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# Countermeasures on Low-carbon Economy Development in the West District of Panzhihua City

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## Abstract

At present, economy development in the West District of Panzhihua City has the triple pressure in shortage of resources, environment constraints and the coordinated development of economy and society. The imperative task that the West District faces is how to make good use of resources, transform the mode in economic increase, optimize the industrial structure and achieve the sustained development of economy and society. Low-carbon economy provides the direction for sustained development in the West District. The government of the West District of Panzhihua City can formulate scientific low-carbon economy development plan, introducing appropriate policies, increase input in R&D of science and technology, developing the new technology in energy conservation, emission reduction and clean energy, improving the efficiency of energy use and tapping potentials of carbon sink. And also, the government needs to adjust the structure of industries gradually, achieve industrial clusters' development, strengthen the communication of low-carbon economy and advocate actively the lifestyle of low-carbon to promote the sound development of economy and society in the West District.

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*Keywords:* low-carbon economy ecological environment shortage of resources energy conservation and emission reduction

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## 1. The connotation of low-carbon economy

Under the background of global warming, low-carbon economy refers to the mode of economic development with emissions of greenhouse gases as low as possible, especially carbon dioxide that a main greenhouse gas emissions to be effectively controlled. The Implement of low-carbon economy is a way to avoid catastrophic climate change, and maintain the sustainable development of human beings, therefore, low carbon economy" is under premise of economic development, through the technological innovation and institutional innovation, to reduce fossil energy consumption, to develop clean energy, and to reduce greenhouse gas emissions and pollutants emissions with utmost, further to realize economic and

social sustainable development. The connotation of low-carbon economy includes low carbon production mode and low-carbon lifestyle, the former refers to, through intensive energy and resource utilization with low energy, reducing greenhouse gas emissions in producing, and reducing the pressure from economic growth on ecological environment and climate change; the latter refers to, through social saving, restricting the consumption of high-energy products, changing people's high carbon consumption tendency and high carbon preferences, further to truly realize low carbon consumption.

## **2.The necessity of low-carbon economy development**

### *2.1 The objectivity of entropy increase process*

To develop low-carbon economy is to reduce and delay entropy increase for the energy within the earth system. Since energy transformation in a system is subjective to the second law of thermodynamics in physics, also called entropy principle or law of energy scatter, which describes the distribution of space energy is even over time; In the system, the energy flow is characterized with unidirection, entropy means the part of the heat which cannot be used to work in thermal system, in the process of energy conversion and flow in a system, there is always a part of the energy dissipated with the form of heat, and every energy conversion in the system will lead to entropy value increase, which determines the unidirectional energy conversion.

### *2.2 Fossil energy scarcity*

Since the industrial revolution in the west, fossil energy such as coal, oil and natural gas has been widely used throughout the world in human society, which greatly promoted the economic and social civilization and progress of the modernization, and profoundly change the production and life style since 200 years ago. This state leads to great social material prosperity on one hand; on the other hand it also leads to the consumption of energy and resources in a large scale, which makes all the human beings bear the pressure from fossil energy depletion and the consequences from ecological environment deterioration. According to the statistic of BP (June 2009) published a world fossil energy resources data on storage and exploration, the average year for world fossil energy storage and exploration of oil production is 42 years, for gas 122 years, and for coal 60.4, with its main distribution in the United States, Canada, Russia and the Middle East. While, in China, for oil is 11.1, for gas 32.3, and for coal 41, which is much shorter than the world average, China's energy situation is more severe.

At the same time, energy production and consumption structure in our country is rather unreasonable, and China is a developing country with extreme shortage of oil and gas resources while dependent on coal consumption in a large scale. In 2008, China energy consumption is equal to 2.85 billion tons of coal, 4.0% higher than previous year, covering 15% of the total energy consumption in the world, and China becomes the world's second-largest energy consumer. One-off energy consumption structure is: coal covers 70%, petroleum 20%, gas 3%, and others 7%. According to the national bureau of statistics data, from 1993, China began to become a pure oil importer, with import increase of oil year by year. In 2008, about 2 million tons of oil were imported, and external dependency level reached up to about 51.3%. The figure shows that the energy in our country has entered dangerous point.

### *2.3 The burden of ecological environment*

With global warming and sharp reduce of air quality, environment deterioration sharply becomes a universal attention of the international society. Inhuman society development process, fossil energy is consumed in a large scale to gain energy, the carbon deposited in the stratum fast flows into the air, which

has caused catastrophic problems such as greenhouse effect and environmental pollution and so on. According to World Bank, in the 20th century, during the 100 years, the total consumption of oil, coal steel aluminium and copper is 265, 142, 38, 0.76, and 0.48 billion tons respectively, meanwhile with large greenhouse gas emissions, which makes CO<sub>2</sub> concentration in the atmosphere increase from 300ppm in the early 20th century up to close to 400ppm, obviously threatening the global ecological balance. It is forecasted that the economy scale by 2050 will be 3 ~ 4 times higher, while in the present global energy consumption structure, carbon energy (coal, oil and natural gas) covers 87% of total energy, if high-carbon mode is still used for future development, to the middle of the century, human beings will inevitably burden the consequences of ecological deterioration.

#### *2.4 The sustainability of economy development*

From the perspective of mid-and-long term, environment deterioration and energy shortage in the future will be the biggest bottleneck in our country's development, economic and social sustainable development problems will be increasingly obvious. Low carbon economy is a new kind of development mode integrated with "low carbon" and "economy". Low carbon means that economic development must minimize or stop carbon fuel energy dependence as much as possible, to realize energy utilization transformation and economic transformation; Economy means on the basis of energy utilization transformation, the stability of the economic growth continues to maintain. From the low-carbon economy connotation, low carbon economic model is suitable for China's real situation, our country needs not only to get out of dependence on fossil fuels, alleviate the pressure from high oil prices, and to realize the economic transformation, but also to maintain moderate rapid economic growth and to solve the problems in development. Therefore, the development of low-carbon energy technology, changing economic development and social consumption mode, and low carbon development road will be an inevitable choice to realize the sustainable development in China.

### **3 Basic principles for low carbon economy development in west district**

Under the historic opportunity of West Development, west district needs to closely focus on the magnificent goal of comprehensive construction well-off society, with the center of economic construction, with the main line of structure adjustment, with the drive of scientific and technological progress, and take new-style industrialization road, strengthen the implementation of strong industrial zone, project-led and sustainable development strategy, with the core of the improvement on efficiency of resources conversion and utilization, to develop circular economy industry, and to foster and strengthen emerging and high-tech industries; to accelerate the transformation and upgradation of traditional industries, to comprehensively optimize industrial structure, to promote industrial economy transformation from resources-orientation to market-orientation, from extensive growth to intensive growth, from high carbon economy development mode gradually to low carbon economy development mode; to strengthening the legal system construction and perfect the policy measures, adhere to the policy guidance combined with market dominance, further to form low carbon development mechanism of "with the main body of enterprises, with the drive of market, with government strong promotion, and the public active participation".

#### *3.1 The principle of science The economic development of west district should insist on the principle of science.*

To develop low carbon economy is not only the basic demand of scientific outlook on development , but also an important way to implement it, and a scientific choice to construct ecologic civilization and to realize economic sustainable development. Only through low carbon economy development, can development mode change from the unsustainable mode with the basis of carbon energy to sustainable development on the basis of low carbon or noncarbon energy, energy structure change from high carbon fossil energy to low carbon clean energy, further to truly realize ecological, economic and social clean green and sustainable development. At present, under the era background of climate change and vigorously development of low carbon economy, west district should, under the guidance of scientific outlook on development, actively face the challenges from development stage, energy structure, technical level, and consumption mode and so on, to lead and promote low carbon economy development, adhere to the rule of efficiency superiority, optimization of key factor resources, to direct enterprises and public actively into low carbon activities, and to speed the economy transformation from high carbon to low carbon.

### *3.2 The principle of coordination*

To develop Economy must follow the natural law and social law, to realize the harmonious development between man and nature. Based on the actual conditions, west district should strengthen industrial structure adjustment and traditional industrial upgrading, improve the efficiency of resources using, reducing emissions of pollutants, relieve pressure of the ecological environment, in productivity layout to form banded extensions, blob-shaped group, mutual penetration, parallel propulsion development pattern. To develop Gelinping industrial park to a certain scale, should give full consideration to the organic unity of the local ecological environment development, production capacity, good ecological environment, and affluent life, adhere to the economic development together with social progress, dominant industry together with supporting functions, to promote the linkage between industry development and urban construction, and to strengthen and promote research and development, hatching, concentration, and radiation ability of the industrial park, to build a resource-saving and environment-friendly economy system, further to build the industrial park into a modern park with advanced infrastructure, good ecological environment, and obvious industrial advantage, fully to realize economic, social and environmental coordinated development in west district.

### *3.3 The principle of constancy*

The core idea in the principle of constancy refers to human economic construction and social development not exceeding the capacity of natural resources and ecological environment. Resources environment is the base and premise for human existence and development, thus resources continuous utilization and the ecological constancy and stability are the first premise for human society sustainable development. Sustainable development is to meet the demands of the present generation, while not to damage the following generations demands for themselves, and a development mode to utmostly pursue producing and life demands for present generation under the premise of not damaging following generations.it is not a simple development of natural resources to meet present benefit, but a development to meet future long-term benefit with the coordination between development and natural reserve. And it is a spinal uprising development mode, to focus on the match between economic growth and natural resources in development, to promote natural development and reserve through economic development, meanwhile to further positive economic growth through natural resources development and reserve.

### *3.4 The principle of industry group*

Industry group refers to in a certain specific field, interrelated (complementary or competitive) enterprises and institutions build in a certain region, further to form an organic unity with complete structure of upstream, midstream and downstream, and a wholesome system with peripheral supporting industries, characterized with elasticity and flexibility. Industry group is characterized with regional focus, industry domination, products line and specific matching facilities, thus it can form a comprehensive competitive advantage which a single enterprise can not match, further to greatly promote regional economic development. West district should base on the idea of industry group development, direct enterprises to gather around industrial park, fully take the regional resources and industry advantage, grasp market demand, strengthen market classification, promote industry group and industry cooperation, further to realize coordinated development of the industries in the industrial park.

#### **4 Feasibility of low carbon economy development in west district**

##### *4.1 Industry policy direction*

On December 2nd, 2005, National Development and Reform Commission (NDRC) issued Guidance Contents of Industrial Structure Adjustment(2005), with four categories --- encouragement, permission, limitation and elimination, according to it (40, NDRC[2005]) and relative provincial and municipal rules, and the real situation of industrial structure adjustment and industrial development in Panzhihua City, Guidance on Further Strengthening National Industry Policy Guidance, to Promote Panzhihua New industrialization Development was issued. In it, Panzhihua industry adjustment direction is pointed out: adhere to promoting Panzhihua industrialization, meanwhile to realize coordinated development between population, resources, and environment; actively to adopt high and new technology and advanced suitable technology to reform and upgrade traditional industry, further to transform economic growth mode, to be dependent on technical advancement, to reduce consumption, to prevent and treat pollution, to promote resources utilization efficiency, and to really protect ecological environment; to support the popularization of energy saving, consumption reducing, water saving and environment friendly advanced facilities and products, to forcefully eliminate high-consumption, heavy-pollution and poor-quality backward production capacity, processes, facilities and products. The industrial adjustment in Panzhihua should be centered on resources saving, energy structure optimization and ecological protection, supported by technology, to manage to control greenhouse gas emissions, to strengthen sustainable development capacity, with the cut point of low carbon development mode for industry adjustment. At present, west district can fully take the advantage of national policy to implement west development, grasp the development opportunities of the national investment to strengthen west infrastructure, resources development, characteristic industries, ecological construction and public affairs, to build a series of important green economy or recycling economy projects, further to promote economic social low carbon development.

##### *4.2 Technology advancement*

As for low carbon technology, there is a big gap between our country and developed countries, however, the opportunities of international cooperation on low carbon technology gradually increase, which leaves large room for improvement. Under the background of global focus on climate change and promises from developed countries to transfer greenhouse gas technology in a large scale, our country, as a country of large energy consumption and emissions of greenhouse gases, should size the opportunity, according to the real situation of the industry, to develop new technology on the one hand, on the other

hand to speed the introduction of advanced technology, further to promote the technical upgradation of enterprises, to improve energy efficiency, and to reduce the emissions of "three pollutants".

#### *4.3 Rich clean energy resources*

West district is rich in clean energy resources mainly including solar energy, water energy, etc. The special location of west district enable it to have special solar energy with 2700 hours of annual sunshine duration. The rate of annual sunshine duration reaches up to 61%, the longest hour of sunshine duration in the province, with total about 5,600-6,300MJ/M<sup>2</sup> of sun radiation, belonging to the second-class region of solar energy, which is one of the best region to develop and utilize solar energy in the country. West district is located along the Jisha River, with abundant water resources, the theoretical reserve of water resources for Panzihua area along the Jinsha River is 1.949 million KW, among which 1.513 million KW can be developed, 1.209 billion KWH can be generated to electric power, at present 500 thousand KW Jinsha hydropower station is being planned to establish.

#### *4.4 The transformation of consumption ideas*

People's consumption ideas are based on a certain social economy, and be gradually formed during the long-term consumption activities, thus, the form and transformation of consumption ideas should be in accordance with a certain productivity and the development level of social culture, a certain consumption idea can influence people's consumption behaviour. Because of the double pressure from resources and environment, the consumption mode for previous west district is formed on the basis of high energy consumption and high pollution, which is to be transformed to low carbon direction, the previous long-term formed consumption habits, such as convenient consumption, one-off consumption and conspicuous consumption, etc. will change along the popularization of low carbon idea, thus such consumption ideas as green consumption, healthy consumption are being gradually formed.

### **5 Existing problems to develop low carbon economy in west district**

On the background of active exploration of low carbon economy development road home and abroad, some obvious problems and weakness in west district economic development should be resolved.

#### *5.1 Inappropriate industry structure*

The Key existing problem of economic development in West district of Panzihua City is inappropriate industry structure and unbalanced industrial development. For present 10 years, the second industry has developed rapidly, while the development of the third industry has lagged behind, according to the west district industry structure during 1997 - 2009, the ratio between the first, second and third industry is inappropriate, with simple industry structure and rather heavy proportion of traditional industries, especially on coal and related products which covers up to 80%, and industrial convergence problems has become obvious.

#### *5.2 Extensive producing and operation*

West district and its perimeter zones are rich in resources although, lack of saving consciousness, and low resources use efficiency has caused rather serious waste of resources, meanwhile, some problems such as extensive management, rather short industry chain, and low value-added products exist in most businesses.

### *5.3 Backward producing technology*

Since effective utilization of resources and processing depths rather low, the scale of enterprises is rather small, process equipment is relatively backward, products are in low level with many primary products and rather small proportion of depth-processing, high-tech and high value-added products, thus, industrial products are without strong competitiveness, and the comprehensive efficiency is not high.

### *5.4 Insufficient investment in low carbon*

Since the low carbon industry needs a large one-off investment, although it has rather obvious social and environment benefits, its direct economic efficiency is not high, which is unable to compete with the conventional industries in the same market. From the experience of other countries, all of countries with the fast development of low carbon economy, a strong incentive policy has been established. In west district, due to its economic strength, it lacks of focus on low carbon industry, and of low carbon technology development and introduction, at the same time, the low carbon industry investment is seriously insufficient, thus, the low carbon economic development is rather slow.

### *5.5 Exceeding the environment capacity*

Coal is the main source of energy in west district, such energy structure in the future for a quite long period of time will be hard to change, meanwhile, with the rapid increase of automobile in west district, the air pollution in the future will be the mixture of coal smoke and motor vehicle off-gas. If such situation continues, it will bring more damage to ecological environment.

## **6 Countermeasures for low carbon economic development in west district**

In the implementation of the strategy of economic development in west district, Panxihua city should not only fully exert all kinds of advantages, but also seize all kinds of opportunities. From the perspective of advantage exerting, the following three should be done well: firstly, the unique geographical advantages; secondly, abundant resources advantage; thirdly, good industrial situation. Meanwhile, the opportunities encountered are as following: firstly, the continuous implementation of great West Development; secondly, industrial transferring from eastern developed regions; thirdly, great efforts of low carbon economic development from central government. Only when the four opportunities mentioned above are seized, can west district realize its economy great-leap-forward development.

### *6.1 To make a scientific planning on development*

It is an inevitable way for west district to realize sustainable development to implement low carbon economic development strategy, to establish a long-run mechanism for low-carbon economic development, to create favorable environment for low carbon development, and to promote social and economic transition towards low carbon direction.

### *6.2 To perfect related government policies*

Under the guidance of low carbon economy strategic goal, related policies should be issued to encourage enterprises to conduct low carbon innovation, energy conservation and emission reduction, and the renewable energy use. Such measures as tax cuts, subsidies, government procurement and green credit

can be adopted to guide enterprises to develop low carbon technologies and to conduct low carbon production.

### *6.3 To fully exert regional carbon collecting potential*

In west district, carbon collecting potential should be fully exerted, further to expand carbon collecting channel. To develop low carbon economy should not only effectively constrain the carbon sources, reducing carbon sources emissions, but also take great efforts on carbon collecting. Carbon source refers to the source of carbon dioxide, which is not only from nature, but also from the process of human life and production. Carbon collecting refers to carbon parasites in the nature, while, forest vegetation is the earth's largest carbon collecting. Renewable energies such as solar energy, water energy and bioenergy, etc., to reduce the proportion of coal in energy consumption structure, to expand the channel for carbon dioxide reducing and emissions, to reduce carbon sources emissions, provides a new path for the development of low carbon economy. Meanwhile, waste mountain resources should be actively used in west district, to strengthen afforestation, expand the greening afforestation areas, improve the biological yield per unit area, increase the volume of carbon solidification of the forest vegetation, to fully exert carbon collecting potential of forest vegetation, to take the advantage of nature to reduce carbon dioxide in the air, further to improve ecological environment quality.

### *6.46 To strengthen cooperation home and abroad*

Economy and technology cooperation home and abroad should be participated in, to strengthen technology innovation capacity. Since low carbon economy is in the primary stage in our country, for the rapidly economically developed west district of Panzhuhua city, it is in the budding stage. If only through self-technical capacity, it is hard to really exert low carbon economy potential, thus, it is advisable to introduce advanced low carbon technology from developed countries.

### *6.5 To explore low carbon development way*

In present industrialization and urbanization, such low carbon industries are booming as green energy, environmental protection and resource recycling use, in order to avoid the problems of high energy consumption, high material consumptions and high emissions from excessive development of heavy industrialization. West district is an energy supporting town, with resources exploitation and processing as its leading industry, which belongs to the second industry, with the problem of traditional technology, labor intensive, and heavy pollution; meanwhile, due to unrenewablity of resources, now, west district is facing existing pressure from resources depletion. Therefore, resource-based cities should insist on the principle of circular economy, strengthen industrial structure adjustment, actively develop low carbon industry, further to capture the initiative and industrial dominant point. Besides, low carbon industry include such fields as industrial energy saving and emission reduction, thermal power emission reduction, new energy industry, energy-saving building, resources recycling, environmental protection equipment, and energy-saving materials and so on.

### *6.6 To advocate low carbon life style*

Low carbon economy involves not only the choice of regions, governments, and enterprises, but also usual behaviour habits of social public. Government departments are served as low carbon economic policy planner and designer, guider and supervisors, thus, self education, ideas renewal, and advocacy and education should be done well according to regional characteristics; through television, newspapers,



magazines, radio networks, and various media, climate change and low carbon economy knowledge should be popularized, to provide related knowledge training on energy consumption, green consumption, and so on for the public, to make them be fully conscious of and understand the necessity and importance of low-carbon economy development, enabling them to establish new ideas on green energy, green production, green products, green consumption, green residence and green transportation, further to form low carbon life style and consumption behaviour, and comprehensively improve the social public understanding on low carbon economy.

## 7. Conclusions

China has become one of the countries that enjoy the highest economic growth speed in the world. As a large responsible country, China must play a positive role in responding to global warming. China should transform the mode of economic growth as soon as possible and develop low - carbon economy. The West District of Panzhuhua city should keep in mind the general situation, conform to the trend of the economy time and actively respond to the adjustment of the industrial structure. And it also should grasp the opportunity of optimizing industrial structure, reinforce the efforts of energy conservation and emission reduction, foster low-carbon industry and explore the new mode of low-carbon economy to attain sustained development of economy and society in the West District.

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