the large and suspend the small" policy is the reduction of 516,633 jobs from 2003 to 2020.

4.4 Green employment in the forestry industry

Forests are the largest carbon bank and the most economical carbon absorber. There is huge employment potential in forestry, in three main areas: First, is employment created by forestation and reforestation, the restoration of degraded ecosystems, developing a joint system of forestry and agriculture and improving the sustainable development of forests. Second is employment created through developing timber production and processing and the third is in sectors relating to forestry such as forestry-tourism; developing chemicals for forests; forest machinery manufacturing; forestry food, herbal medicines and flowers; and bamboo etc. Since 1980, China has invested heavily on strengthening forest ecosystem building, undertaking key forest projects, expanding the total amount of forestry resources, and enhancing forest carbon sinks. According to the estimates of forest coverage targets, by 2010 when forest coverage reaches 20%, the newly created jobs would reach 17,795,000.

According to The Research on China Forestry Development Strategy, the six key forestry projects started in 2002 undertook forestation of 760 million hm² in ten years, and expected to create 22,800,000 jobs. In 2007, China's total forestation area was 2,680,000 hectares. Among this, key construction projects in the "Three North's" and the Yangtze River basin accounted for 574,000 hectares. Income paid to local workers 368.57 million Yuan. Based on the 2007 average salary of 6,007 Yuan for workers in collective enterprises, this amount was equivalent to one year's work for 61,356 people, or three months full time work for 245,427 people. There are 980,000¹³ registered workers across all natural forest conservation projects in China.

Table 4.3 Estimates of the employment potential of China's carbon sink forests¹⁴ (2010-2050)

Year	Forest coverage %	Forest area (10k ha)	Forest carbon storage (1billion MT C)	Value of CER (1b USD)	Newly increased forest (10k Ha)	Newly created Jobs (million) See note
2003	18.21	17490.92	14.43	158.73	-	-
2010	20	19210.20	15.85	174.35	1719.28	17.795
2020	23	22091.73	18.23	200.53	4600.81	47.618
2050	26	24973.26	20.60	226.6	7482.34	77.442

Note: Number of jobs calculated based on 103 working days per hectare and 100 working days per worker. CER price is set at USD11 per ton of carbon.

According to the China Forestry Statistical Yearbook 2008, China had over 1,200 forest parks, whose numbers of tourists reached 83 million in 2001, generating total revenue over RMB50 billion, directly or indirectly creating 3.5 million jobs.

Forest related side industries: China ranks number one in terms of area of bamboo forest, storage of bamboo volume and annual bamboo output, being termed the Bamboo Kingdom. The Chinese floral industry is also one of the most dynamic in the world, with long horticultural history, encompassing many varieties with vast development potential.

By the end of 2007, total registered forestry workers amounted to 1,849,200 people, of which 1,396,000 were incumbent workers. In the state-owned forestry economic enterprises, 1,116,000 people worked in the fields of agricultural forestry and fishery, accounting to 84% of the total. Another 88,000 worked in the fields of public

¹³ China Forestry Statistical Yearbook 2008.

¹⁴ Taskforce for "Low Carbon Development and Employment" of the Chinese Academy of Social Science.

management and social organizations, accounting for 6.6%; 37,500 people worked in water environment and public facility management, accounting for 2.8%, 27,300 people worked in scientific research services and geological survey, accounting for 2%, 26,000 people worked in manufacturing, accounting for 2%.

Total of other economic institutions		3.7		3.7			
Total of collective economic institutions		2.58		2.58			
State-owned	Others		0.87	0.7	%		
	Public management and social organizations		8.8	6.6	%		
	Health, social security and welfare		0.6	0.5	%		
	Education		0.86	0.6	%		
	Water environment and public facility management	of which	wildlife conservation	0.1	0.1	%	
			nature reserve management	1.28	1.0	%	
		Sum	3.75	2.8	%		
	Scientific research technology services and geological survey	of which	planning, design and management	0.09	0.5	%	
			Technology exchange and promotion services	0.4	0.3	%	
		Sum	2.73	2.0	%		
	Distribution and retail		0.66	0.5	%		
	Construction		0.3	0.2	%		
	Power, gas and water production and supply		0.4	0.3	%		
	manufacturing	Others		0.3	0.2	%	
		craft production		0.027	0.0	%	
		Special equipment and instrument manufacturing		0.04	0.0	%	
		forest chemical product manufacturing		0.1	0.1	%	
		wood processing and bamboo/rattan/brown straw products	bamboo/rattan/brown straw product manufacturing		0.01	0.0	%
			wood product manufacturing		0.37	0.3	%
			wood based panel manufacturing		1.4	1.1	%
			Sawn wood processing		0.17	0.1	%
		Sum		1.96	1.5	%	
		Non-wood forestry product processing		0.2	0.2	%	
		Sum		2.6	2.0	%	
	Mining		0.1	0.1	%		
	Agriculture/Forestry/Animal husbandry/Fishery	Others		10.5	7.9	%	
		Sand control station		0.1	0.1	%	
Pest control station		1.1	0.8	%			
Seedling station		0.7	0.5	%			
timber check points		2.1	1.6	%			
forestry work station		12.4	9.3	%			
State-owned plant nursery		3.4	2.6	%			
State-owned forest farm		34.7	26.0	%			
Forest and bamboo Logging companies		46.5	34.9	%			
Sum		111.6	83.7	%			
Organizations		8.2	6.0	%			
Institution		69.3	52.0	%			
Enterprise		55.9	41.9	%			
Total		133.3	100.0	%			
Sum		139.6					

Table 4.4 Distribution of forestry workers in 2007

The UN Food and Agriculture Organization estimates that forest restoration can create 10 million green jobs. With 1.3 billion farmers in the world, agriculture is still the largest industry in terms of employment numbers. Green employment in agriculture mainly refers to organic farming and bio fuel production.

China has linked afforestation, employment, and national consumption together to achieve a win-win situation. Chengde City in Hebei province has been exploring different models for green employment since 2004, and has so far reemployed over 2,400 redundant workers. Annual government investment in green jobs is over 1.2 million Yuan, with the planting of 2.62 million trees which has increased the urban greening rate from 24.3% to 34.6%. Recently, topics such as hiring migrant workers to plant trees have drawn heated discussions, demonstrating how much attention people pay to the “forestation + employment” pattern. Under the impending international financial crisis, more and more migrant workers return to their hometown and take up jobs in forestry, so that “one family member as contractor leads to all family members becoming employed”, and “unemployed in the city but self-employed in the forest”.

Source: Chengde City “green employment” patterns create new opportunities for reemployment. Xinhua Net, 24 November 2007

We are still waiting to see the results of the current green employment situation in China. The above analysis is already indicating that although China has made large contributions toward worldwide green employment, green employment in China is still in its early stages, accounting for a very minor proportion of China’s 760 million employed. In particular, China’s employment structure is still quite under-developed and the overall caliber of workers is quite low. The phasing out of outdated facilities will bring about job losses and unemployment. . The adoption of environmental measures will cause some jobs to change and workers face the challenges of transforming their skills. Although some new green positions will be created, the numbers of positions is extremely limited in comparison to the large numbers of workers who will be needing redeployment. On the other hand, economic development will also face challenges brought about by green employment. Some industries might not develop as fast due to labour shortages, while some industries may not be able to exit quickly due to obligations to redundant workers. Structural unemployment may worsen. The transformation process towards green employment requires in depth research.

From an employment perspective, the development of environmentally sustainable policies are part of the solution in the backdrop of the global economic crisis, but cannot be responsible for addressing all the issues, including the need to provide decent work for all.

Chapter 5. The transition of the power industry to green employment

In order to understand the problems faced by the transition towards green employment and to identify policy suggestions to promote this transition, the project team conducted questionnaire surveys and in-depth interviews of the power industry in China. The power industry is the lifeline of the national economy employing millions of workers, responsible for high amounts of greenhouse gas emissions and a major target of national environmental policy regulation. As the energy structure within the Chinese economy shifts, it will also be a sector which holds vast potential for green employment. For these reasons this study chose to focus on the power industry's transition to green employment.

5.1 Characteristics of the power industry

Power generation is an industry under major state supervision and regulatory reform. Since power generation and power grids separation and reform took place in 1984, power plants faced market competition. The price of coal, the main raw material, became market driven. The volume and price of power supplied to the grid are controlled by the state and the grid companies. Since 1997, the state started to implement policies of “upgrading the large and suspending the small” (power stations) and eliminating outdated production capacity. Some small thermal power plants were gradually got shut down and replaced by larger ones. Since the 1990s, the state started to promote renewable energy, in which power companies invested heavily in order to seize the market opportunity. Wind and hydro-elective power grew rapidly.

The power industry is monopolized by the big five state-owned power companies. All of them “red companies”, they have been committed to corporate social responsibilities and to workers, The companies absorbed and relocated surplus workers during restructuring, avoiding retrenchment where possible.

Power affects the country's development and peoples' livelihoods. Production safety is most important. . Plants are managed in a semi-military style to ensure production safety is fail-proof. Each company implements comprehensive and strict production safety measures and has high demands for worker competency, in turn, rewarding staff with relatively good remuneration packages. These factors make the power industry workforce a very stable one and which is regarded as being the highest out of all industries in terms of educational level and skill capability. Power companies only recruit graduates from colleges and vocational schools.

These characteristics also create industry need for continuous workforce training. The operation of large thermal units requires workers to have diversified skills which require long term training. Awareness training is only for the short term. In-post continuous training is most important. University graduates must start from the lowest level on the team, going through different on-job training for one to two years before becoming qualified as normal workers. It takes much longer to be a team leader or engineer.

This industry and training characteristic also determines that its employees could only be relocated within the industry. This is the result of each worker's skill being too specific after long period of training, hence difficult to fit into other industries. Beside, job relocation also depends on the state of local economy. Even if relocation is within the same industry, and each generator's control system is similar, each unit's installation varied. Re-education would still be required for each relocated worker. In the backdrop of overall technology upgrade and adequate power supply, coal-fired power workers' reemployment is facing a very difficult situation.

5.2 Methodology

The power sector study is based on empirical research in eight power plants. In each of the plants, discussion groups were held with management and workers. The plant directors, managers from administrative, financial, production and technology, human resource (HR) and environmental protection departments, and the trade union director took part in the discussions. The focus of the meetings was to understand the company's present situation and the difficulties and problems faced in facilitating green employment and transition toward a green economy.

An employee questionnaire was conducted in each plant. 600 employee questionnaires were handed out in total of which 587 effective replies were received. The respondents in each company were selected by the HR administrator as per principles of sampling i.e. the targets of the survey were strictly defined as front line workers across different types of power generation units, age groups, genders, and educational backgrounds. The samples included both green jobs as well as non- green jobs. The employees surveyed were limited to within a certain percentage of the company. In general, the sampling was quite representative.

According to the purpose of the study, workers in wind and coal power were divided both by energy source and the size of the equipment used. For the coal power group, the national policy to “promoting the large units and reducing the small units” was referred to, with equipment over 200,000 KW called large thermal power units and those under 200,000KW called small thermal power units. Data for each group are listed below:

		Frequency	%	Valid %	Cumulative %
Valid	Wind power	52	8.9	9.1	9.1
	Large thermal power unit	361	61.5	63.1	72.2
	Small thermal power unit	159	27.1	27.8	100.0
	Sum	572	97.4	100.0	
Invalid	System	15	2.6		
Total		587	100.0		

Table 5.1 Primary questionnaire data

5.3 Background of the survey group and the transition to a green economy

5.3.1 Employment background of surveyed enterprises

The project team selected eight power plants in Tianjin, Hohhot and Wulanchabu for the study. Three of the plants are new with modern technology, one is a renewable energy plant, two are conventional coal-fired plants, and the other is a plant that combines both traditional and new generators. One plant is representative of regional power plants, and the others belong to two national power company groups.

	Hohhot No. 1 Power Plant	Hohhot No. 2 Power Plant	Hohhot No. 3 Power Plant	Hohhot No. 4 Power Plant
No. of workers	362	1061	238	330
No. of samples	100	70	45	35
Year of establishment	2005	1954	1999	1956
Ownership	SOE	SOE	Joint Venture	SOE
Phase I, II or III	Phase III	Phase I, II, III	Phase III	Phase I, II
	Wulanchabu City Power Plant	Tianjin Dagang District Power Plant	Tianjin Dongli Power Generation Company Limited	Tianjin Hexi District Power Generation Company Limited
No. of workers	193	1923	2302	801
No. of samples	50	100	100	100
Year of establishment	1989	1974	1960	1992
Ownership	Joint Venture	SOE	SOE	SOE
Phase I, II or III	--	Phase I, II or III	Phase I, III	Phase I, II

Table 5.2 Background of the eight selected power plants

The workers surveyed mainly use automated tools to perform their work. Based on the work tools used, the wind power sector has the highest rate of automated tool usage at 74.5%, and large thermal power units use the lowest at 52.5%. These percentages relate to the distribution of generation sets. Wind power uses a fully modernized management system, which is highly mechanized and automated. Even the average worker uses automated tools,

hence the wind industry recording the highest rate of automated tool usage. Technical positions at large thermal power generators account for a lower percentage of automation compared with small thermal power generators, with the respective automated tool usage for their workers lower.

It is worth noting that the level of automation varies depending on the type of tool. For example, production technology and flow are more or less the same for large and small thermal power generators but the main control equipment is different. Also, some semi-automatic tools may have a different categorization.

	Manual instruments	Automated instruments
Wind power	25.5%	74.5%
Large-scale thermal power	47.5%	52.5%
Small-scale thermal power	37.7%	62.3%

Table 5.3 Equipment used by workers in the power industry



A central control room of 10,000 KW thermal power plant



Boiler workshop of the thermal power plant



A central control room of the thermal power plant

5.3.2 Employment impacts of the green transition of power industry enterprises

All surveyed thermal plants had adopted some environmental protection measures. The environmental measures taken by large thermal power enterprises include: installation of import generators; increases in investment to introduce or carry out energy-saving technological, such as the introduction of advanced water treatment, dust bag, limestone - gypsum wet FGD technology, plasma ignition, etc., adoption of high-efficiency filters and fixed-enclosure in the coal handling system, side-mounted water-bath type Cyclone dust collector and other environmental protection measures, to carry out generation of waste comprehensive utilization of fly ash and gypsum, to carry out sea water desalination, etc.; enhancing unit energy-saving work management and research; carrying out afforestation and so on. Major problems of large fire power enterprises in the transition to a green economy are linked to the raising national environmental policy standards putting pressure on production and operation of enterprises, the need to increase investment to improve production efficiency and constantly update equipment. The major impact on the employees is the need to continuously improve skills.

Small thermal power plants preserve the environment by adopting technical enhancement measures such as using desulphurization equipment. After transformation of desulfurization systems, the power consumption rate of a power plant factory would increase by nearly 1.3%, electricity coal consumption increase 4.3g/kwh. The increase of huge amount of facilities will also increase the operating and maintenance costs increased significantly. The annual increase cost on maintenance, materials and water is nearly 15 million yuan. Desulfurization transform requires more from the workers. The company will assign newly employed university students into the dust workshop to carry out desulfurization preparation and go out to other power plants to learn how to install desulfurization equipment and operation, and take up on-site training and internship. Meanwhile, the company needs to send out technicians to equipment manufacturing enterprises to learn how to repair desulphurization equipment. After installation of desulfurization equipment, the company also needs to train and monitor its employees in how to use the equipment.

Another important environmental protection measure is the “upgrade the large and suspend the small power units” program. Workers of the shut down power units need to be laid off. How to relocate the extra labour is a very difficult issue. Through the consultation mechanism between employers and employees, labour representatives and union leaders are all involved in corporate layoffs and employee placement, trying to avoid the sharp change of workers benefit. Although some enterprises have not yet adopted the measure, it is expected to be implemented the next three to five years.

When carrying out the programs of upgrading large units and suspending small units, and energy saving emission reduction, the companies tried their best to relocate the surplus workers, giving full considerations to the industry and the company’s own features as well as their own human resource characteristics, so as to avoid adding pressures to the community’s unemployment. For those workers from the suspended units, the company would place them in new supporting positions after giving them training based on new units’ requirements. The company also had various ways to relocate those who could not fit into the new production lines:

1. First is to relocate them to the maintenance and repair team so that their experience and skills could be utilized, and encourage them to go beyond the company for other maintenance and repair works.
2. Secondly, relocate them to the company’s tertiary industry-type subsidiaries. For instance, a conventional coal fired power place in Tianjin had nearly 2000 employees. It had 12 tertiary industry-type subsidiaries, involving restaurant and catering, hotel, food, logistics, construction materials, construction, etc., which were already very well developed and became main tax payers in Tianjin. The desalination operation alone already helped to absorbed 60 surplus workers. In another example, Inner Mongolia’s economy is not as good as Tianjin, and power company’s tertiary industry-type subsidiaries were not as competitive.
3. Thirdly, to implement job sharing for some positions, work intensity was reduced and the respective employees’ incomes would be affected.

Wind Power Company protects the environmental through continuous expansion of new wind farms, and continuously enhancing the installed capacity of stand-alone device. This triggered a great demand for labour, leading to high staff turnover, for which companies need to pay a higher labour costs. On the other hand, with the rapid expansion of enterprises, the skills of workers need to be constantly updated.

5.3.3 Effect of the financial crisis on the companies

The 2008 global financial crisis reduced the demand for electricity, which eased coal power plants' operational loads. This resulted in some negative effects on employees' income with a proportion of employees experiencing wage cuts. The financial crisis did not have clear impact on employees at wind power companies. 98% of employees surveyed said they did not experience shortened work hours, a temporary cut to paid leave, wage cuts or training leave etc.

	Did any of the below happen since the 2008 financial crisis?					
	Shortened working hours	Temporary cuts to paid leave	Wage cuts	Training leave	Others	None of the above
Wind power	.0%	.0%	2.0%	.0%	.0%	98.0%
Large-scale thermal power	1.5%	.3%	18.1%	.5%	1.5%	78.1%
Small-scale thermal power	.0%	.0%	38.6%	1.2%	.0%	60.2%

Table 5.4 The impact of the financial crisis on employment in power companies

5.4 The general workplace composition in the surveyed companies

The composition of the workforce is similar across the different power generation companies.

Table 5.5 Profile of employees in eight power plants

	Hohhot No. 1 Power Plant		Hohhot No. 2 Power Plant		Hohhot No. 3 Power Plant		Hohhot No. 4 Power Plant	
Gender	M: 54.09%		M: 63.9%		M: 65.1%		M: 72.1%	
	W: 45.1%		W: 36.1%		W: 34.9%		W: 27.9%	
Age	37.98	M:39.43	33.88	M:34.33	36.84	M:36.02	35.43	M:35.20
		W:36.14		W:33.09		W:38.36		W:36.00
Average years with the company	9.06	M:9.71	5.45	M:5.78	14.44	M:12.62	10.85	M:10.41
		W:8.19		W:4.89		W:17.73		W:11.92
Education level	5.31	M:5.00	5.52	M:5.45	4.75	M:4.61	5.55	M:5.53
		W:5.68		W:5.63		W:5.00		W:5.58
Hukou	90.4%		86.0%		96.8%		90.7%	
	Wulanchabu City Power Plant		Tianjin Dagang District Power Plant		Tianjin Dongli Power Generation Co. Ltd.		Tianjin Hexi District Power Co. Ltd.	
Gender	M: 48.4%		M: 77.7%		M: 66.7%		M: 79.6%	
	W: 51.6%		W: 22.3%		W: 33.3%		W: 20.4%	
Age	41.03	M:42.93	37.77	M:37.42	39.55	M:40.38	34.79	M:34.32
		W:39.13		W:38.95		W:37.88		W:36.74
Average years with the company	21.67	M:18.31	16.76	M:16.31	19.43	M:20.02	12.52	M:11.70
		W:19.94		W:18.40		W:18.27		W:15.16
Education level	4.42	M:4.13	4.78	M:4.77	3.65	M:3.91	4.46	M:4.47
		W:4.69		W:4.81		W:3.12		W:4.40
Hukou	96.8%		98.9%		100%		94.8%	

Note: Age and years with the company mean the average age and years. We gave scores to each employee based on their educational background (1 for junior middle school and below, 2 for senior high school and vocational high school; 3 for technical school and secondary technical school; 4 for senior vocational school, 5 for junior college, 6 for university, 7 for Masters and above). The percentage for Hukou shows the non-agricultural share.

5.4.1. Demographic information

The average age amongst small thermal power stations is the oldest. The average age for workers at small thermal

power stations was 39.1 years. This is older than the average age in wind power of 38 years, and large thermal power stations of 36.3 years. Older workers account for a higher percentage in small thermal power stations: less than 10% of workers were aged 30 and under, and those between the ages of 31 to 40 accounted for the highest percentage of workers at nearly 60%.

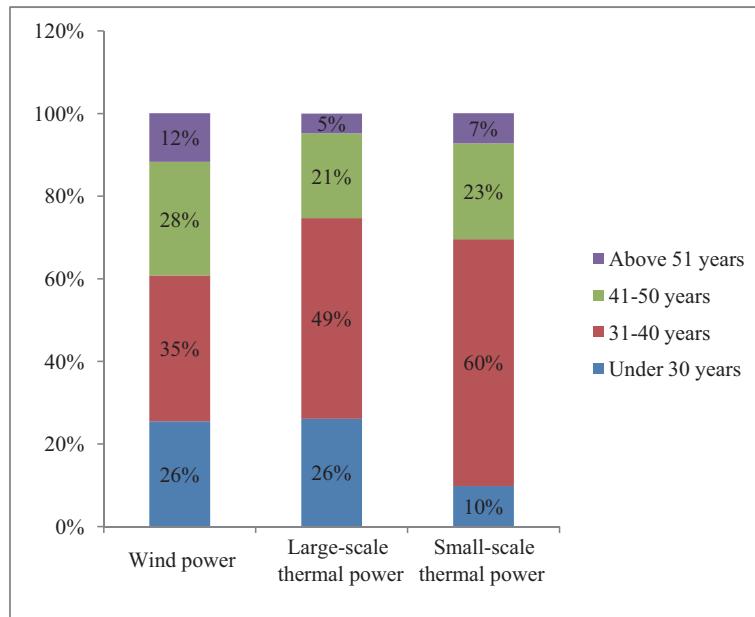


Figure 5.1 Power company employee demographics

Workers at small thermal power stations have the highest tenure. The least tenure in each group was one to two years, the highest 37 to 38 years. But considering the average work years for each group, the small thermal power unit group is the most, at 17.84 years, about 5 years longer than those in the large thermal power unit group (12.97 years), and nearly twice as many as those in the wind power group (9.10 years).

Grouping the samples by their worked years, it is noted that, 46% among the wind power group have work years between 1-5 years, having the highest proportion of new recruits, and distribution in the remaining 3 work-year ranges are quite in proportion; among the large thermal power unit group, distribution among all 4 work-year ranges are quite in proportion, with 37% for both 1-5 work years and 11-20 work years; over half of the small thermal power group have work years between 11-20 years, and 30.0% for 20 years and above, less than 10% is with 1-5 work-years.

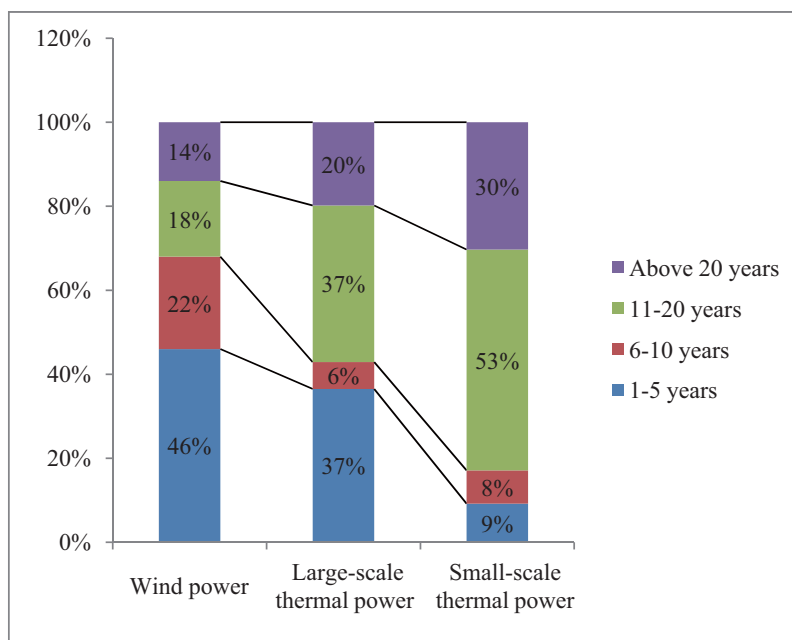


Figure 5.2 Tenure of workers in power enterprises

5.4.2. Worker's education and skills

Workers in small thermal power units have the lowest educational levels. We gave scores to each employee based on their educational background (1 for junior middle school and below, 2 for senior high school and vocational high school; 3 for technical school and secondary technical school; 4 for senior vocational school, 5 for junior college, 6 for university, 7 for Masters and above). The wind power group's average education score is the highest, at 5.3, small thermal power unit group being lowest, at 4.25, 1.05 lower than the wind power group.

	Junior middle school and below	Senior high school	Vocational high school	Technical School	Secondary technical school	Junior college	University	Masters and above
Wind power	.0%	4.0%	.0%	2.0%	4.0%	38.0%	50.0%	2.0%
Large Thermal power	2.5%	3.3%	3.0%	10.5%	9.8%	26.1%	43.1%	1.8%
Small Thermal power	4.8%	3.6%	9.6%	10.8%	14.5%	25.3%	27.7%	3.6%

Table 5.6 Educational level of workers in Power Enterprises

Wind power is an emerging industry; its workforce has the highest education, with 0% at Junior high school and below level, and 90% for junior college and above. The large thermal power unit group uses mostly freshly built units, workforce education level is also quite high, and 71% are with junior college degree and above. Also, over 20% are with technical school and vocational high school education. Workers at the small thermal power group have relatively lower education than the other 2 groups in the survey, only 56.6% possessed junior college and above degrees. The proportion with technical school and vocational high school education is relatively high, at 25.3%.

Older workers have lower levels of education. The educational index for workers aged 30 and below, 31-40, 41-50 and 51 years and above is 5.56 years, 4.66 years, 4.42 years and 2.88 years respectively. Most workers aged 30 or below attended higher education, higher than any other age group. Contrastingly, nearly 80% of workers aged 51 or older, did not attend higher education.

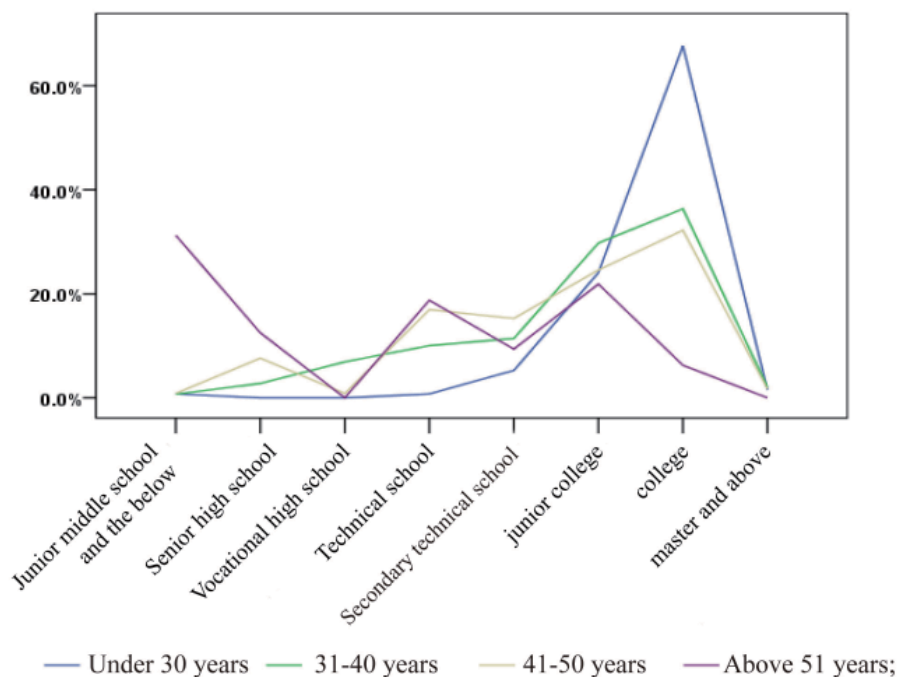


Figure 5.3 Educational background of workers of different ages

Technicians account for the highest percentage of workers in the small thermal power group. Regarding vocational skill levels, the qualification rate across the power generation workforce is quite high, with most workers possessing professional qualifications. The small thermal power group has the highest percentage of workers with professional qualifications, at 90.2%; the wind power group and the large thermal power group are similar, at 84.8% and 83.8% respectively.

	Do you possess any professional qualifications?	
	Yes	No
Wind power	84.8%	15.2%
Large Thermal Power	83.8%	16.2%
Small Thermal Power	90.2%	9.8%

Table 5.7 Professional qualifications of workers in power enterprises

Regarding the composition of technical levels and skills, workers in the wind power group are mainly middle and senior technicians or engineers; those in the large thermal power unit group are mainly senior and intermediate technicians or have intermediate technical qualifications; those in the small thermal power unit group are quite similar to those in the large group, with many senior and intermediate technicians, or with intermediate technical qualifications. That is to say, wind power industry workforce is mainly made up workers with professional titles and technicians, whereas workers in coal-fired power plants are mostly intermediate and senior technicians.

	N/A	Junior workman	Intermediate workman	Senior workman	Tech nician	Senior Tech nician	Junior profes- sional title	Intermediate professional title	Senior professional title
Wind power	6.5%	13.0%	6.5%	2.2%	15.2%	2.2%	10.9%	28.3%	15.2%
Large thermal power	4.2%	7.7%	24.7%	25.3%	6.8%	1.2%	6.5%	18.2%	5.4%
Small thermal power	2.7%	4.1%	27.0%	24.3%	8.1%	1.4%	8.1%	17.6%	6.8%

Table 5.8 Vocational level of workers in the power enterprises

On skill level, 50% of workers aged 30 or below are intermediate or junior technicians. Nearly 30% of those aged 31-40 are senior technicians. The workers aged 51 and older have a larger proportion of engineers than any other age group with 60% having the intermediate qualifications or higher. In professional positions, 40% of those aged from 31-40 have intermediate professional titles or above, followed by 41-50 age group and 51 years and older age group. This means that skill level and professional and technical positions have a positive correlation to age.

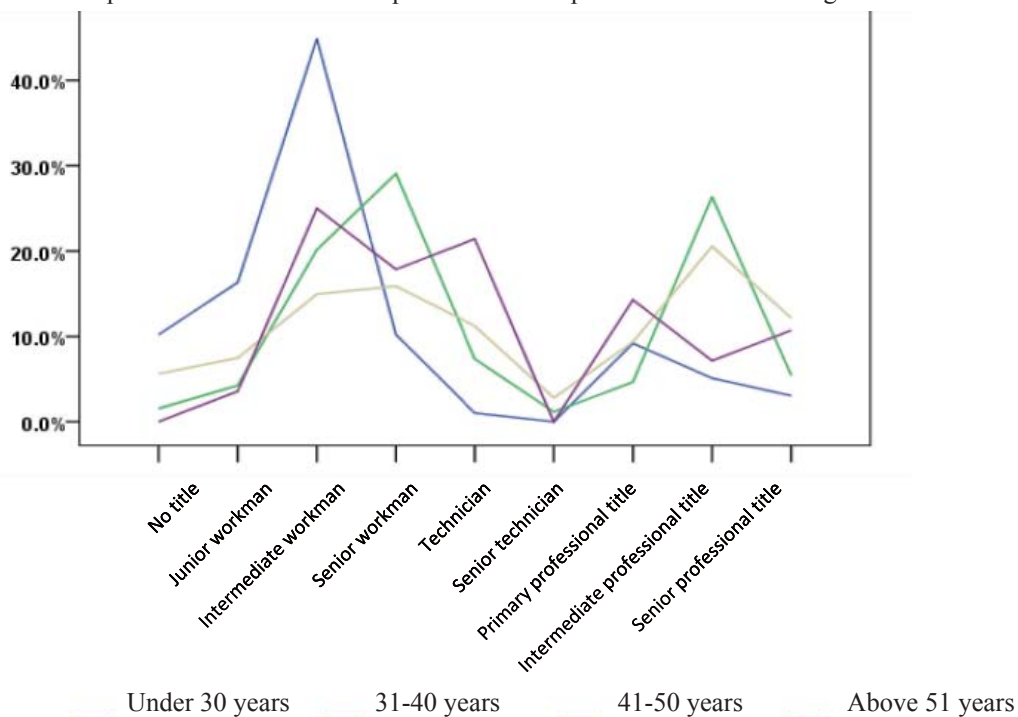


Figure 5.4 Skills level and professional titles of workers of different ages

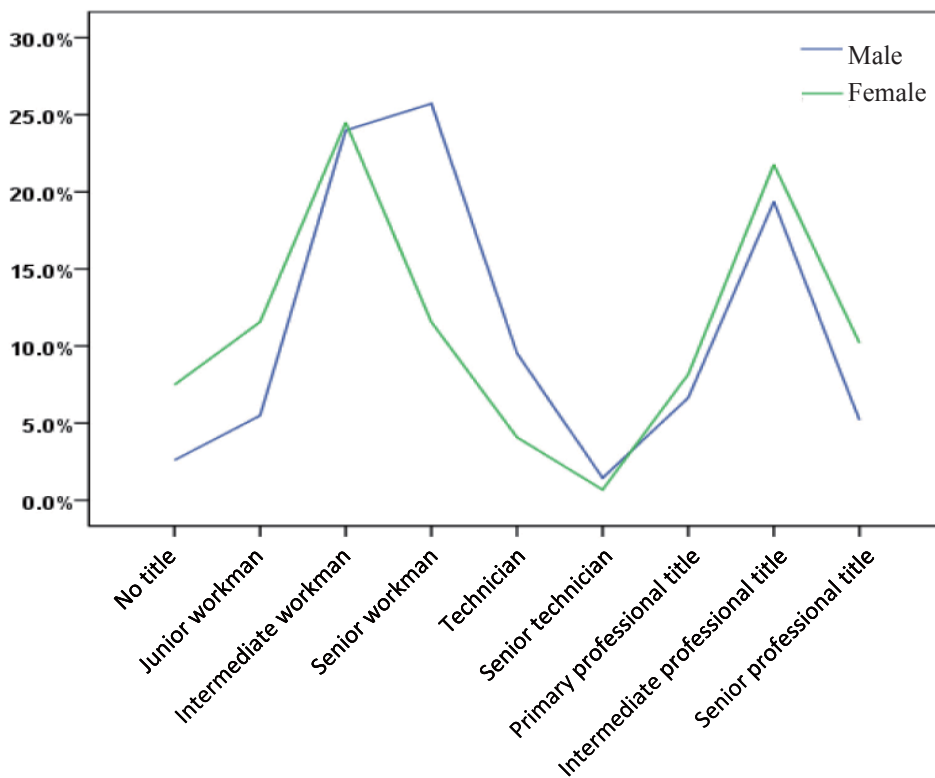


Figure 5.5 Skill level and professional title of workers of different genders

In terms of gender, the skill level of male workers is generally higher than female workers, but women's professional and technical positions are generally higher than men's. This demonstrates the major difference in the nature of gender related positions.

5.4.3 Employee status

Employees in the small thermal power group are all classed as local non-agricultural registered permanent residents. Many insights into the makeup of the power industry workforce can be derived by examining the employee's residential registration. Due to the unique conditions of the wind power industry, workers need to work long shifts often working continuously for ten days or half a month without going home. Therefore many employees are non-local non-agricultural registered residents. As the large thermal power units' production efficiency has been greatly improved, they do not require many formal employees. As a result they tend to recruit local agricultural registered residents, and non-local agricultural or non-agricultural registered residents. The workers for the small thermal power units tended to be recruited long time ago when the plant was first built. They all tend to be local non-agricultural registered residents.

	Local non-agriculture	Local agriculture	Non-local non-agriculture	Non-local agriculture	Other
Wind Power	90.4%	1.9%	7.7%	.0%	.0%
Large Thermal Power	93.7%	3.3%	.8%	.8%	1.5%
Small Thermal Power	100.0%	.0%	.0%	.0%	.0%

Table 5.9 The residential status of workers in power enterprises

Workers at small thermal power units are all formally employed. Nearly all workers at the power plants are formally employed. Some exceptions are wind power companies which have some workers in dispatch jobs, and the large thermal power units who employ some temporary workers. There are some redundant positions within small thermal units, but all of their workers are formal employees. Such practices are the result of each company’s own production needs.

	Formal workers	Labour dispatch	Hourly workers	Contractual migrant rural workers
Wind power	96.2%	3.8%	.0%	.0%
Large thermal power unit	98.5%	1.0%	.3%	.3%
Small thermal power unit	100.0%	.0%	.0%	.0%

Table 5.10 Employment status of workers in power enterprises

The proportions of technical positions are the highest at small thermal power units. The surveyed workers’ job types show that among the wind power, large and small thermal power units, the percentage of technical positions increases in turn, while the percentages for ordinary positions and skilled positions decrease in turn. This may mean that workers at coal-fired power plants requires relatively long term training, that small thermal power units have been in operation for quite some time, hence the percentage of technical positions become higher, while wind power and large thermal power units had been running for relatively short time, therefore the percentage for technical positions are relatively low. On the other hand, this may also be due to the fact that the degree of worker specialization at wind power and large thermal power units are higher, with more detailed and specific division of labour, such that production efficiency for those technical positions are higher, requiring relatively more non-technical positions for supporting. Wind power companies have a higher percentage of other positions, this may be because wind power companies in general have lean workforce, and some management positions were also included in the survey.

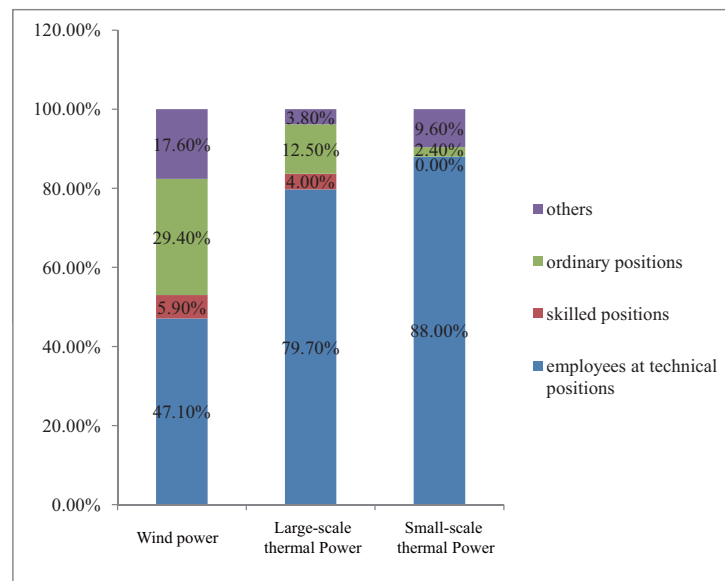


Figure 5.6 Skill levels of workers in power enterprises

Employees generally signed employment contracts. Regardless the type of positions, basically all workers signed employment contracts with their companies. In particular, workers at wind power have the highest percentage of signing contracts with no fixed term, at 80%. For those wind power workers who signed fixed term contracts, the term is quite short, averaging at 4.62 years.

The percentage of workers signing contacts with no fixed term at both large and small thermal power units are also quite high, at close to 60%. Although 40% of the surveyed workers signed fixed term contracts, but the terms are relatively long, averaging 6.27 years and 5.8 years respectively, maximum fixed terms are up to 20 years and 10 years. These are much higher than that at wind power, which is only 5 years.

	Open-ended	Fixed term	Project-based contract	Unclear
Wind power	80.4%	15.7%	.0%	3.9%
Large thermal power	55.0%	40.6%	.3%	4.1%
Small thermal power	59.3%	38.3%	.0%	2.5%

Table 5.11 Contract status of workers in power enterprises

Among the surveyed workers who signed fixed term contracts, nearly all of them were willing to renew contract with the company, and most of them felt that this expectation would materialize. Among those fixed term contract workers at coal-fired power plants, a small proportion felt that there was uncertainty regarding their contract renewal.

	Will renew	Won't renew	Hard to say now
Wind power	100.0%	.0%	.0%
Large Thermal	90.3%	.6%	9.1%
Small Thermal	94.3%	.0%	5.7%

Table 5.12 Worker views on renewing contracts with power enterprises

5.4.4. Job seeking and job changing

Workers at small thermal power units were mainly allocated by the State while those in wind power obtained their jobs through reassignment. Historically, the power generation industries were all State owned and all employees were allocated to positions by the State. All employees over 40 years old mainly were assigned to their roles in this way. Since the introduction of market oriented employment in 1993, employment needs have been met through recruitments with employer and graduate's mutual selection. State allocation was abandoned. New recruits in those companies have mostly been university graduates. Since the recruitment channels are quite mature, and remuneration package is quite attractive, the companies did not need to rely on other market-oriented approaches such as agency, recommendation by relatives and friends, etc. to meet their recruitment needs.

Wind power is an emerging industry in China, specialized university graduates for this industry are not yet available. Therefore, the recruitment needs were mostly met by internal position relocation, training, and reassignment from other companies. The survey shows that 41.2% of wind power workers joined the company through job reassignment.

	State allocation	Reassignment	Self application	Merger & reorganization	Agency	Recommendation by friends & family	Labour dispatch	Others
Wind power	43.1%	41.2%	7.8%	.0%	.0%	2.0%	3.9%	2.0%
Large thermal	60.1%	19.0%	16.5%	.5%	.2%	1.5%	.2%	2.0%
Small thermal	80.5%	4.9%	11.0%	.0%	.0%	.0%	.0%	3.7%

Table 5.13 Ways to obtain employment in power enterprises

Job post changes in power generation industry are mostly internal relocation. Workers' job post changes are related to equipment unit's years of operation. Since small thermal power units have been in operation for a long time, the proportion of workers who experienced job post changes became higher. Among those experienced job post changes, about 1/4 of the workers across all 3 groups experienced it once; over 1/4 of the small thermal group workers experienced job post change twice, which is the highest proportion, while in large thermal group and wind power group, more workers experienced job changes three times than those experienced it twice.

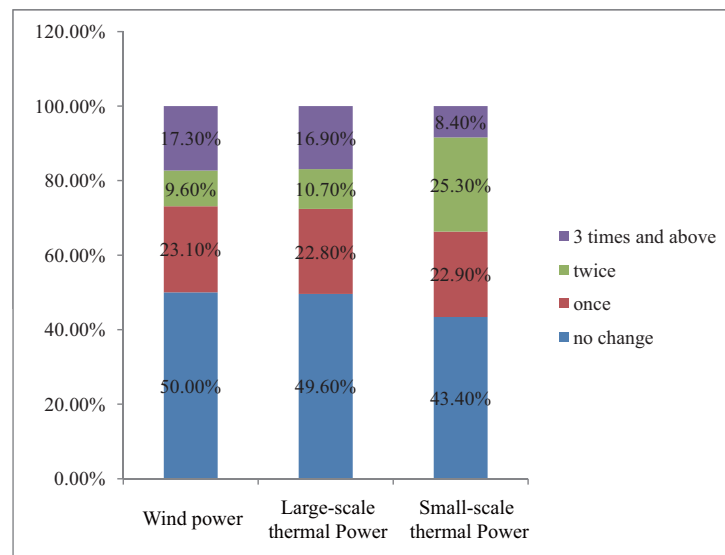


Figure 5-7 Job changes of workers in power enterprises

5.5 Different frontline worker’s working conditions in power generation industry

5.5.1. Working hours and time arrangements

There is more shift work in small thermal power units. Shift work in small thermal power units is very common. Half of the surveyed workers work shifts; while this among wind power and large thermal power units are around 1/3. Since wind power enterprises are far from the city, employees need to work difference shifts, working continuous 10-15 days, then resting 10-15 days. There are 2-3 workers on each shift and the shifts rotate on duty. It could be interpreted that after implementing eco friendly measures, more workers can enjoy normal work hours.

	Yes	No
Wind power	33.3%	66.7%
Large-scale thermal Power	31.6%	68.4%
Small-scale thermal Power	49.4%	50.6%

Table 5.14 Shift work in power enterprises

Working overtime is common in the power generation industry and worker rights and interests are mostly protected. Overtime work in all 3 categories are very common, percentage of those worked overtime in the past year are all over 85%, increasing in turn from small thermal, to large thermal and wind power.

	Have you worked overtime in the past year?	
	Yes	No
Wind power	93.5%	6.5%
Large thermal	89.3%	10.7%
Small thermal	87.7%	12.3%

Table 5.15 Overtime in power enterprises

The majority of workers that worked overtime got overtime pay or supplementary leave according to the country’s regulations. As working long shifts are very common in the wind power group, those workers mainly received compensation in the form or supplementary leave, accounting for 60%. The other 40% got overtime pay.

In the two coal-fired power groups, workers’ overtime compensation are mostly by overtime payment, accounting for 60-70% who got basic rate compensation for their overtime, less than 10% got supplementary leave. In the small thermal group, more workers got no compensation for their overtime work compared with the large thermal group.

	Received full overtime pay	Received partial overtime pay	No overtime pay	Supplementary leave	Not sure
Wind	20.0%	20.0%	.0%	57.5%	2.5%
Large thermal	18.4%	50.6%	15.8%	9.0%	6.2%
Small thermal	44.4%	19.4%	26.4%	9.7%	.0%

Table 5.16 Overtime payment in power enterprises

Overtime working is determined by nature of the industry. With the democratic decision-making and participation in the management, workers can understand overtime arrangement.

5.5.2 Wages and benefits

Workers at wind power enterprises had the highest average annual income with the biggest variation in income existed in the small thermal power units. Wind power workers had the highest average annual income at RMB51,687.50, nearly RMB10,000 higher than that of the small thermal power units which ranked the lowest. From wind power to large thermal power units, then to the small thermal power units, the differences between the respective workers' average annual income became higher.

Last year's income				
	Lowest	Highest	Average	Standard Deviation
Wind power	27000	100000	51687.50	14715.446
Large thermal power	7500	120000	46792.74	17750.316
Small thermal power	15000	95000	42219.34	20373.406

Table 5.17 Annual income of workers in power enterprises

Grouping the samples by their ranges of annual income, wind power's income shows a normal distribution pattern, where middle income range of RMB40,001-50,000 accounts for 41%, while the percentages of higher and lower income are both lower. This appears to be scientific and reasonable. Coal-fired power workforce represents a descending pattern, where lower income groups accounts for higher proportion, and percentage becomes less as income gets higher. Over half of the surveyed workers at large thermal power units have annual incomes below RMB40,000, while this percentage is over 70% of those surveyed at small thermal power units.

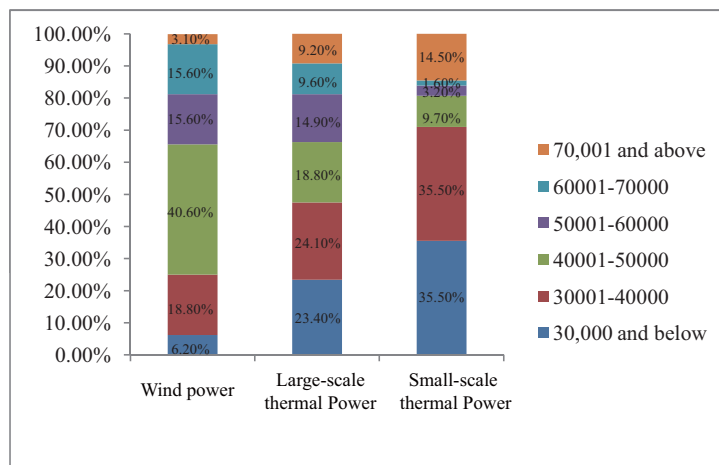


Figure 5.8 The annual income structure of workers in power enterprises

From the correlation analysis, age and entry age have a significant positive correlation to income. The older the worker is, the higher the income. The academic scores and annual income are negatively correlated.

The principle rule for income distribution at power generation industry is leaning towards frontline workers, and the income levels are differentiated. The higher percentage of lower income workers means higher percentage of non-frontline workers at the generator unit.

Workers' benefits at power generation companies are generally quite good. Almost all surveyed employees had housing subsidies or (and) housing fund (wind power at 94.2% and the other 2 groups both at 97%)

Major differences exist at each group's meal/skipped meal subsidies, and transportation subsidies. Only 1/3 of those at wind power group could get meal/skipped meal subsidies, while that in large thermal power units are over 3/4.

At wind power group, only 26.9% got transportation subsidy, only half of that at small thermal power units, while large thermal power units are the best at 73%.

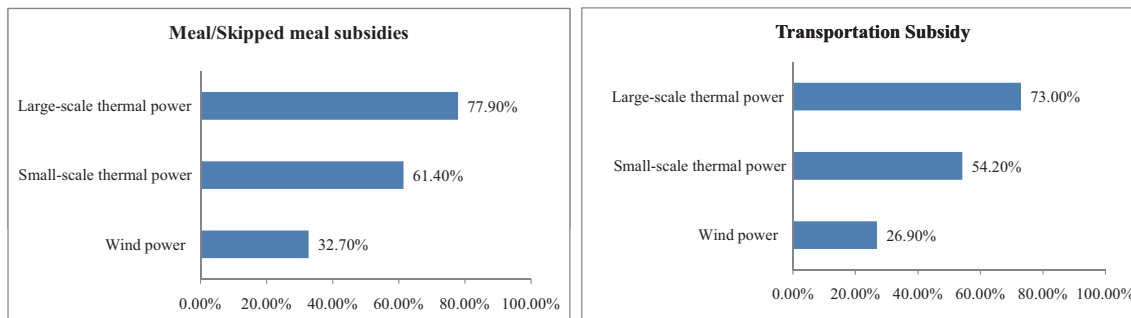


Figure 5.10-1 Meals and transportation subsidies in power enterprises

In addition, power companies also organized periodic health checks for their employees, and provided living allowances to those in need. The benefits extended to workers across the three sectors differed. In terms of health checks, almost all workers in the wind power group had access to this benefit, while just short of 20% of the coal-fired power groups did not have this benefit.

Regarding living allowance for needy employees, 40% of those from wind power group said their companies offered such benefit, while 60% and 50% from large and small thermal power units respectively said they had such benefit.

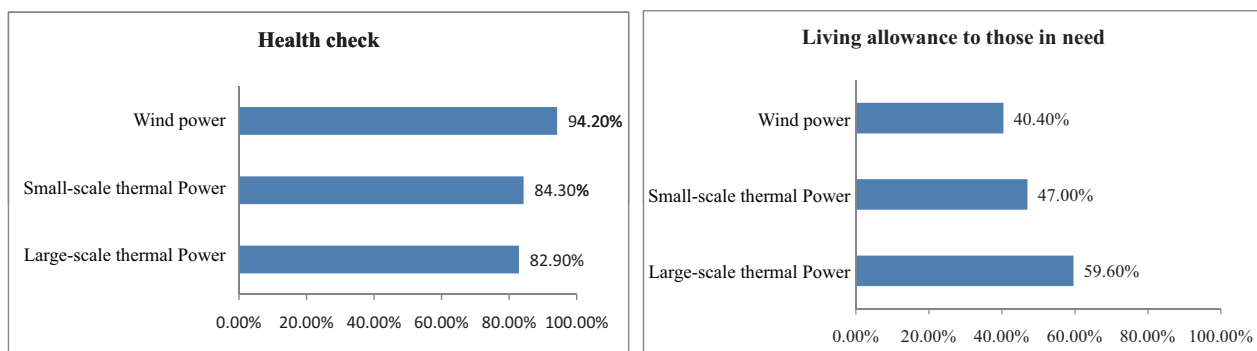


Figure 5.10-2 Health check and living allowance for workers in power enterprises

5.5.3 Social security

Social security participation rate in the power generating industry is higher than the national average. Judging from participation rates for the five social security measures required by law, nearly all surveyed workers at wind power groups participated in urban worker's basic superannuation and medical insurance schemes, while a small portion of surveyed employees from coal-fired power plants did not participate in these two plans. Among these, workers at small thermal power units have a higher rate of non-participation or uncertainty than those at large thermal power units. All three groups' participation rate of childbirth insurance is relatively low, with small thermal power units being lowest: 31.8% clearly stated they did not participate in childbirth insurance, and an additional 15.9% said they were not sure. The percentages at wind power and large thermal power units are slightly better.

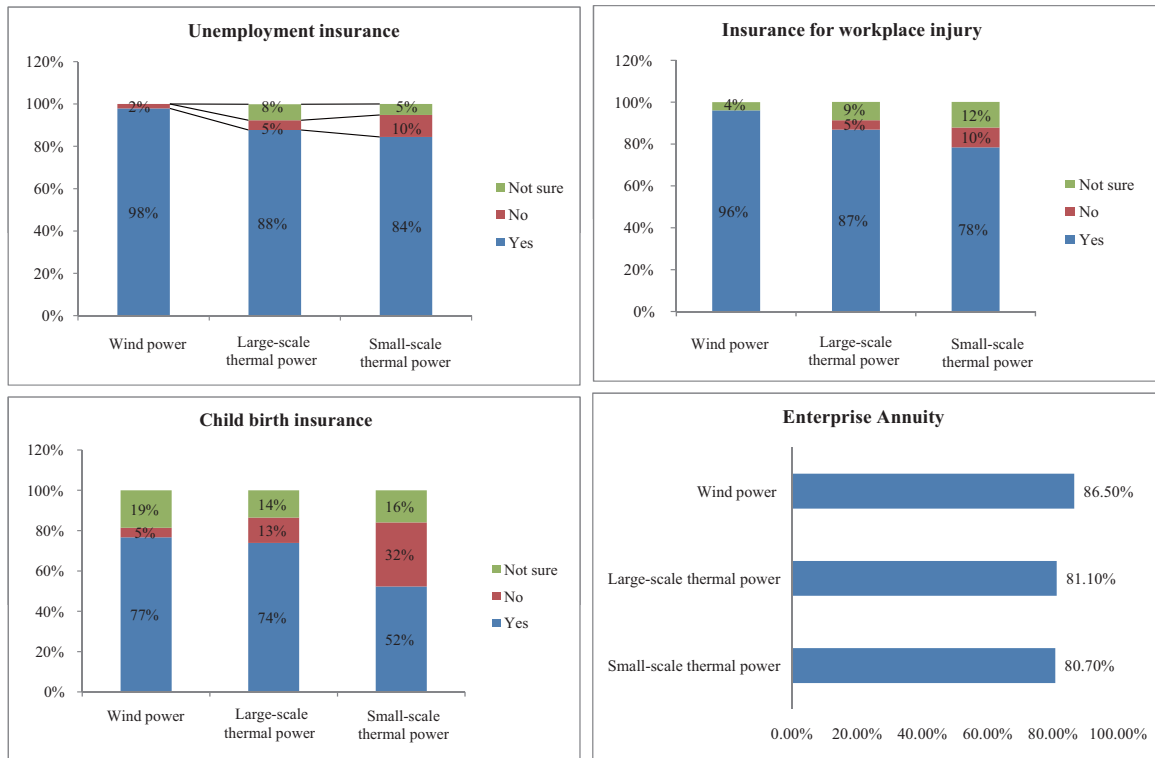


Figure 5.11-1/2/3/4 Social security for workers in power enterprises

In terms of age, generally the older the workers, the better they participated in contributing to social security. From the perspective of gender, the social security position of male workers is better than female workers.

Type of insurance	Insurance coverage rate %				
		Under 30 years	31-40	41-50	Above 51 years
Endowment insurance	98.5%	99.7%	99.2%	100.0%	
Medical insurance	100.0%	100.0%	100.0%	99.2%	
Unemployment insurance	81.6%	90.9%	86.0%	93.9%	
Insurance for work place injury	84.1%	84.0%	85.3%	93.8%	
Child birth insurance	60.9%	70.0%	77.0%	84.6%	
Commercial insurance	25.0%	25.1%	26.5%	7.7%	

Table 5.18 Social security/insurance position across difference age groups

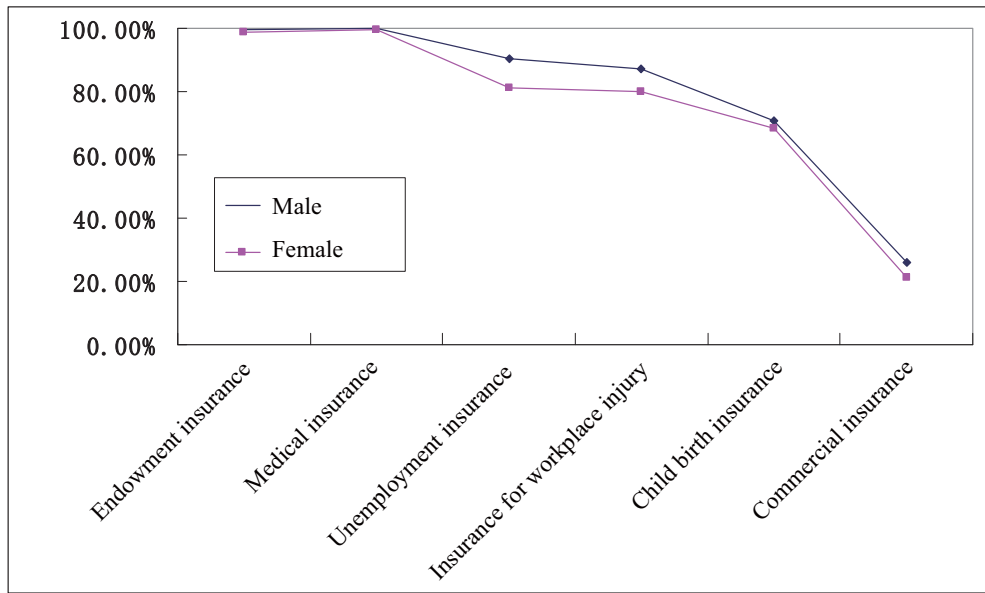


Figure 5.12 Social security and insurance position across gender groups

Other than the basic social insurances, power generation companies all offered annuities. The difference across each group is very little; the wind power group appears to do a little better.

5.5.4. Working environment

Major differences exist regarding occupational hazards. This survey concerned four types of occupational hazards: high temperature, noise, dust, and radiation. Wind power company clearly displays green employment characteristics: none of the surveyed workers considered they experience any hazard concerning high temperature, only 2% considered they experienced dust, less than one fifth experienced noise, and less than one third felt they were exposed to radiation at work.

On the contrary, coal-fired power groups displayed clear non-green employment characteristics: in large thermal power units, 2/3 felt they were exposed to noise hazard at work, the percentage at small thermal power units are over 75%; in both thermal power units around two thirds felt they were exposed to dust hazard, over half in those two groups felt they experienced high temperature, an 42.4% and 44.6% respectively felt they were exposed to radiation.

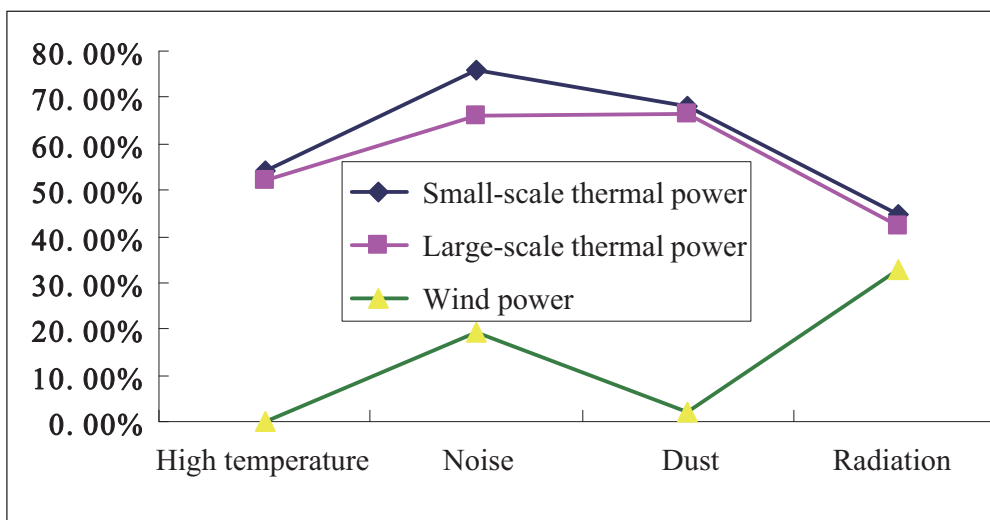


Figure 5.13 Occupational hazards for workers in power enterprises

In terms of gender, in addition to radiation hazards, there are a higher proportion of male workers who face high heat, noise and dust hazards than female workers, which also reflects that power generation front-line positions are dominated by males. From an age perspective, higher proportions of workers aged under 30 and over 51 faced occupational hazards. This might be due to the sensitivity of both groups to the occupational hazards. In terms of job types, technical workers believe they have the highest occupational hazard risks, higher than ordinary and skilled workers. This reflects the knowledge and skills-intensive aspect of power generation enterprise.

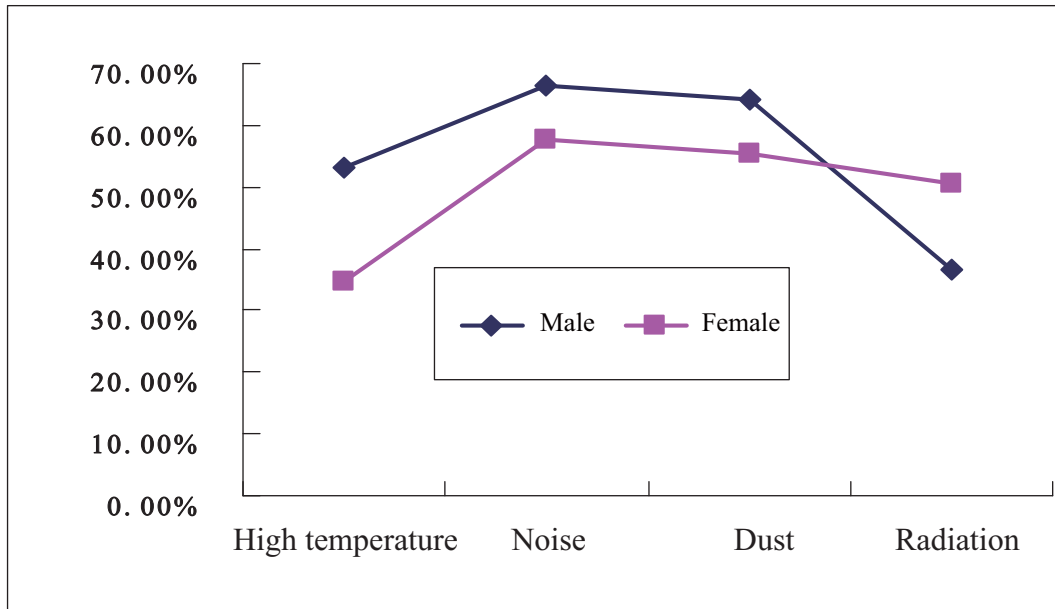


Figure 5.14 Occupational hazards for workers in power enterprises by gender

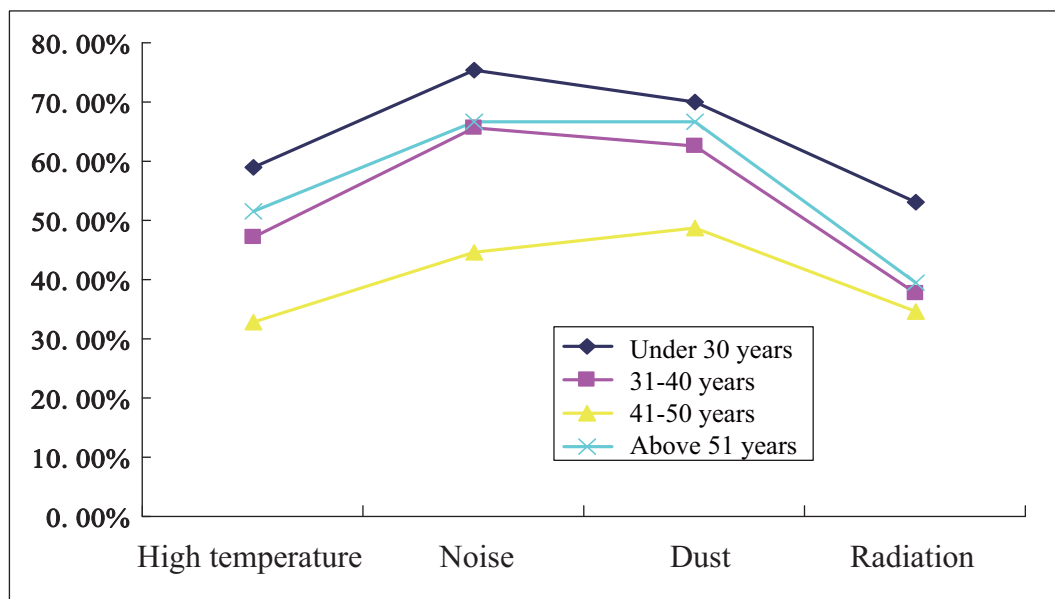


Figure 5.15 Occupational hazards for workers in power enterprises by age

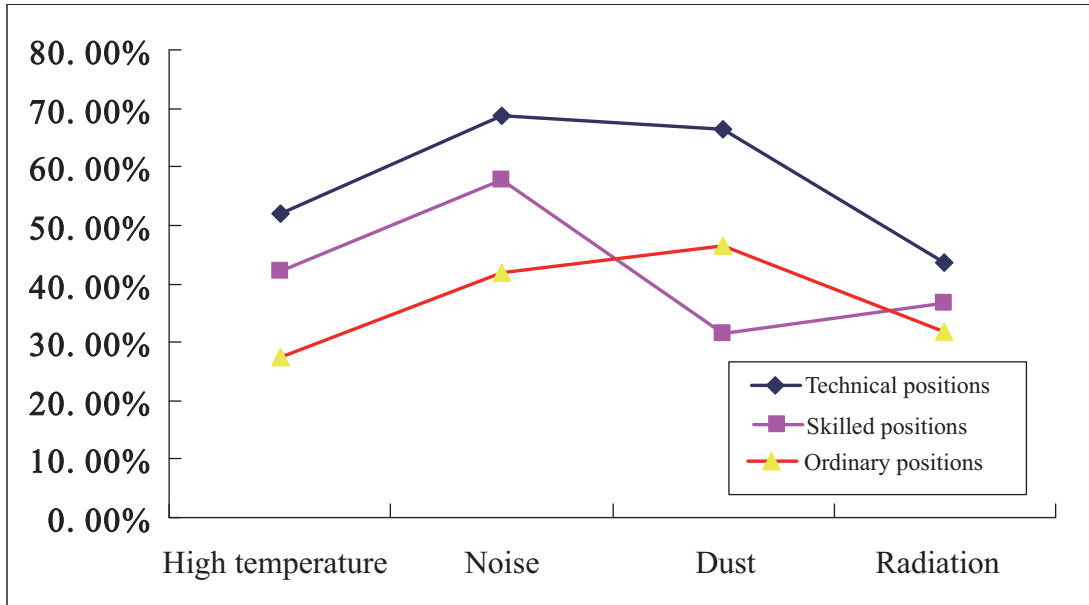


Figure 5.16 Occupational hazards for workers in power enterprises by occupation

Workers were generally happy about their work environment, while there were clear differences between the wind power and thermal power groups. Most or 76.9% of workers in the wind power group considered their work environment to be “very good”. In the two thermal power groups, 18.2% and 13.3% respectively considered their work environment to be “very good”, with the majority feeling it was only “so so”.

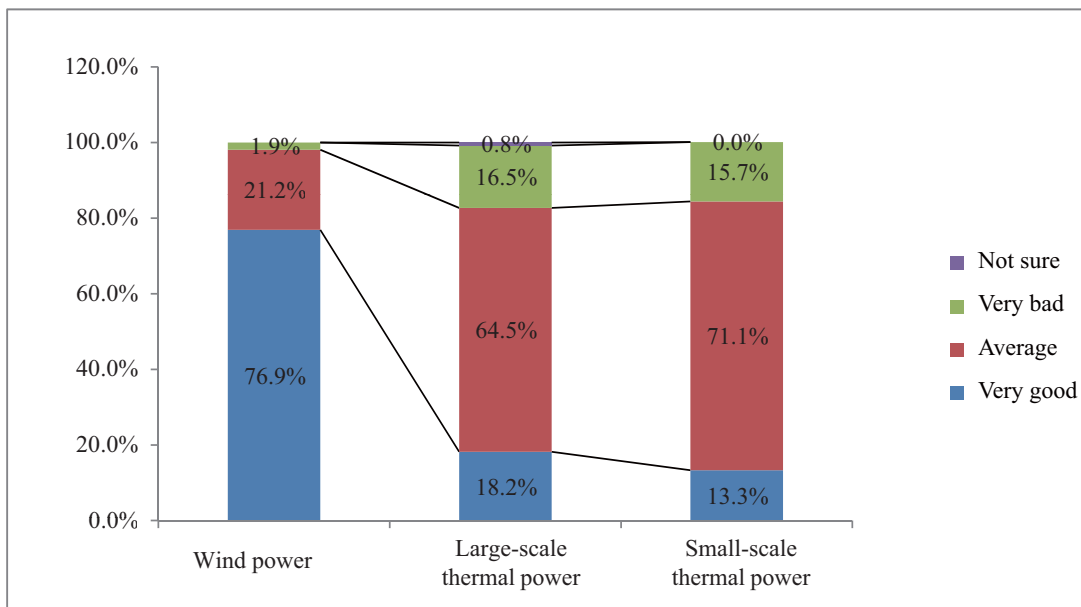


Figure 5.9 Worker views on conditions at power enterprises

In terms of gender and age in the evaluation working conditions, female workers, interestingly, rated work conditions as being better than that reported by male workers. Also, the older the worker, the more positively they evaluated working conditions. Ordinary workers evaluated work conditions the highest followed by skilled workers and technical workers.

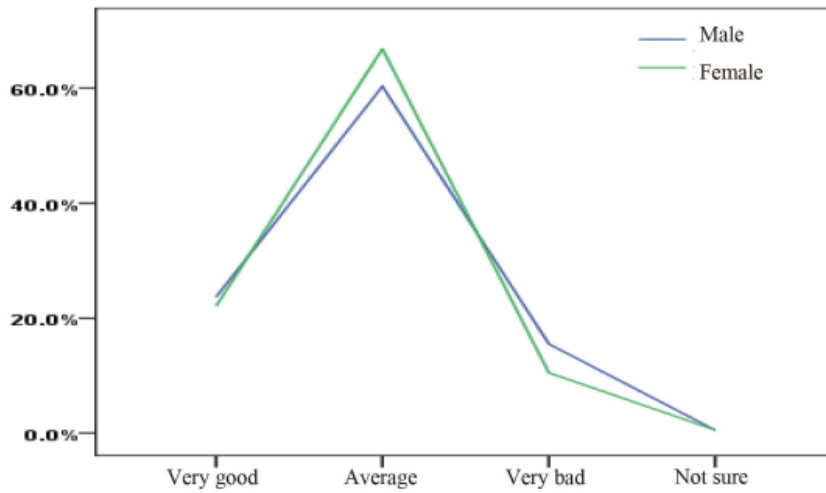


Figure 5.10 Worker views on the work conditions at power enterprises by gender

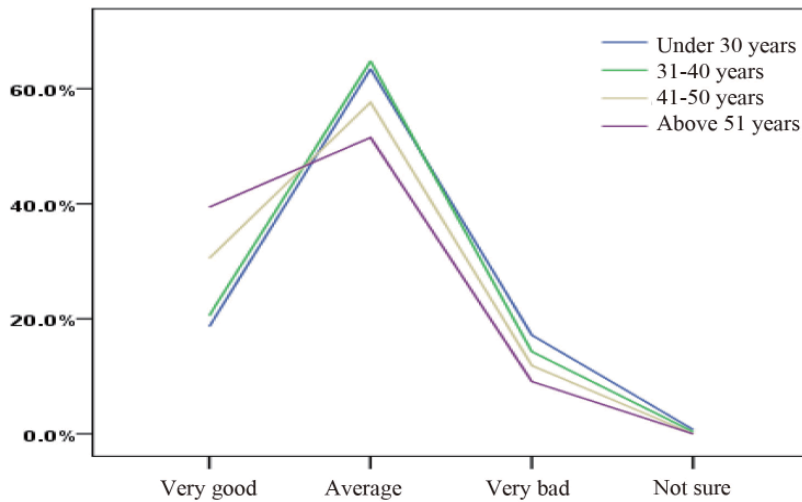


Figure 5.11 Worker views on work conditions at power enterprises by age

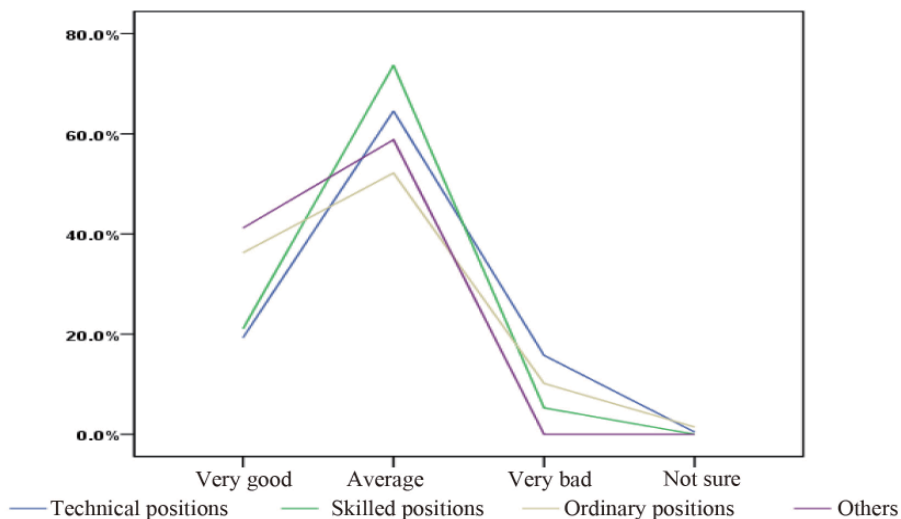


Figure 5.12 Worker views on the conditions of power enterprises by occupation

Workplace protection measures. Among all the protection measures adopted in each group, wind power companies have the least occupational hazards and enforce the highest level of workplace protection measures. However, small thermal power units which have the most serious occupational hazards, provide the lowest protection measures.

Nearly 90% of those surveyed in wind power said their company held safety education training, while these percentages at small thermal power plants are less than 75%. Nearly 85% of the surveyed wind power plant workers said there were safety measures and facilities at their workplace, while at small thermal power units this was less than 65%. About 92% in each of the surveyed groups said their companies provided safety protection supplies.

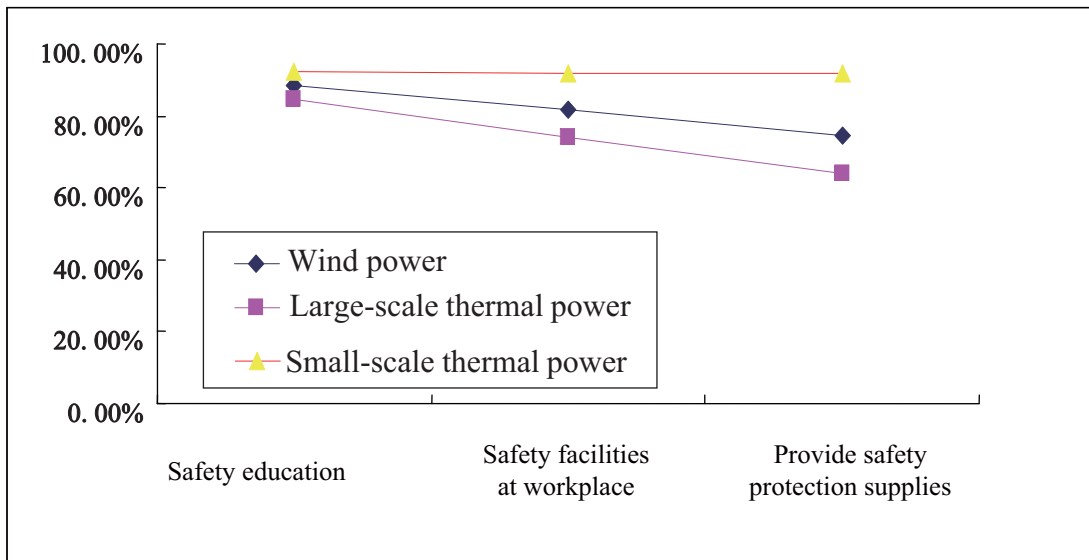


Figure 5.13 Safety measures for workers in power enterprises

Health conditions among wind power workers are the best. 98% of those surveyed in wind power enterprises said they were “healthy”, while less than 80% of those surveyed at coal power said so, nearly 20% of them said their health condition was average. The general health conditions of those from small power units are not as good as those from large power units. Nearly 5% were quite frail. Large thermal power units also employed about 0.3% disabled people and placed them at suitable positions, displaying corporate sense of social responsibility.

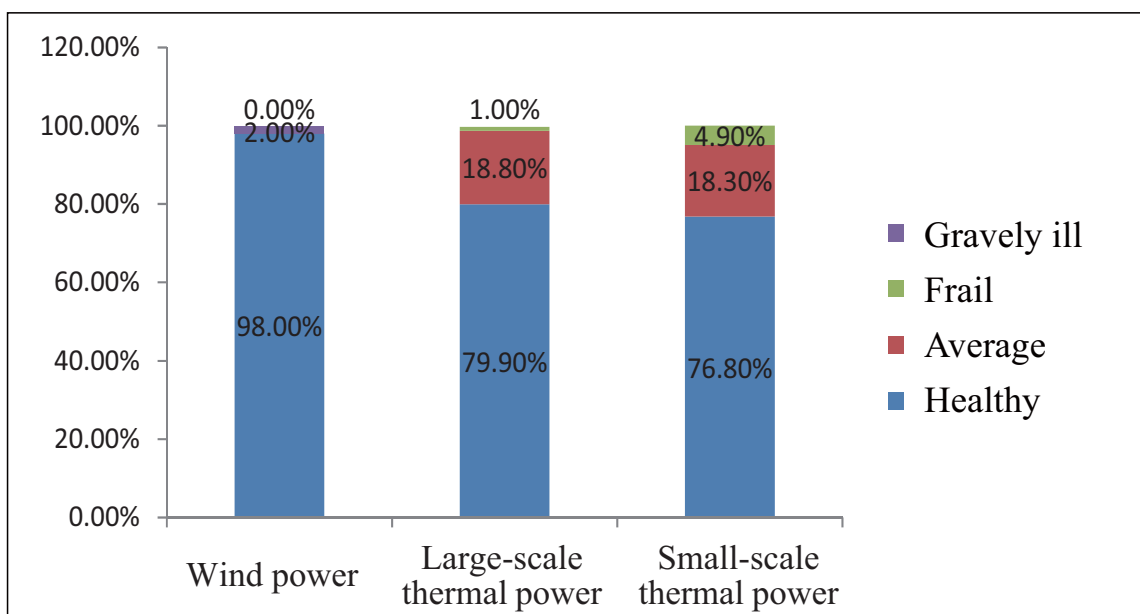


Figure 5.14 Health of workers in power enterprises

Similar to the results of evaluation of working environment, the overall health conditions for women is better than men, for younger rather than older workers, for ordinary workers compared to skilled workers and for skilled workers compared to technical workers.

Occupational diseases. The wind power group had the best health conditions amongst the three sectors. Except for the 10.9% who were not sure if they had any occupational diseases, the other 89.1% said they not developed any occupational diseases from their current job. In the two thermal power groups, over one quarter were not sure if they had any occupational diseases from their current job, and 45.6% in large thermal power units had occupational diseases from their current jobs, and this percentage for the small power units was even higher, at 55.4%.

In need of special attention is the occurrence of occupational diseases of workers increased with the increase of age, and workers at technical jobs have higher occurrence rate of occupational diseases than workers at jobs of different types.

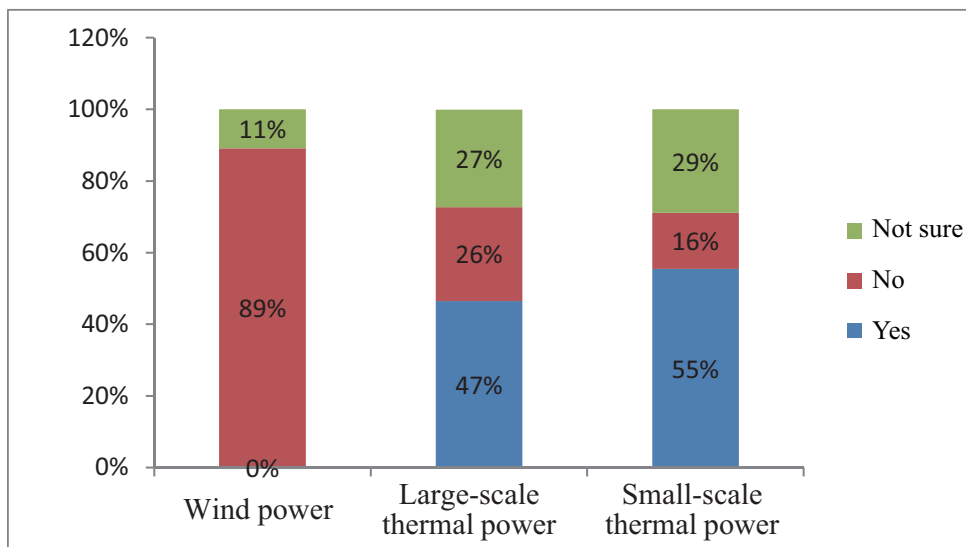


Figure 5.15 Occupational diseases of workers in power enterprises

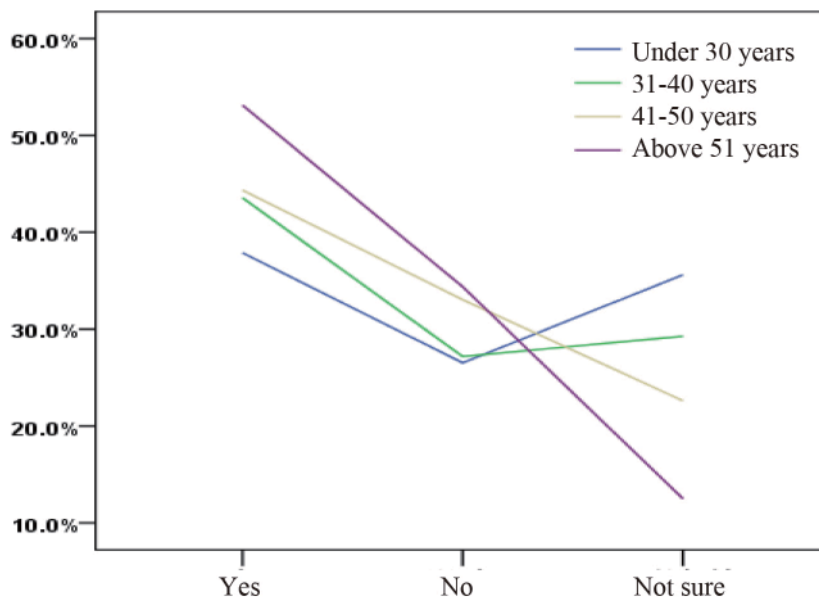


Figure 5.16 Occupational diseases by age of workers in power enterprises

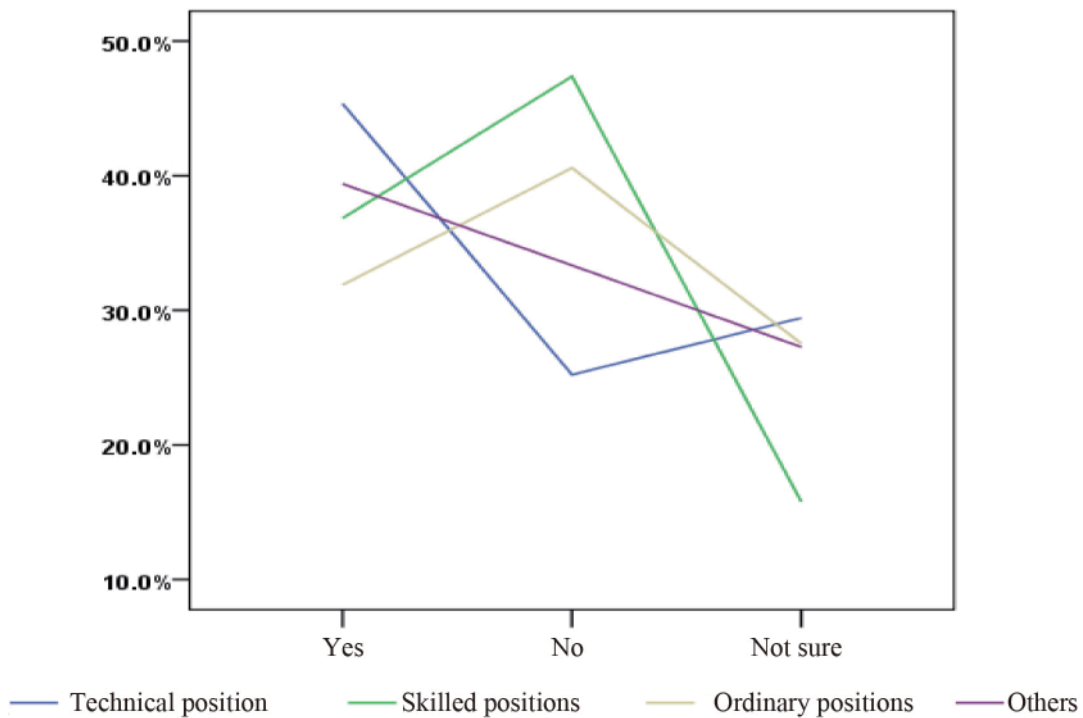


Figure 5.17 Occupational diseases of workers in power enterprises by occupation

In analyzing the answers to this question, the results showed that Silicoses was the most common among these types of companies. Neurasthenia and Tinnitus were also quite common. Silicosis is the main type of occupational disease in power plants, mainly due to the operating environment and the smoke and dust which cannot be thoroughly cleaned. Second, noise pollution is also a major source of pollution by power generation enterprises, as well as shift work associated with 24-hour production, which causes workers to develop occupational diseases such as tinnitus and neurasthenia.

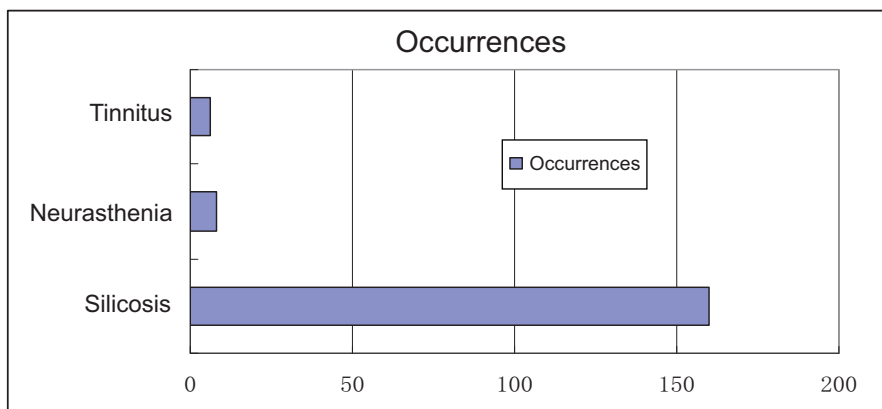


Figure 5.18 Major occupational diseases in power enterprises

Clear differences existed between the different groups of surveyed workers regarding their risk assessment for occupational diseases. No respondents at wind power enterprises felt there was “significant risk” of occupational diseases, and the majority felt that it “would not happen” or that the likelihood was “average”. In the two thermal power groups, nearly one third in each sector felt there was “significant risk”, nearly half felt the risk was “average”; and among the small thermal power group, only 1.2% felt there would be no risk of occupational diseases at all.

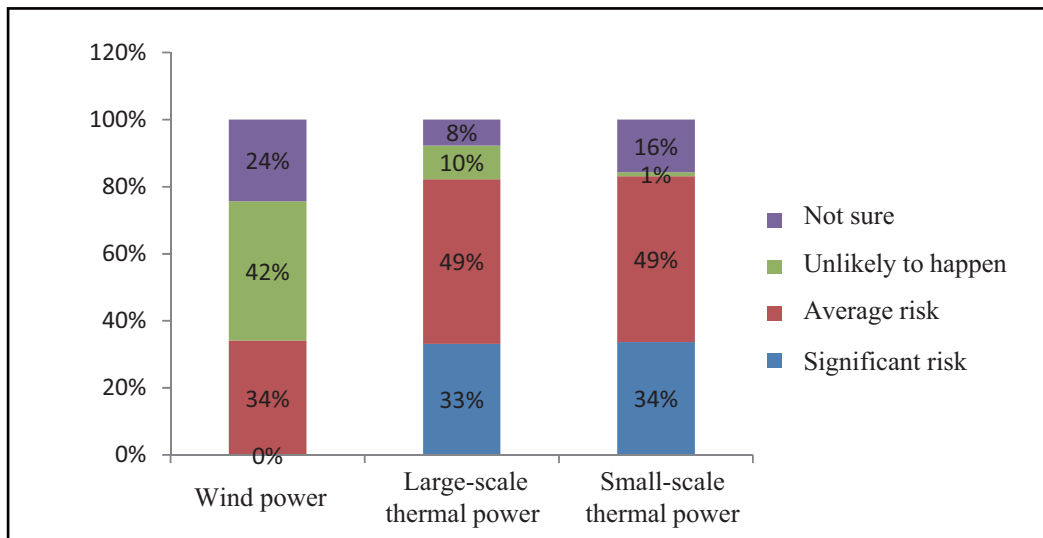


Figure 5.19 Worker awareness of occupational diseases in power enterprises

5.6 labour Relations

Labour union participation in company's decision-making. All the employees surveyed reported that their companies had labour unions, and over 90% indicated they were members. There was little difference across the three groups in this area. The unions or labour representatives were able to participate in the companies' management, having their say in consultations regarding the company reform and structural adjustment. In particular, participation in management at wind power was slightly better than in the other two groups, with nearly 90% of those surveyed indicating their unions or representatives could take part in the consultations about the company's reform and structural adjustment. This percentage at the two thermal power groups was 81.6% and 80.5% respectively.

	Are the Union or labour representatives allowed to take part in consultations regarding the company's reform/structural adjustment?	
	Yes	No
Wind	89.8%	10.2%
Large Thermal	81.6%	18.4%
Small Thermal	80.5%	19.5%

Table 5.19 Workers' participation in the management of power enterprises

Union chairmen played an important role in each company. At the worker representatives' annual meeting, all important company decisions must be passed by the union. Workers participated in the company's management through this channel, having their say in consultations for the company's reform and restructuring, expressing their views and suggestions so to ensure their rights and interests were protected. The unions also carried out help and support program for employees in difficulties. This all contributed to maintaining the stability of the company's operating conditions and its workforce. As a result, the employees expressed relatively high level of satisfaction towards their jobs.

5.7 Training at different power enterprises

5.7.1 Changing skill requirements in the power sector

Over 70% of those surveyed in the wind power group said there had been significant changes to the skills needed and equipment /instruments used at work. At large thermal power plants, less than half of the employees felt there had been significant changes towards the skills and equipment/instrument at work with over 25% feeling there were a little

change, and the remaining 25% felt there had been no change at all. At small thermal power plants, only 25% felt that the change was significant, and over 70% felt there was a little or no change at all.

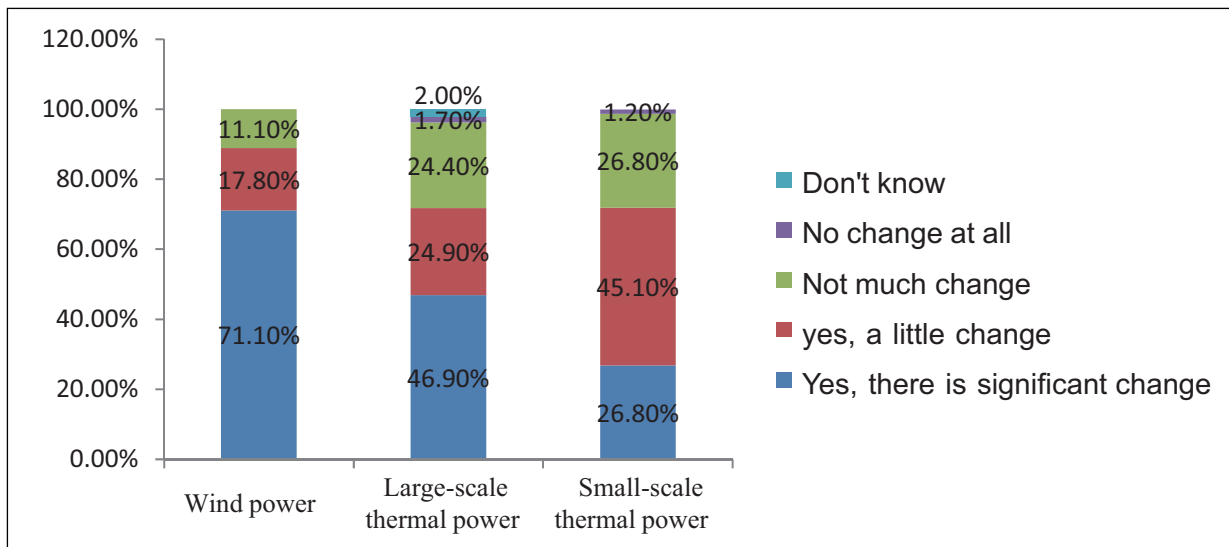


Figure 5.20 The impact of environmental protection measures on workers' tools and skills

5.7.2 Training programmes

Employee training is a very important activity in power enterprises. The older the company, the more standardized the training programs.

1. The first kind of training is induction training. After commencing work, an employee usually receives a two week long induction, involving company rules and regulations, safety requirements, fire safety requirements, first aid associated with electric shock and cardiopulmonary resuscitation, production process, explanations about the employment contract and social security. Induction training is usually followed by on-site training, and then specific job-training or operating training. Its training stages included on-site attendant internship, work under supervision, and work independently. It would normally take 1 year for the new recruit to get through all the above trainings, and then take a qualification test before becoming a formal employee. It would generally take no less than 5 years for a new recruit to become a master attendant. After a new recruit enters the company, he would normally sign apprenticeship agreement with an experienced technician to receive one-to-one training.
2. The second kind of training relates to specific equipment. When an enterprise purchases a new piece of equipment, the equipment supplier is responsible for providing training. The most common way for this to occur is for the supplier to come to the company's site to host a training session, and then arrange another session during the equipment's trial period. Some enterprises host lecture series by industry experts while other forms of training include arranging for study visits to similar power plants, appointing specialist training organization to host on-site learning, and simulation training, etc. Sometimes the company would also cooperate with universities to organize classes for subject-specific theoretical study. For example, when a Tianjin power plant installed desulphurization equipment, they allotted the elites among that year's university graduates to the dust removing workshop and let them take part in the preparation for desulphurization, and also send them off to visit the installation and operation of desulphurization equipment in other power plants, and study on-site as trainees and interns. Meanwhile, the company sent a repair and maintenance team to intern for the desulphurization equipment. After the desulphurization equipment came on line, the company set up full course training as follow up, and comprehensive assessment, making use of company-level professional examination on dust removal and desulphurization.
3. The third type of training is daily training. Daily training includes both routine and special trainings. For example, a company might specify that there must be a training component in every operating team's shift

circle. The maintenance and repair team may attend a 2-hour training section in an afternoon on a weekly basis. On-site trainings were taken as special trainings, explanation and random testing would be given as and when problems arose.

The forms of training generally involve every member in each shift to attend technical presentation, on-site examination, technical Q&A, technical tests, and anti-accident drills. The company's training center would have monthly random checking. The evaluation of training is done through company- and workshop-level tests. The annual company level test involved all production positions and the main management positions. The test results were linked to the company's talent project evaluation, where employees with outstanding results would be well rewarded.

4. The fourth is to apply joint management, joint training, joint exams, joint certification and joint reexamination for employees working in special positions. The company would send them to attend industry-wide training and certification programs, to fully implement the national professional qualification system, strengthen the management of special equipment operators' training and qualification, standardizing the above by setting respective rules.
5. The fifth is to encourage employees to attend relevant courses in their own time, and, according to the terms of the company's academic award program, offer partial reimbursement of tuition fees to employees upon graduation.. This will improve workforce capabilities and enhance employee's professionalism and capacity to learn.

Strengthening training is an important way to counteract the effects on employment of a power company's adoption of environmental protection measures. After adopting environmental protection measures, over two thirds of employees in wind power attended relevant training. This fraction reached 59% for large coal power units and 42.5% for small coal power units. Employees gave high ratings to the trainings they received, and expressed a high demand for further training. Training is the issue most cared about by employees.

	Did the company arrange any training after adopting environmental protection measures?	
	Yes	No
Wind	67.7%	32.3%
Large thermal power	59.0%	41.0%
Small thermal power	42.5%	57.5%

Table 5.22 Training offered by power enterprises after the introduction of environmental protection measures

Enterprises used education campaigns, questionnaires and quizzes to increase employees' environmental awareness and the focus of energy saving and environmental protection. As a result, employee environmental awareness both at work and at home increased, and they became supportive of eager to participate in the enterprise's environmental measures.

5.7.2 Employee satisfaction with training programmes

Overall, the coverage of training offered at coal-fired power plants is quite good as more than 97.5% of workers had received training. This number was slightly lower for wind power enterprises where around 88.5% of workers had received training.

	Attended training	No training
Wind power	88.5%	11.5%
Large thermal power	97.5%	2.5%
Small thermal power	97.6%	2.4%

Table 5.23 Training for workers in power enterprises

Training types. In terms of types of training offered by enterprises, wind power employees received better classed training than those at thermal power plants. The percentages of wind power employees receiving qualification training, continuous education, and training to adapt new industry/enterprise changes were all higher than that of employees in

thermal power plants, only lower on the scale of technical training received.

	Qualification training		Adaptive training		Technical level training		Continuous education	
	No	Yes	No	Yes	No	Yes	No	Yes
Wind Power	48.1%	51.9%	69.2%	30.8%	57.7%	42.3%	57.7%	42.3%
Large thermal power	64.8%	35.2%	84.6%	15.4%	38.2%	61.8%	66.0%	34.0%
Small thermal power	72.3%	27.7%	83.1%	16.9%	34.9%	65.1%	75.9%	24.1%

Table 5.24 Types of training attended by power enterprise workers

Employees gave high ratings for the trainings, and their desire for more training was very strong. All the surveyed employees in each group who received training expressed high rating for their trainings. The surveyed workers at wind power all said the training was “very useful” or “somewhat useful”, without any negative or average comments. However, small percentage of thermal power workers said their training did not think much of their training.

All employees felt a strong need for training. 85% of the surveyed employees thought that they needed more training in order to fit into the current company or department better; relatively, small thermal power workers’ need for training was lower than the other 2 groups.

	Do you feel the need for further training in order to adapt to the company/ department’s technological development?		How would you rate the training you have received so far?				
	Yes	No	Very useful	Somewhat useful	Average	Not very useful	No use at all
Wind power	88.4%	11.6%	61.9%	38.1%	.0%	.0%	.0%
Large thermal power	86.5%	13.5%	51.0%	35.0%	12.2%	1.3%	.5%
Small thermal power	76.8%	23.2%	54.9%	29.3%	8.5%	7.3%	.0%

Table 5.25 Evaluation of needs and evaluation of trainings for workers in power enterprises

5.8 Job security, job satisfaction and worker concerns

Job security appraisal. In general, the surveyed employees felt their jobs were relatively secure. In the wind power group, 76.9% felt that their job was “very secure”, and 19.2% felt “quite secure”. Most coal power workers felt “quite secure”, and 20% felt “very secure”. A small percentage in small thermal power plants felt there was uncertainty in their jobs.

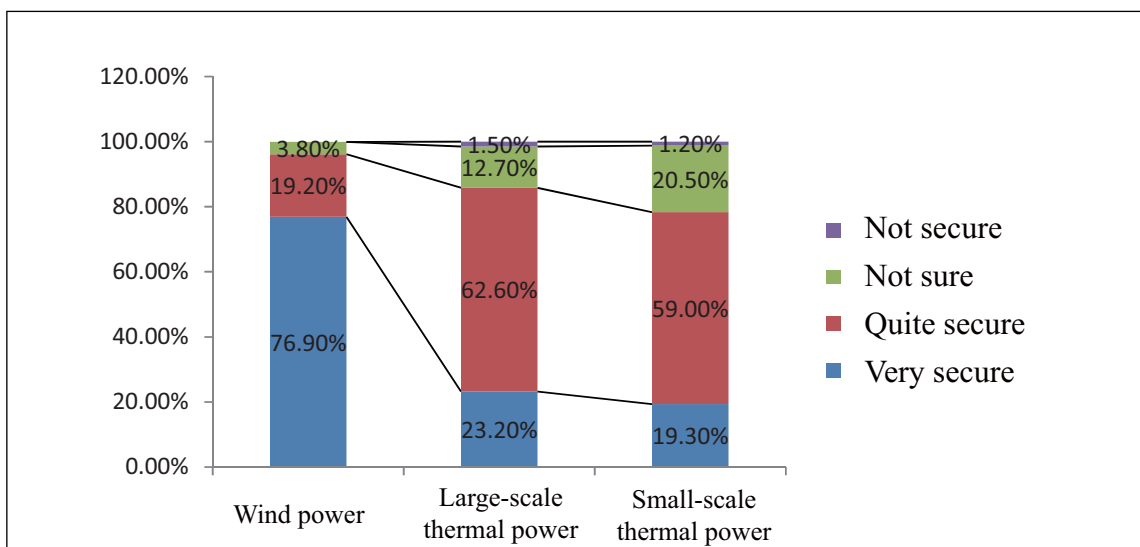


Figure 5.21 Job security of workers in the power sector

In terms of age, the older the worker, the higher the evaluation of job security. From a job type and gender perspective, there was very little difference between the groups. Workers' evaluation of job security is not strongly related to educational background as people with different educational backgrounds all think highly about job security. Only those with Masters degrees and higher were not confident about their job security which relates to career orientation rather than educational background.

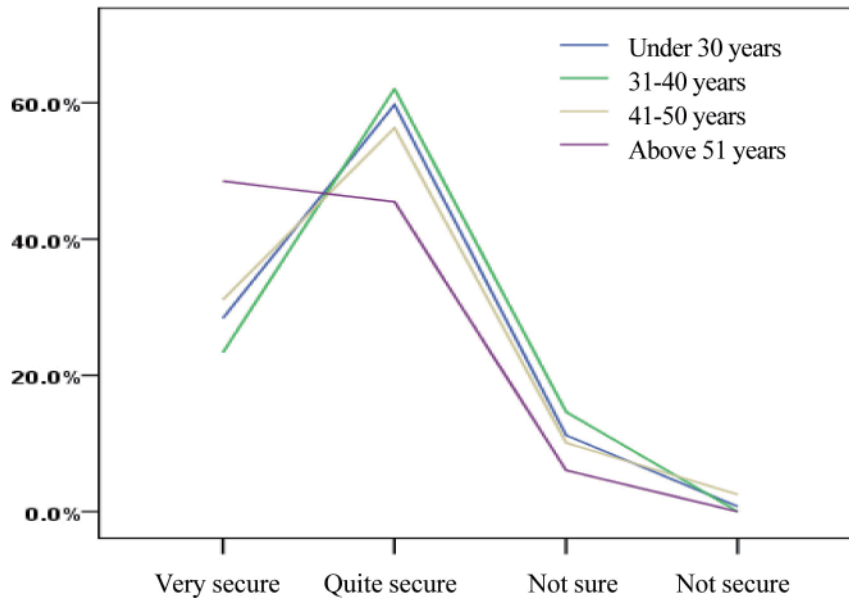


Figure 5.22 Job security by age of workers in power enterprises

Factors affecting job security. The main reason for job insecurity/ uncertainty amongst the 3.8% of wind power workers was limited skills. For large thermal power workers the reasons, in descending order are, insufficient government support, fierce industry competition, limited skills, and the changes occurring within the industry. Reasons given by small thermal power workers, in descending order are insufficient government support, limited skills, changes occurring within the industry and short-term contracts.

	Short contract terms	Current skill set becoming increasing insufficient to meet work demands	Competition becoming more fierce	Insufficient government support on employment	Reduction in employment numbers required as the industry develops	Others
Wind power	.0%	100.0%	.0%	.0%	.0%	.0%
Large thermal power	13.2%	15.1%	18.9%	34.0%	15.1%	3.8%
Small thermal power	18.8%	18.8%	6.2%	31.2%	18.8%	6.2%

Table 5.26 reasons for worker job uncertainty in the power industry

Levels of job satisfaction. Although coal fire power workers had some worries about their job security, they are generally satisfactory with their job as a whole. The job satisfaction for wind power workers in regard to their present job was very high, with over half of them “very satisfied”, and another 42.6% “quite satisfied”. None were unhappy. In the two thermal power groups, while the percentage of those that were “very satisfied” with their jobs was not high, most surveyed workers were “quite satisfied”. Those that were unhappy about their jobs only made up a small percentage.

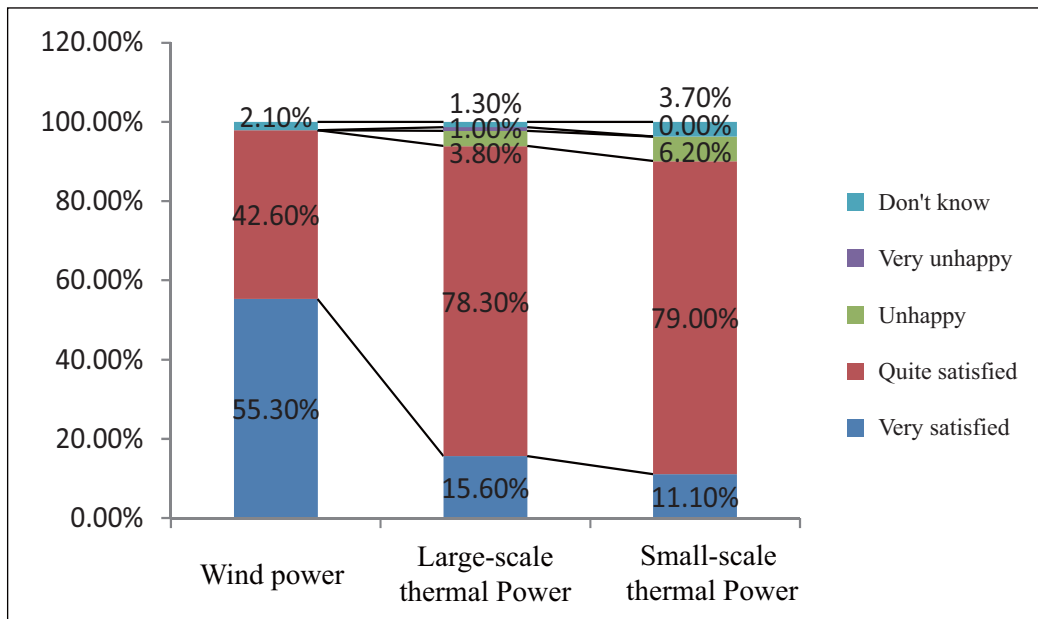


Figure 5.23 job satisfaction of workers in power enterprises

Workers were mostly concerned about technical training. Almost all surveyed felt that their companies should listen more to take into account workers’ opinions. Workers were most concerned about skills training. Over half the workers in each of the three groups felt strongly about the need for skills training. In the wind power group this proportion grew as high as 75%. In the two thermal power groups, this proportion was over 50%.

Thermal power workers were also very concerned about their wages. 57% of those surveyed at large thermal power units expressed their concerns about wages. Wind power workers had the lowest level of concern regarding salary. This may be because they were already quite happy about their current pay level. --- the average income level for wind power workers was the highest and the income disparity between them the lowest. Also, the company did not need to cut wages to compensate for implementing environmental protection measures.

Workplace safety is another issue of much concern, particularly among small thermal power workers. This may be because their workplace safety conditions were the worst.

Workers at large thermal power stations were also quite concerned about the “introduction of new technology” and “worker transfers to new positions”. This may be because some workers needed to learn new skills after transferring from small thermal power units to large ones.

There was also some minor concern about “redundancy and compensation”, however, the table below again shows that employment in the power industry is relatively stable.

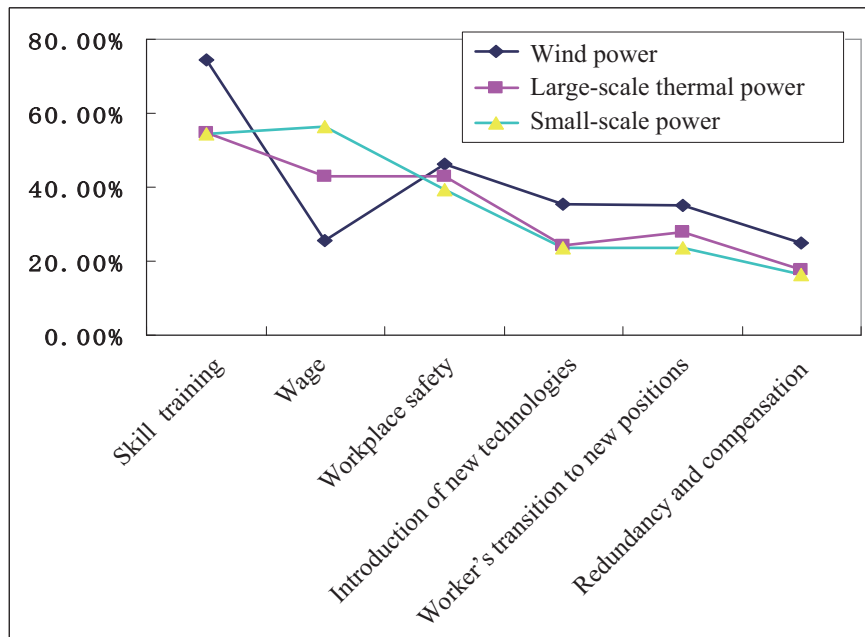


Figure 5.24/1/2/3/4 Issues of most concern for workers in power enterprises

5.9 Summary of key findings of the power sector study

5.9.1 Power industry restructuring and the impacts on employment

1. Significant negative impacts on direct employment

The power study conducted in eight power plants shows that, firstly, the job creation potential of the renewable energy sector is limited. The potential for employment in wind power (generators of over 300,000 KW), large thermal power stations and small thermal power stations are 30 to 50, 300-500 and over 1000 workers respectively. Advances in technology and energy supply restructuring will result in a significant reduction in the demand for employment in the power industry.

Secondly, large thermal power units can only take on a limited number of workers. The demand for workers at large thermal power stations is small and only 25% of workers that lose jobs from the closure of small stations will be able to find positions in supporting roles after receiving training. The remaining 75% of workers must rely on alternative arrangements made for them by the company.

Thirdly, there are limited direct employment opportunities created from installing desulphurization units and other such environmental measures. Generally speaking, desulphurization installation only creates one to two additional positions per unit. As power plants usually have five units, this only amounts to another ten additional positions at most.

Overall, the process of upgrading large plants and closing down smaller ones is a necessary process for advancement within the power industry and for the creation of renewable energy. Under set supply conditions, the need for labour becomes less and less. While high quality jobs are being created in this process, a much larger number of jobs will be eliminated.

2. Power industry restructuring will increasingly create employment problems

There is little room left for small thermal power stations that are yet to be shut down. They have lower production efficiency than the bigger stations, contribute greatly to environmental pollution and under the same market conditions have higher operational costs than the large stations. In order to meet environmental requirements, small thermal

power units have to go through much technical transformation, leading to increases in power consumption, causing increased operational costs. The effect of increases to raw material prices, such as limestone, are also felt more heavily by small thermal power units than on large ones.

Under such circumstances, job creation at small thermal power plants is extremely limited. As the units were constructed some time ago, the demographic of the workforce tends to be aging, the average tenure quite high, the level of worker education quite low, and worker skill level is quite outdated. It is an inevitable trend that all small thermal power units will be suspended eventually, so much attention must be paid to address the redundant workers in this sector in the future.

3. Energy sector policies will lead to changes in employment across different industries and regions

Restructuring in the power industry will lead to a reduction in direct employment, but on the other hand increase indirect employment and induced employment¹⁷. For example, the use of desulphurization equipment led to the development of an entire product chain that contributed positively to society: limestone is the raw material used for desulphurization which increased job opportunities at limestone production factories; after desulphurization, the resultant product, gypsum, could be used in the construction industry and also create jobs in motor transportation; and demand for the maintenance and production of desulphurization equipment is also created. Another example is that wind power development could lead to new jobs for wind turbine production and installation. In another word, while suspension of small units would lead to lost jobs, it would also lead to new jobs in the upper and lower production streams as well as the relevant sector's industries and regions. The energy policies cause changes of employment situations across different industries and regions.

5.9.2 Environmental protection measures in the power industry and the impact on employment

1. Small companies face considerable difficulties when adopting environmental measures

Using the example of desulphurization, coal fired power companies generally upgrade their older desulphurization units and facilities for dust removal and add efficient desulphurization and dust removal components to new units. Installing desulphurization equipment generally involves significant investment, and after installation, maintenance and operation of the units increase power consumption, in turn increasing coal input on the power needed to be supplied. More new equipment equates to more maintenance, components and water costs, contributing to increasing a company's operational costs by 10%. The government subsidizes companies by adding 0.015 Yuan per kilowatt when they supply power generated by desulphurization, but the actual increased cost to enterprise is 0.02 Yuan per kilowatt, the incremental cost not covered in full by the subsidy. Large enterprises can afford to invest in environmental measures, while small enterprises struggle – faced with losing competitive edge if the required pollution reduction measures are not adopted, or incurring higher operational costs from investing in environmental technology that threatens their existences.

2. The difficulty of redeploying older workers

The difficulty of redeploying older workers is demonstrated by looking at the work structure of thermal power plants, the organization of which has undergone a scientific rationalization process. In operating the earliest Phase One units (those small thermal power units already suspended or soon to be suspended), jobs were highly specialized, organized in three groups: turbine, boilers, and electrical operation. The feature of this arrangement was that specialized skills could be utilized for relatively long period of time with a worker's skills tending to be highly specialized and specific, making it difficult for a worker to diversify their skill base. Operators of Phase Two units, mainly those constructed since the 1990s using 200,000KW, had positions on the verge of transition. All workers were trying hard to learn new skills, and capable workers diversified their range of skills. The third phase of units were mainly new units operating at 300,000KW, intended to be operated by workers with a broad skill base. Therefore, workers used to working with older units would have difficulty finding new positions. Older workers with outdated skills face considerable difficulties

¹⁷ This conclusion driven from research from the team. The idea comes from the interviewees in power generate industry.

learning new ones. Combined with the stress of adjusting to a new position, these workers have considerable difficulty finding reemployment.

3. Closure of small thermal power units met with internal resistance

The income distribution of power plants is geared towards front line workers. Their income is ten times that of the support roles or service roles. Once the small thermal plant is closed, frontline workers are relocated to support positions, with a large drop in income. While enterprises can try to relocate the workers, workers will still feel dissatisfied.

As the industry itself places higher and higher requirements on its workers, small thermal unit team members who cannot return to the frontline are unlikely to feel positive about their career prospects, increasing their job insecurity.

Also, the narrowing room to survive and pressure from increasing operating costs infects workplace culture, increasing workers' feelings of job insecurity and discontent. Insufficient support from the government was recorded as the top factor affecting feelings of job security in the thermal power sector.

5.9.3 Comparison of employment in the wind and coal power sectors

1. Wind sector jobs offer higher job security

Industry prospects determine a job's safety and security. Wind power is an emerging industry with high growth potential, and its demand for labour is very strong. Workers do not have to worry about shortage of positions, just whether they have the skills to meet the job's requirements. For workers that sign fixed term contracts with wind power plants, almost all were willing to renew their contracts, and felt that would happen.

Contrastingly, small thermal power workers are concerned whether they will be able to keep their current positions. As thermal power plants are increasingly affected by market conditions, competition is increasingly fierce, and demand for labour is gradually reducing as technology advances, so more workers feel that their jobs are under threat. Followed by this is the skills issue. Among workers who signed fixed term contracts, a small proportion felt uncertainty about renewal. This demonstrates there is relatively more potential for structural adjustment among workers in coal-fired power plants.

2. Wind sector employment has higher flexibility and lower employee loyalty

In terms of the type of labour used, wind power companies employed a small number of dispatch workers, large thermal power units a small number of temporary workers, while the entire workforce at small thermal power units were formal employees. Regarding employee status, wind power plants hire relatively more non-locally registered workers, large thermal power units hired both locally registered agriculture workers and some non-locally registered workers, while workers at small thermal power units workers had been hired since business startup, and were all locally registered non-agriculture workers. In terms of contract length, wind power workers had shorter contract terms than those at thermal power units. Regarding recruitment, wind power is the most flexible. Regarding the mobility of workers, wind power and large thermal power workers had higher frequencies of job changing. All these above show that green jobs in general have higher flexibility than non-green jobs.

The backside of increased employment flexibility is reduced employee loyalty toward the company. The key staff would change jobs as soon as they found better opportunities. For some regular posts that could be replaced easily, the company would hire some temps with relatively low education level, to make sure they could fire them when they are no longer needed. This group generally account for 10% of a company's total workforce. Also temp workers had similar wage compared with formal workers, they do not have any benefits such as annuity and house fund. They would not feel strong loyalty towards the company either.

After the implementation of labour Law, the companies changed all temp workers to be labour dispatchers, who enjoyed the same level of wages for same type of job. This would increase the company's dismissal cost and labour

costs, and employment flexibility would be lower. This is another new question the companies have to deal with.

3. Wind energy jobs are more decent

Firstly, wind power plants offer the best workplace environments with the least health effects on workers. The work conditions of thermal power plants by nature include high temperatures and noise which would have detrimental effects on workers' health. There are also considerable differences between old and new generator units at thermal power plants. Older units were designed giving sole consideration to production with little regard for workers' health. New units designs took more human factors into account so with new technology, the workplace environment has continuously improved.

However, wind power also faces some new problems. As wind power plants are far from the city, workers generally work long shifts, working nonstop for 10-15 days before taking 10-15 days at home. There would be only a few people in each shift, in the long run worker's communication skills would be affected. Also, open-air operation is largely affected by naturally weather factors, equipment repair and maintenance and operation management are very demanding on the worker's physical requirements. Therefore, worker's age and gender are quite specific, generally young males in their 20s would be quite suitable.

Secondly, regarding income, wind power offers abundant employment opportunities as new wind power plants are being started up in record speed under the state's heavy promotion through the policy on encouraging the development of renewable energy industries. However, the pool for reserve staff is very limited, therefore the income for this sector becomes higher than coal-fired power plants. Wind power companies offer relatively good wages as well as benefit packages in order to avoid losing talent too fast. Conventional coal-fired power industry is in generally good shape, workers' income is quite stable. However, in the adaptation of environmental measures, some non-green positions, while still existed, faced reduced incomes.

Thirdly, it is more common for workers in wind power to work overtime and this is generally compensated through pay or leave although remuneration is always paid. Among other differences between the three sectors, workers in the small thermal power group often did not receive overtime pay.

Fourthly, regarding the impact of financial crisis, it had little impact on wind power companies and had some impact on coal-fired power plants.

Additionally, green employment is more superior than non-green employments in terms of work instruments, working hours, enrollment of social insurances, the company's benefit package, worker's health, occupational hazard, workplace safety measures, worker's satisfaction rate towards work environment, and worker's participation in the company's democratic decision making.

4. Adopting environmental measures help to promote decent jobs

After adopting environmental measures, wind power enterprises had the most changes in terms of production skills and tooling and equipment. Small thermal power units experienced some changes in these areas too. Workers' overall working hours remained unchanged, but night shifts for wind power workers became much longer. Over one quarter of small thermal power workers also had some increases to their work hours but the work intensity in each sector increased. Income levels increased for nearly 60% of wind power workers, 25% for small thermal power workers.

Overall, the adaptation of environmental measures has brought about positive changes and improvements across all sectors in terms of production skills, equipment and tools, income, working hours and work intensity. The adoption of environmental measures helps promote decent employment.

Chapter 6. The principles and policy suggestions for green job development

As an initial study of green employment in China, this report conducted investigations into the theoretical concepts behind green employment, the macro-development conditions for green employment, and the micro-practices of the transformation towards green employment. The initial results show that the development of green employment has broad potential, and can promote decent jobs.

The promotion of and transformation toward the green economy are the inevitable directions and China's future economic and social development are heading in. These have continuously generated more and more emerging industries, which are becoming the new points of economic growth that lead the way for economic development and job creation. Green jobs across all walks of life which could benefit all kinds of workers are yet to be exploited.

Environmental protection is a continuous process and green employment has vast potential for sustainable growth. Desulphurization is one example. Old desulphurization furnaces were based on young technology which required frequent maintenance at high costs and lower productivity. While the workplace environment for desulphurization operators was considered quite good, the conditions for repair workers was extremely poor as they need to get into the furnace to undertake repair work and tolerated the strong odor. As equipment in desulphurization facilities are currently quite new, frequent maintenance and repair are not required, but in the next five to six years, workload for maintenance and repair is likely to increase. Therefore environmental protection requires continuous input with advancements in technology with green employment a sustainable development process.

Green employment directly leads to increases in productivity and efficiency, helps to promote faster income growth for workers and increases the amounts of income distributed across workers. The promotion of various environmental protection measures lead to an ever-expanding green industry chain with numerous direct and indirect employment opportunities which have the potential to offset the numbers of jobs lost in conventional industries. The newly created jobs would be safer, more economical and stable. The adaptation of energy saving measures in production processes could largely improve workplace conditions and hence workers' health and safety. They could also promote technological advances, updates to industry as well as the increase of technical content in labour, and help to improve workers' quality of skills. In summary, green employment helps to promote decent employment.

Policies in human resources, therefore, have no option but to follow the trend of green development and effectively promote green employment.

6.1 The guiding ideology and basic principles for the promotion of green employment

6.1.1. Promotion of green employment through classification

There are two kinds of environment-related jobs, one is self-generated by the market based on the economic value of the activity or resource, such as jobs in waste recycling, and the other is directed by the government, such as the employment in the thermal power industry. Different kinds of ideas and principles must be used to promote different types of green jobs, as they cannot be generalized nor standardized. For green jobs born out of demand, the government should follow market mechanisms, eliminating factors which might obstruct the proper functioning of the market and try to provide more and better employment services. For the government directed type of green jobs, policy interference needs to occur to design specific employment promotion policies.

6.1.2. Industrial, environmental and employment policies are equally important and should be considered concurrently

Economic development, environmental protection and employment promotion are all bring about improvements to people's lives, all three equally important. The economy cannot be developed by ignoring the environment or

employment, nor could the environment be well protected by limiting economic growth and job creation or a development model be created without employment growth be adopted. China's development direction should be firmly towards a more environmentally sustainable, viable, socially acceptable economy, while the pace should be progressive and within the means of economic development. Policy should provide leverage for integrated support, coordinating the promotion of industrial structure optimization, the environment's continuous improvement, job increases and improvement to job quality. All these mean that, under the premise that employment goals are given full consideration, we should encourage industries in the environmental sector to promote the transformation of traditional industries towards more sustainable production and gradually improve environmental standards.

The key to realizing the coordinated development of the three dimensions outlined above is to have synchronized policy making, i.e. when deciding on industrial policy and planning, there should be simultaneous drafting of employment policies and plans; when drafting employment policies and plans, the effects on economic development and the environment must be taken into account.

6.1.3. Focusing on the effects on employment of low-carbon, sustainable development

China is in the middle of industrialization, and an inevitable component of this has been high energy consumption. The shift to a low carbon economy is pressing and it does not infer waiting for the industrialization process to finish before engaging in low carbon development. At the same time, shift to a low carbon economy is necessary to try to shift away from the trend of high energy consumption, which is restricting the level and scale of energy consumption, and which will ultimately constrain development and employment. Therefore, China should have the cognizance that low carbon development is not for the purpose of reducing output but to increase resource and energy efficiency in the production process. Full consideration should be given to employment, to exploit where possible win-win situations where technological and financial investment, and international funding and technology can promote economic development while mitigating greenhouse gas emissions.

6.1.4. Policies that promote green employment require further scrutiny of the concept of green employment

Further scrutiny of the green job concept is required before green policy is promoted because: some green jobs do not offer decent employment; some green jobs are good for the environment but do not promote low carbon employment, some low carbon jobs are work against environmental protection, such as the growing of biomass energy crops using of fertilizer that generates pollution; some green jobs do not meet the need for industrial development, such as photovoltaic power plants and PV power generation equipment manufacturing where over capacity is pervasive; some green jobs do not meet the characteristics of resource endowments, for example, China has limited land resources and is not suitable for developing biomass energy.

Therefore, green job development should not solely involve promotion without policy constraint and control. When the government is drafting green employment promotion policies, it must take into account China's unique position and identify the areas and levels of intervention for green employment.

6.1.5. Industry-specific green job promotion policies

Green jobs exist in all different industries, sectors and levels and impact all kinds of workers, varying widely across different industries. Therefore, under the general guiding ideology and principles, industry-specific survey and research must be conducted, and industry specific green employment promotion policies must be devised.

6.2 Policy suggestions for the promotion of green employment

China formally established a market-based economic system in 1992, followed by large-scale reform of State-Owned Enterprises in the mid 1990s. 1998 saw the start of a re-employment project, which involved enhancing productivity, reducing worker numbers and the redeployment of redundant workers. This changed the status of 30 million state

workers in state owned enterprises and the project concluded in 2002. Based on reflection of lessons learned, an employment policy system with Chinese characteristics was then set up in 2002. After three years, the system was further expanded, enriched, extended and enhanced. Following the global financial crisis, this policy system has been further improved and made more aggressive.

The ILO fully affirms China's active employment policy, considering the system is to have included all elements of existing employment policies in other countries: emphasizing the role of active promotion of employment, while also including measures to prevent job losses; a simultaneous emphasis on job creation and skill development; and an emphasis on entrepreneurship. These are not only fundamental characteristics of decent employment, but are also enforceable.

Setting green employment promotion policies is the greening of a more active employment policy system. On the one hand a the "green" concept must be implanted into the current policy system, but include past policies on the other e.g employment policies for resource depleting cities, water reservoir immigrant employment, and handling of policy-induced enterprise closure and bankruptcy, etc. On this basis, a more aggressive employment policy system would be further enriched and improved, ultimately becoming a system for China's green employment policy.

At present, the annual non-agricultural employment demand is around 30 million, and current economic growth only creates around 10 million new jobs. Accelerating economic growth and expanding employment are still the government's most urgent tasks. In this employment scenario, the green employment promotion must give proper consideration to the following issues: firstly, green employment promotion should not cause great employment fluctuation, with respective employment plans well designed. Secondly, when it is difficult to fully transfer surplus agricultural labour to meet job demand, the government should support the greening of labour intensive employment in the agricultural. Thirdly, like other policies, green job promotion should focus on non-public sectors, including individual, privately-owned, and village and township enterprises etc. On one hand, these enterprises generate the majority of jobs, and on the other hand, the greening potential is quite considerable. Fourthly, flexible employment is still the key channel for job creation and green employment promotion must not strangle this employment channel.

In accordance with the research findings, the following policy suggestions are made:

6.2.1. Ensure green employment is developed through legal channels

6.2.1.1 Conduct an employment evaluation of industrial and environmental policies

First of all, employment must be the centre of a social evaluation index system set up for environmental protection. In industrial and environmental planning, employment evaluation indexes must use scientific methods, including the number of new jobs a project could possibly create, the number of lost jobs brought about by the project's existence, the impact on the local human resource supply-demand position, the impact on local income levels and the identification of potential human resources for the project, etc.

Secondly, designing of employment evaluation indexes should be followed by employment planning. This means the design of policies and measures to address the project's impacts on employment. If job losses are likely, plans must be made to counteract unemployment; if there are additional human resource needs, a supply plan must be devised. At the crux of such planning is the provision of adequate financial resources to address the project impacts.

Thirdly, employment evaluation indexes and plans should be accompanied by employment budgeting, i.e. the cost-benefit of the project on employment including accounting for the cost of employment and funding.

Lastly, project evaluation should be conducted. The impacts on employment of evaluation of the industrial and environmental policies should a pre-condition for project approval.

6.2.1.2 Modify and improve relevant laws and industrial and environmental policy.

Firstly, clear goals for green employment must be raised during the process of drafting the Twelfth Five Year Plan. These goals relate to environmental protection, China's main industries human resources and social security.

Ultimately, targets for employment and environmental protection must be clearly stated so to ensure the development of green employment in China over the next five years.

Secondly, as the Twelfth Five-Year plan is being carried out, respective laws and regulations will be modified. These include the Environmental Protection Law, Cyclical Economic Promotion Law, Energy Conservation Act, Employment Promotion Law, Labour Contract Law, etc. Also, elements of green employment should be included in the formulation of new laws and regulations such as the Vocational Ability Development Ordinance and Social Insurance Law.

6.2.2. Policy measures for promoting green employment

6.2.2.1 Green HR market mechanisms to promote green employment

A green employment certification system should be set up to promote green employment. Companies in green industries and green companies in non-green industries could be acknowledged with the title of ‘Green Employer’, a reference for receiving related policy support. For example, Green Employers could qualify to join suppliers on the government’s green procurement list.

A professional green job certification system could be set up to promote workers’ transformation towards “green collar” jobs. Improvements to the professional certification system, setting up standards for green jobs and encouraging workers to take part in certification will help to get more people to join the ranks of green employment.

The third point concerns the public employment service system. A green job service zone should be set up in public employment service agencies, in order to collect and advertise green job information and promote matching between demand and supply for green jobs. The labour and social security community platform should be used so that green job information can reach every worker.

6.2.2.2 The greening of existing employment policy to promote green employment

At present, China’s employment policy mainly targets redundant workers and the unemployed. To green the employment policy is to broaden the current program to include those affected by the transformation towards a green economy. These could include workers affected in the reform of state-owned forests as well as workers from the 13 industries which are required to shut down or suspend outdated production facilities. The affected industries are power, steel, construction materials, electrolytic aluminum, ferroalloy, calcium carbide, coke, coal, plate glass and paper making. Jobs in these industries were affected for institutional reasons and due to the State’s industrial policies and as such they should be provided with support on employment policies, including those that promote job stabilization and employment.

The first is to encourage companies to expand employment. Policy leverages such as tax benefits, social insurance subsidies, guaranteed loans and interest subsidies should be used to encourage employment of those affected in the transformation towards green economy. Policy supports such as tax benefits should be provided to those companies that use multiple channels to relocate their own affected workers by the use of their existing facilities, sites and technology for diversification.

The second is to help companies overcome difficulties to create as many jobs as possible. Preferential treatments such as delaying payment of social insurances, reducing social insurance rates, and providing social insurance subsidies, job subsidies, and worker training subsidies, should be given to those companies who are in the transformation towards green production and have the potential to absorb surplus workers, so that they could maintain stable employment, and eliminate or minimize redundancy.

The third is to encourage self-employed entrepreneurs. Entrepreneurship should be encouraged by providing free training, set tax relief and loan credit. Administrative fees and taxes could be reduced or waived for those starting their own businesses such as in small industry and privately owned businesses. . For entrepreneurs that lack funding to operate their business, assistance could be provided in the form of fixed amount low interest (guaranteed) micro loans. Creating a supportive tax and credit environment creates a suitable way for workers to make a living.

The fourth is to promote reemployment through public employment services and reemployment training.

The government's public employment agencies should provide free employment services to people looking to be reemployed. Employees from the sunset industries should be retrained with a focus on the industries that are transforming their resource use, making it easier for those out of work to be reemployed in industries where there is growing demand.

The fifth is to provide employment support for those in financial difficulties. The government could create volunteer or charitable positions which have social security subsidies and job subsidies, which are open to those who are experiencing difficulty in finding reemployment. The government could provide social security subsidies to those who are expected to find reemployment relatively easily and coordinate placements for those that are finding it difficult to become reemployed.

The sixth is to allow older workers to retire early. Some older workers are difficult to retrain and relocate and should be allowed to take an early retirement. This will enable them to exit the employment market in a decent and dignified way.

The seventh is to provide support to regions in economic difficulty. The areas of China which are expected to struggle in the transformation towards a green economy, especially the middle and western parts of the country where the economy is relatively backwards, will need special funding from the central government to overcome employment problems.

6.2.2.3 Develop green job through policy support

Some green jobs very competitive and will develop strongly without additional policy support. Environmental equipment, cleansing products and organic food are examples of such industries. However, generally speaking, green employment is an emerging phenomenon which still needs to rely on the quick set up of supportive policy. This does not necessarily refer to big investment but offers enormous potential for employment.

For example, some cities piloted waste collection and recycling stations which could not compete with private recycling operators. To build their size, jobs in waste recycling were created in communities to build up a network, using subsidies or social welfare subsidies in the early phases of growth. When green employment develops into a formal industry, it will be able to operate free from government intervention.

In another example, each year large numbers of Chinese universities graduates majoring in the environmental have difficulty finding jobs, while some companies cannot recruit enough suitable employees, end up short staffed. If each company was required to hire an environmentally assessed worker, large quantities of new jobs could be created. From The 2008 China Statistical Yearbook on Environment, of 188,000 of China's professional environmental workers, were spread across 70,612 companies involved in the collection of industrial solid wastes and 6,463 across 2,681 companies working with environmental protection archives. According to the first National Economic Census, if each of the 5.169 million work groups and 6.824 million industrial entities hired one environmental worker 12 million jobs could be created.

6.2.2.4 Develop green employment in the process of rural development and building the west

There is broad potential for green employment in rural areas. Agriculture is the foundation of the Chinese economy. Building the ecological environment is the basis of Chinese national policy and the rural economy is a miniature national economy. The development of agricultural knowledge-intensive industries i.e. those that use the sun as a direct energy source; rely on photosynthesis for production; fully utilize bio-resources and modern production techniques and industries using water flow for production such as forestry, pasture, sand and marine will be the future of rural China. Long sunshine days and rich land and other resources in the west give it the biggest potential for developing agricultural knowledge-intensive industries. Green employment in rural China will incorporate the following six areas:

The first is in developing employment in eco-agriculture. Eco-agriculture combines labour with green knowledge to produce energy saving green food. Eco-agriculture has the potential to increase the local transformation of the countryside by 20% and increase an ordinary farmer's income by over 50%.

The second is in developing employment in specialized agriculture. Specialized agriculture based on market and regional advantages will be the development direction for modern agriculture. This would lead to the creation of groups of specialized households and villages, also helping to increase farmers' incomes.

The third is developing employment in processing the products of specialized agriculture. This processing combines agriculture, industry and commerce, lead by an enterprise or farmer's cooperative linking farmers and the processing industry in an operational chain.

The fourth is developing rural eco-tourism, which could achieve 15% growth in production, revenue and employment.

The fifth is developing new energy industries. Energy consumption in rural areas is undergoing a fast increase. The development of biomass energy, straw manure biogas etc, not only helps to meet countryside energy demand, but also are important areas for green employment.

The sixth is to drive up demand for rural public services and create green public service positions on the basis of developing the rural economy.

The promotion of countryside green employment should first develop an energy and eco-compensation mechanism; charge an eco-resource tax, taxing the end-stream industry and compensating the source industry; and make secondary and tertiary industries compensate primary industry. The eco resource tax collected should then be used to fund the development of rural green public services, such as improvements to rural conditions, water supply systems and health facilities.

Secondly, in order to optimize present policies promoting university graduates to take up grass root jobs, technicians should be given advice as how to start up green businesses in the rural areas. The countryside lacks professional expertise and entrepreneurs not village officials. Promotions aimed a university graduates must be expanded to include those graduates working in the green public services. The policy for promoting entrepreneurship to boost employment must also be expanded to include rural green entrepreneurship.

Thirdly, there should be increased publicity to enable more people to become aware of the broad potential of rural green employment. Compared to industries that have a large effect on GDP such as energy, agriculture does not have overt economic benefits, so rural green economy tends to escape attention. However, the rural green economy has technological and labour intensive elements so it is an emerging industry with enormous potential for development. In coordinating the development of township and rural employment, the promotion of rural green employment should be regarded key aspect for further exploitation.

Fourthly, rural worker's education must be strengthened. At the moment, conflicts exist between rural worker quality and the needs of rural economic development. The present rural workforce is mainly elderly and female, female and there are difficulties in taking up the responsibility of rural green economic development. Developing a green rural economy would attract those with the skills and knowledge to join the rural workforce. In the meantime, expanding specific training for rural workers could help to optimize the rural human resource pools, promoting the rural sustainable development.

6.2.2.5 Drive employment growth by supporting the development of green jobs in small business

Small business has always played a key role in creating and absorbing employment and this is also true for green employment. Green Employer Certificates should be given out to small enterprises classified as green-jobs employers so that businesses can enjoy preferential policies. For example, green employers could be given support in the form of loans; have access to graded income tax relief schemes i.e. 100% tax relief for the first three years of operation and 50% tax relief in the following two years; or receive subsidies. Founders of new small green businesses should have company tax, personal income tax, urban maintenance and construction tax and education surcharges waived for three years. They should also be provided with micro loans; have their industrial and commercial registrations simplified; and once they receive a Green Employer Certificate, no longer require a business license. A policy to support the promotion of green technology should be made to drive the implementation and popularization of green scientific research results, and to promote green collar entrepreneurship.

6.2.3. Develop a green skills development plan for the promotion of green employment

Skills development is the key in the transformation towards green employment. All existing training should be greened, such as practical skills training in agriculture, training related to sunshine and dew and skills training for transforming rural employment. Green skills should be incorporated into all these training programs. A new skills development plan should also be drawn up.

6.2.3.1 Green job surveys and developing a green employment register

There are many kinds of green jobs in China. Some are already part of the professional qualification system, such as environmental assessment engineers, jobs in renewable resource recycling, sewage treatment operators, solar power workers, biogas production operators etc. On one hand, China should continue to discover new green jobs in each industry, and on the other hand speed up the process of developing green job standards by develop specialized green training and gradually improve the range of green employment and the system of green employment training standards.

6.2.3.2 Plan for technical and technological enhancement for green industry

This refers to drawing up and implementing a plan for the technical and technological enhancement of China's green industry, improving workers' overall green skills levels and supplying the necessary human resources for green development.

To achieve this, industry-specific outlines for green technology and skills and human resource planning must be drawn up. For new technologies and skills, industries and universities can work together to establish the most suitable training methods. One example is the vocational skills training school set up under the Himin Group which continuously develops various technology and professional training for solar thermal utilization. The existing education and training system must institutionally accept and promote such new technology and skills. Relatively mature technologies and skills should have incentive programs in place, for example, the provision of an unemployment insurance fund to motivate companies to give green skills training to their entire workforce; training subsidies to encourage various educational and training institutions to conduct training; and training vouchers to workers to encourage them to attend training.

6.2.3.3 Greening existing corporate training

Greening of existing corporate training includes topics such as green entrepreneurial philosophies, green industrial skills and green entrepreneurship etc.

6.2.3.4 Strengthening training for the transformation to green jobs

The channels for moving out of non-green employment include changing jobs, changing industries or coming out of the labour market altogether i.e. through job displacement, change or simply from roles disappearing. To bring about a fair transition to green employment, skills development and job transition training must be primarily for workers in those situations.

Training in relation to job displacement mainly involves skills transformation training, which could be provided by the enterprise with support from the community. Training for job change is relocation training i.e. relocation to a different industry. This can be quite difficult as the skills required for the new job aren't necessarily ones that the worker is good at so workers would require government and community support to undergo training.

For industries and regions facing jobs losses, the government should draw up specific job conversion training plans and assign specific funding to carry out skills re-training.

6.2.3.5 Developing green job qualifications and skills appraisals

Green-collar assessment and evaluation should be developed according to green job standards so to gradually develop green job practitioner qualifications and green skills appraisals.

6.2.3.6 Setting up a green skill development system for all workers

As green jobs exist in every industry and involve all kinds of workers, green skills development should extend to all workers. All kinds of channels such as vocational schools, community training centers, public sector employment agencies and companies should be used to spread the concept of green employment and green skills so that the next generation of workers are aware of green jobs; to provide green return-to-work training for the unemployed; offer up-skilling and re-training for workers in struggling companies; provide green vocational skills training for migrant workers; provide free green vocational training for demobilized soldiers; provide green entrepreneurial training for university graduates and those wanting to start their own businesses; and hold green vocational training as part of skills development for existing workers. Policies offering subsidized training could be used to encourage the scope of training. Extensions to the duration of training courses as well as improvements to training focus and effectiveness could also be made.

6.2.4. Strengthening the protection of green workers' rights

Green employment helps to protect the environment, but the rights and interests of workers in some green jobs are not well protected. In the first instance, workplace conditions are poor. For example, wind power workers' jobs are largely driven by the weather conditions and workers must work long shifts. This calls for special subsidy or compensation measures to address problems related to extended shift work. Apart from offering compensation and improving company welfare, it is also important for companies to address the issue of education for their worker's children.

Secondly, worker wages are very low, and they lack social security, especially workers under temporary employment organizations. For example, workers in garbage recycling on cities roads and streets need to enter into formal employment arrangements where possible, to improve their employment stability, safety, and improve their income level.

Thirdly, some green jobs offer poor job security. With short-term contracts and the possibility of firing at any time, worker's rights and interests are often abused. This is most common in small and medium-sized enterprises and in the private sector. Improving the law enforcement supervision as well as collective bargaining would help to increase workers' job security.

Fourth, is the situation where labour tensions exist within an organization. For example, at the Himin Group, new graduate recruits clash with company staff: the company feels that the new recruits aren't fitting into their jobs in terms of work attitude and capabilities, while the new recruits think that the company's demands are too high. Confrontation often takes place. As wage levels are low, there is high staff turnover. Therefore, assistance to help the company improve management quality and systems and smooth workplace tensions would ultimately help the development of employment.

6.2.5. Working with social partners to promote green employment

Mutual understanding must be reached between the government, employers and workers. Employers must take on the social responsibility for green development, aligning green employment with economic benefits. In the tripartite consultation process in labour relations, development strategies should emphasize and promote green employment. .

Worker's unions can take an active part in promoting the development of green employment. Firstly, they can hold up-skilling training, to improve worker's capacity for green employment. For example, unions can help workers to learn new skills and new approaches for green production by providing topical training and consultation, compiling reading materials and hosting talks. Unions can unearth and collect new innovative operating techniques and tips developed by workers, helping workers to improve their ability to save resources. Unions can also hold drills and skills contests, to motivate workers' to improve their skill set.

Secondly, is participative enterprise management and the strengthening of the supervision of green development in business. Worker participation in management could penetrate a company's entire production and operation process.

Workers could be encouraged to carefully identify weak links, plug loopholes, reduce resource wastes and improve resource utilization so to improve levels of environmental protection. Workers can also learn about the company's environmental situation, check on the company's environmental measures, actively assist the company to design plans, identify responsibilities, and ensure various environmental protection measures are implemented effectively. Workers can also organize work supervision teams to strengthen levels of supervision.

6.2.6. Improving publicity and creating an atmosphere for the development of green employment

Different methods can be employed to promote an atmosphere where green employment is well understood, respected and developed. Awareness raising can be achieved through increasing publicity for green employment and important green projects and events, as well as road shows, activities to collect suggestions from workers, releasing news of innovative or energy efficient practices, hosting environmental knowledge contests and issuing awards to selected groups and individuals in recognition of their contribution to green employment.

6.2.7. Improving the environment for promoting green development

6.2.7.1 Improving environmental standards

At present, China is developing its environmental protection standards with many industries either lacking standards or with standards partially complete. Therefore, the development of the environmental standards system must be sped up and able to be met by the majority of businesses. The government should give thorough consideration to the position of the country when setting up the standards: firstly allowing companies to comply step by step and secondly, using funding or policy support to make it feasible for companies to implement the standards. Full consideration must be giving to the impact on society and in particular, the impact on employment when implementing environmental standards.

6.2.7.2 Incentives and punitive measures to encourage the sustainable development of enterprise

Refusing to fulfill environmental responsibilities equates to externalizing responsibilities for the environmental and social costs of doing business. Firstly, promoting a company's transformation towards green development requires incentives, putting green technology and its users in an advantageous market position such as increasing government subsidies on environmental products and services that will not or do not yet generate financial returns. Secondly, law enforcement must be improved. At present State Owned Enterprises are generally able to follow national environmental policies, while some small private enterprises aren't able to strictly follow the national standards. Rectification of environmental practices and environmental law enforcement should be strengthened for those enterprises.

6.2.7.3 Improving the finance mechanisms for green development

The development, utilization and popularization of environmental technologies are critical in promoting transformation toward a green economy, and the key for the adapting environmental technology is funding. Financing facilities must be continuously improved, including the imposition of resource, environment and carbon taxes etc, to generate funding for green economic development and green job creation. International support in terms of technology and funding should also be sought.

Bibliography:

1. China Environment Statistical Yearbook 2008, SSB and MEP, China Statistics Press, October 2008
2. China Environment Statistical Yearbook 2006, SSB and MEP, China Statistics Press, November 2006
3. Bulletin of China environment status 2008. CEPA
4. China Energy Statistical Yearbook 2008, Statistics Department of SSB and General department of NEB, China Statistics Press, December 2008
5. China Forestry Yearbook 2008, State Forestry Bureau, China Forestry Press, December 2008
6. China Statistics Yearbook 2008, SSB, China Statistics Press, September 2008
7. China labour Statistics 2008, Population and employment statistics department of SSB and Finance Department of Human Resources and social security ministry, China Statistics Press, December 2008
8. First National Economic Census Bulletin
9. Compiling statistical information on the electric power industry 2007, Statistics Department of China Federation of Electric Power Enterprises
10. Guide book on Market supply and demand in China Environmental Protection Industry 2006, Scientific Standard Department of CEPA and CAEPI, China Environmental Science Press, June 2007
11. Circular of the State Council about A comprehensive work program of energy-saving and emission reduction

Green Jobs in China

Green Jobs in China 中国绿色工作

ILO Office for China and Mongolia March 2010

