CSCanada
Management Science and Engineering
Vol. 7, No. 2, 2013, pp. 41-44
DOI:10.3968/j.mse.1913035X20130702.2103

ISSN 1913-0341 [Print]
ISSN 1913-035X [Online]
www.cscanada.net
www.cscanada.org

Constraints and Countermeasures: To Promote Low-Carbon Economy Development of Resource-Based Cities

FU Yuanzhai[a],*; LI Hongyu[a]

[a] School of Finance and Economics, Shandong University of Science and Technology, Jinan, China
* Corresponding author.

Supported by Shandong Social Science Planning Research Key Projects (Number: 10BJGJ11)

Received 17 March 2013; accepted 07 April 2013

Abstract
This article summarized the experience of low-carbon economy development in both foreign and domestic countries. Also, the present study proposed a low carbon system where the government plays the leading role in developing low-carbon economy, enterprises set up the goal of low-carbon operation, market instruments are used to adjust low-carbon operation, society layout is arranged in a low-carbon manner, and low-carbon consumption awareness among residents is well established. In addition, the existing problems and proposed countermeasures were discussed for low-carbon development of resource-based cities.

Key words: Low-carbon economy; Resource-based city; Development problem

FU Yuanzhai, LI Hongyu (2013). Constraints and Countermeasures: To Promote Low-Carbon Economy Development of Resource-based Cities. *Management Science and Engineering, 7*(2), 41-44. Available from: http://www.cscanada.net/index.php/mse/article/view/j.mse.1913035X20130702.2103
DOI: http://dx.doi.org/10.3968/j.mse.1913035X20130702.2103

INTRODUCTION
Resource-based cities have made a huge contribution to national economy and social development in China. However, as the economy of the resource-based cities grow, problems like resource depletion and ecological environment deterioration are also becoming increasingly severe, posing great threat to the sustainable development of its economy and people's life quality. Therefore, promoting low-carbon economy of resource-based cities will not only bring new opportunities for their own development, but is also of great important economic and political significance to the society as a whole.

1. CONSTRAINTS OF LOW CARBON ECONOMY DEVELOPMENT IN RESOURCE-BASED CITIES

1.1 Low-Carbon Policy is Imperfect and Low-Carbon Consumption Awareness is poor
Development of laws and regulations on low-carbon economy in China is still at its infancy, and the strategic and policies and systems of low-carbon development is still not perfect (Xia, 2008). Thus, low-carbon market management is mainly achieved through administrative means by such as energy conservation and emission reduction by the government. This leads to many serious problems of the carbon trading market. Besides, the lack of proper low-carbon consumption habits and lifestyle also highlights the needs of strengthening people's low-carbon consumption awareness.

1.2 Backward of Low-Carbon Technology, and Insufficient R & D Funding
At present, China's investment in low-carbon technology projects mainly comes from government funding, and it lacks a proper investment mechanism which integrates the efforts of government, enterprises and the society (Zhang, 2010). Due to the lack of confidence on low-carbon technology, the financial industry provides little funding for low-carbon projects with few financing instrument. As a result, the funding for low-carbon technologies development is far from satisfactory.

1.3 "Carbonized" Industrial Structure and the "Lock-in Effect"

For a long time, resource-based cities have been developing extensively under the guideline of large-scale development of resources which focuses on resource output and value-added processing of resource-based products. Economic growth is achieved mainly through extended exploitation and depletion of natural resources, with the consumption of "high-carbon" takes a large proportion. Besides, the long service lifecycle of the "high-carbon" infrastructure, machinery and equipment provided by enterprises made it very difficult for enterprises to change them into low-carbon ones. As a result, such phenomenon generates a "lock-in effect" which seriously restricts industrial restructuring.

1.4 Severe Ecological and Environmental Problems and Disorderly City Layout

Irrational economic structure and layout of resource-dependent cities lead to many problems like ecological environment deterioration, ecological damage in mining area, land subsidence and soil erosion. In addition, the population mainly lives in highly compact clusters of communities scattered around mines, forming urban-rural ecotone (Wang, Wang, Gao, 2011). The deterioration of ecological environment and the disorder of city layout triggered social and economic contradictions, which seriously affected the sustainable economic development and social stability.

2. PRACTICAL EXPERIENCE OF LOW-CARBON ECONOMY DEVELOPMENT IN DIFFERENT COUNTRIES

2.1 Practice of Low-Carbon Economic Development in Foreign Countries

The United Nations has held many conferences to coordinate the efforts of all countries and yielded with a series of international agreements. Under the influence of UN, countries all over the world made various efforts in developing low-carbon economy. They established various low-carbon development strategies and related laws and took a variety of measures and actions such as introducing the "Green New Deal" (See Table 2. Guan, 2005).

Table 1
Low-Carbon Plans and Initiatives in Different Countries Around the World

Country	Planning and Initiatives
Britain	*Our future energy, create low-carbon economy* is released as a national document for the first time. It puts forward the concept of low-carbon economy. Emissions trading scheme and renewable energy quota policy are implemented.
Sweden	Pushes forward the "green vehicles plan". Starts 600 million kroner plan to promote energy conservation and recycling, and the use of renewable resources.
Denmark	Promotes the green energy model, and green energy technology development by establishing social support system jointly with the society.
Japan	The cabinet approved the "achieving low-carbon society action plan"; promoted the technology of alternative energy sources, renewable energy and clean energy vehicles. The government actively popularizes electric and hybrid vehicles, and advocates the use of natural gas for power generation in urban areas.
Canada	Formulated a strict management system on building materials focuses on energy saving and environmental protection, and integrated energy saving and environmental protection into its city planning. The government uses BRT system to transform urban transport system to achieve low-carbon energy saving in traffic areas.
U.S.A	The Senate proposed the *Low-carbon Economy Bill*, and the Obama administration launched a new energy strategy. The House of Representatives passed the *American Clean Energy and Security Act*.

2.2 Practice of Low-Carbon Economy Development in China

Although many cities in China have already taken some actions to develop low-carbon economy, most of these initiatives are tentative (see Table 2) and simply focuses on low-carbon urban construction. To establish a system framework in which sustainable low-carbon development can be achieved, a comprehensive strategy of low-carbon economy development is required.

Table 2
Low-Carbon Planning and Initiatives in China

City	Goal setting	Planning and Initiatives
Weihai	Low-carbon Economic Area	Promotes the use of liquefied natural gas for buses and taxis.
Xiamen	Low-carbon city	Advocates LED lighting, solar architecture, energy Museum
Hangzhou	Low-carbon industry, Low-carbon city	Free renting bikes, promotes low-carbon transport
Shanghai	Low-carbon communities, Carbon neutral regions,Low-carbon industrial area	World Expo green buildings, new energy, hydrogen energy grid and Carbon neutral planning area on Chongming ecological island
Chongqing	Low-carbon industrial area	Promotes the use of geothermal energy, and a low-carbon research institute is under plan
Weihai	Low-carbon Economic Area	Promotes the use of liquefied natural gas (LNG), advocates low carbon transport
Jilin	Low-carbon demonstration area	Explores restructuring strategy of its heavy industry
Dezhou	Low-carbon industry	Develops wind power, biomass power equipment establishes the China Sun Valley
Guiyang	Eco-city	Establishes Ecological Low-carbon Summer Community

3. COUNTERMEASURES FOR LOW-CARBON ECONOMY DEVELOPMENT OF RESOURCE-BASED CITIES

To develop low-carbon economy, resource-based cities should take the concept low-carbon development as their guide, and take into account various factors including their actual economic and social development, resources and environment conditions. To achieve the goal of low-carbon regulation, low-carbon business, low-carbon market operation, low-carbon society layout and low-carbon public consumption, changes in government regulation means, corporate operating mode, market operation order, social layout and public consumption concept are required (Qian, 2005).

3.1 Government: Low-Carbon Supervision

(1) Establish overall strategic plan of low-carbon economy development. Government should define development goals and integrate low-carbon economy development into city construction. In accordance with the general requirements of "low consumption, low emission, low pollution and high-yield", the government should act as a lighthouse for low-carbon economy development by developing appropriate laws and regulations and establishing specialized agencies.

(2) Promote innovation of low-carbon technologies. Government can make mandatory and incentive policies to promote continuous advancement of low-carbon technologies, and provide special energy-saving fund for enterprise to enhance energy-saving and low-carbon technological innovation. Besides, efforts should also be made to accelerate the application of the existing low-carbon technologies, and self-dependent innovation of key low-carbon technologies, which would provide impetus for low-carbon economy development and industrial restructuring.

(3) Establish and improve low-carbon laws and regulations (Chen, 2007). The government should strengthen environmental management and governance of resource-based cities, and take resolute efforts to put an end to overexploitation of nature and disorderly emission of the "three wastes". Also, the government should set a deadline for enterprises to keep industrial pollution sources under control and provide rewards such as financial subsidies and tax relief for business transformation.

(4) Adjust industrial structure actively and develop low-carbon industries vigorously (Wang, 2009). The government should promote transformation and upgrading of traditional industries, advocate low-carbon development for high-carbon industry, and encourage the use of new technologies, processes and equipment among enterprises. Thus, both industrial transformation and core competitiveness would be enhanced. Besides, the government should also make more efforts in accelerating the development of low-carbon industries and popularize low-carbon products actively.

(5) Establish a systematic capital protection mechanism (Wang, 2009). The government should increase investment in technological innovation, expand their fiscal expenditure for environmental protection, and improve the management of clean production, renewable energy sources and new energy development. The government should make relevant policies to encourage banks to level up green credit services and provide preferential policies on credit and fiscal subsidy for resource-based cities.

(6) Enhance the popularity of low-carbon education. The government should guide and promote public participation in the construction of the low-carbon city, popularize low-carbon knowledge and concept, and raise low-carbon awareness among the public through advocacy and education.

3.2 Enterprises: Low-Carbon Operations on the Basis of Fulfilling Social Responsibility and Profit Maximization

(1) Develop low-carbon technologies and establish low-carbon technology system. Enterprises should actively develop technologies to improve energy utilization and establish diversified low-carbon technology system of new energy, renewable energy and natural carbon sinks. Enterprises could also make good use of hydrogen energy and develop "low-carbon and hydrogen-rich" technologies, which would promote the transformation to low-carbon economy.

(2) Produce low-carbon products and strengthen comprehensive utilization of by-products and waste (Zhang, 2012). To boost business profits, enterprises should produce eco-efficient low-carbon products through improvement and introduction of advanced technologies. Additionally, enterprises should strengthen the comprehensive utilization of waste and by-products such as gangue, coal cinder and coal washing mud and turn the waste into treasure.

(3) Extend industrial chain and improve deep processing. Through comprehensive management of coal and electric power, enterprises should enhance their ability of value-increasing in energy intensive processing and to improve the processing efficiency. This would not only bring economic, but also social and environmental benefits to resource-based cities.

3.3 Market: Adjust Low-Carbon Operation

(1) Establish carbon trading market and set up transaction platform for certified carbon emission reductions related derivatives from clean development projects (Chinese Market Web., 2010). Efforts should be made to attract advanced technology and capital from foreign countries, and promote international cooperation in clean development projects. Additionally, businesses

could gain benefits through selling carbon emission rights, thus encourage energy conservation and emission reduction.

(2) Allocate market resources. As a resource allocator, the market should make more efforts in breaking the obstacles which restrict city development, encouraging free competition in the market and guiding the industry to develop along the "green" road. Enterprises whose carbon emissions could not meet the requirement of market should be eliminated.

(3) Rationalize the price of low-carbon products. To achieve desired economic benefits, price of low-carbon products must be kept at a reasonable level which is different from other products. In addition, modern distribution approaches such as direct marketing, chain marketing and franchise selling would be used to optimize the way low-carbon products enter into the market, reduce the cost of products accessing into the market, promote brand awareness of low-carbon products, and enhance the quality of low-carbon products.

3.4 Society: Promote Low-Carbon Layout and Pattern

(1) Rationalize city layout. With precious development opportunities provided by the process urbanization, more efforts should be made in compacting spatial structure of resource-based cities, dividing urban functions reasonably and improving infrastructure layout.

(2) Explore and develop low-carbon transport modes (Fu, 2011). A transportation system featuring green and "slow preferred" traffic pattern will not only meet residents' transportation demand, but also reduces carbon emissions by decreasing vehicle exhaust emissions.

(3) Advocate green building. Improving building energy efficiency and increasing renewable energy construction could improve the utilization efficiency of building energy, and help to achieve the goal of energy conservation and emission reduction. Also, building energy conservation would contribute to the harmonious development of human settlement environment.

(4) Improve the work of reclamation and city layout.

3.5 Residents: Establish Low-Carbon Consumption Behavior and Habits

Residents should establish their low-carbon awareness and change their traditional lifestyle and consumption habits actively. To prevent the deterioration of the ecological environment, the public should make their share contribution by changing their consuming attitudes, deepening of low-carbon concept, adopting low-carbon lifestyles, and reducing carbon emissions.

CONCLUSION

The development of low-carbon economy for resource-based cities is imperative. Low carbon transformation of resource-based cities is a project which requires systematic planning and implementation, and the joint efforts of the government, the market, enterprises, society and residents. In general, a low carbon economy requires the government to exercise its regulatory power; enterprises to conduct low-carbon operations; a low-carbon market which works properly; a rational low-carbon city layout; and a population with low-carbon awareness. Only in this way, can we achieve sustainable urban development.

REFERENCES

Chen Xuezhang (2007). Experiences and revelations of rresource-based city transformation in foreign countries. *Journal of Hubei Normal University (Philosophy and Social Science). 2007*(3), 47-49.

Chinese Market Web. (2010). *China coat city information trading platform*. Available from http://www.cctd.com. Access at October 30, 2012.

Fu Erji (2011). Building a low-carbon metropolis of Shanghai. *China Development. 11*(5), 68-75.

Qian Yong (2005). Practice, theory and enlightenment of resource-based cities' industry transformation in foreign countries. *Research on Financial and Economic Issues, 265*(12), 24-29.

Guan Xiqiang (2005). Economic transformation ideas of foreign resource-based cities. *Reformation & Strategy, 12*(12), 12-16.

Wang Xiaorong, Wang Cong, Gao Yanyan (2011). Research of problems of low-carbon construction of Tangshan. *Enterprise Economics*, *368*(4), 71-73.

Wang Kequn (2009). Actively develope low-carbon economy and circular economy. *Contemporary Economics*, *24*(21), 10-11.

Xia Kunbao (2008). Developing low-carbon economy, achieving urban sustainable development. *Environment Protecting,* (2A), 33-35.

Zhang Lianlian (2010). *Strategic thinking on low-carbon economic development of the major energy consuming province of Shanxi*. *China energy, 32*(2), 10-29.

Zhang Yuechao (2012). Low-carbon economic development path of the coal industrial City of Pingdingshan. *Journal of Hebei Energy Institute of Vocation and Technology, 47*(4), 23-30.

