Climate Change and Economic Policies in China
Rong KANG*, Bao-ping REN
School of Economics and Management, Northwest University, Xi’an 710127, China
*Corresponding author

Keywords: Climate change, Economic policy, China.

Abstract. Climate change is the great challenge to all the people in the world. Data shows that consistent with the warming climate globally, the climate change in China in 20th century has shown clear warming characteristics. The government of central and local levels in China has proposed a series of measures. A comprehensive system fighting climate change including controlling greenhouse gas emission, adapting the impacts of climate change, initiating the demonstrating projects, bettering the regional climate policies, etc. International comparison are done in terms of the economic measures fighting climate changes, such as pricing of energy, cancelling the subsidy, and some economic tools of certain countries etc. Based on China’s practice, certain suggestions are proposed on further development direction.

Introduction
Climate change is the great challenge to all the people in the world. According to IPCC, climate change is the significant change of climate in the statistical terms over a long period, say, over 10 years or longer. Currently, the climate change is characterized by warming in the globe. Data shows that consistent with the warming climate globally, the climate change in China in 20th century has shown clear warming characteristics. The warming in China is higher than the average index in the world. Upon this background, the extreme weather and climate incidents happen with higher frequency. In order to realize the vision of “Blue sky, green mountains, and clear water are always with us”, China has proposed a series of effective measures. The efforts have been coordinated with the nation-wide direction, plan, arrangement and efficient cooperation. The role of nation has shown great advantage in the process.

This paper starts from the description of the climate change in China, which is the base of showing the importance of fighting climate change. Then the works of Chinese government are listed, focusing on economic measures, to show the vital role of the government regulation in reaching the 2°C limits, which represents the integrative value of the society.

The Climate Change in China
The Global Warming
According to the five evaluation reports of IPCC (Intergovernmental Panel on Climate Change, IPCC) in 1990, 1995, 2001, 2007 and 2014, climate change is the great change or the change lasting for a long period (typically 10 years or more) in terms of average statistical sense.

The climate change is the result driven by both natural forces and the economic activities of human society. The influence of human beings, especially since the industrial revolution, the direction and speed of the impact of human activities on the climate change have been significant. It is shown by the global warming. According to the fourth evaluation report, within the recent 100 years, the average global temperature has raised by 0.74°C, and it has showing speeding trend.

In the future, the global warming will continue, extreme climate events will happen more often and more serious. As shown in Figure 1, from 1850 up to now, the globally average combined land and ocean surface temperature have raised anomaly; the sea level has been rising; greenhouse gas concentration has increased; cumulative CO2 has reached the highest level within the 800,000 years, which is mainly resulted from the fossil fuels, cement and land usage change.
According to the Chairman of IPCC, it is possible to keep the temperature increase within 2°C with controllable cost, but the global emission of greenhouse gas should decrease by 40%-70%, it should reach zero emission in 2100.

The Climate Change in China

According the research on climate change in China, consisting with the global warming trend, in the 20th century, the climate change in China has also shown significant warming, and also it is more than the average temperature increase.

Since the middle of the 20th century, the precipitation has shown slightly increasing trend. The data of the Tmax and Tmin of climate stations in eastern part of China from 1905-2007 shows that, the average temperature increase in the period is 0.96°C-100a. If the IPCC research period, 1906-2005 is also followed, it shows the climate change speed is in 0.34-1.20°C/100a.

According the average observed day temperature data, the warming increasing ratio between 1880 and 2007 is 0.69°C/100a. Although the data and the analysis methods are different, all of the researches have proved that within recent 100 years, the temperature has increased by 0.5-0.8°C, which is higher than that of the global average.

In the 20th century, the region owns the highest temperature increase is the northern part of China, especially in the area east of Inner Mongolia and the northeast part of China, the top warming speed amounted to 0.8°C/10 years. The significant warming in the whole country started from the end of 1980s, the climate belt moves toward north. This is one of the most obvious signal of warming.

After the global warming, more and more extreme climate and weather events happen more often and more seriously. It includes rising of extreme lowest temperature, decreasing of day temperature change, increasing and stronger extreme precipitation. The frequency, extension and seriousness of climate disasters have been increased, and the damage of climate disasters to the society has grown further.

According to the “Plan for China to deal with climate change (2014-2020)”, China is a country easy to be negatively influenced by climate change. In recent 100 years, the precipitation fluctuates among regions, which has increased in northwest part while decreased in northeast and northern part. The erosion of seashore and salt wave disaster has been serious. Since 1950s, the glacier has shrunk by over 10%, which has speeded since 1990’s, the extreme climate events happen more often, the water resource has shown shortage while the seasonal draught becomes more severe in the south, flood disasters happen together with strong typhoon. The agriculture has faced serious damages and the engineering projects and operations have to face risks often.

The research done by Prof. Kezhen ZHU in 1973 has been an influential paper in the field of climate change, based on over 5000-year-collection of related climate and physical climate researches, he supported his idea that the fluctuation of climate change in ancient China is periodical.

The Greenhouse Gas Emission

In terms of the climate change in China, it must be pointed out that the fast economic growth has been accompanied by serious problems which have brought significant impacts on climate change, or the pollution is currently a serious problem.

According to the data of UNEP, the World Bank, IEA, PBL, GCP of Tyndall, the greenhouse gas emission in China has become a very serious problem. For example, the regional climate problems around PM 2.5 have caused increasing impacts on people’s health, social harmony and economic growth.

For example, according to Global Carbon Project Report (2014), the four economies with the largest CO2 emission are China, US, EU and India. In the global emission of 2012, China took 71%. In terms of emission per capita, China has reached 1.9tC (6.9616 tCO2). If the historical accumulative emission is concerned, US took 26%, EU 23% and China 11%.
The Measures of China in Fighting Climate Change

The Emphasis of Top Leaders and Central Government

The process of fighting climate change and transforming economy toward low-carbon model is a lasting one, so the emphasis of the top leaders is very important.

The central government in China has raised fighting climate change to a national level strategic aim. In the early of 2015, the political bureau meeting of the central government has proposed one new aim based on industrialization, informationization, agricultural modernization, and urbanization that is “greenization”. It is the first time that the aim of constructing an ecologically friend society has been proposed formally.

Another important event is the “US-China joint announcement on climate change” issued on November 12, 2014. The top leaders from US and China announced to combat global climate change jointly, they reaffirmed the importance of strengthening bilateral cooperation on climate change and will work together, and with other countries, to adopt a protocol, another legal instrument or an agreed outcome with legal force under the Convention applicable to all Parties at the United Nations Climate Conference in Paris in 2015.

In APEC conference 2014, the President Xi Jinping has proposed the vision of constructing ecologically friend society, consisting of blue sky, green mountains and clear water, which has made ecological environment the core of China Dream.

Premier Li Keqiang has also mentioned in the World Economic Forum in 2014 that, China’s economy is in the developing process, but the growth of economy is facing serious environmental conflicts, so the protection of the environment should be emphasized.

The Overall Structure of Policies on Fighting Climate Change

In order to combat the climate change and speed the transformation of industrial structure and energy structure, a series of active policies and actions have been carried out.

The national leading group to fight climate change and certain administrative institutes have been formed; documents such as “The national Plan to combat climate change of China”, “The working plan of controlling GHG emission during the 12th five-year project” and “The national strategy of adapting climate change” have been composed and executed. In proposing the energy saving and carbon decreasing, demonstration projects of low carbon have been put forward. In terms of the detailed aim of combating the climate change, China intends to achieve the peaking of CO2 emissions around 2030 and to make best efforts to peak early and intends to increase the share of non-fossil fuels in primary energy consumption to around 20% by 2030.

The overall design of national policies can be seen from Table 1, which is based on “The national Plan to combat climate change of China (2014-2020)”. 


Table 1. The general and detailed tasks of China to combat climate change.

<table>
<thead>
<tr>
<th>General task</th>
<th>Detailed task</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 To control the GHG emission</td>
<td>To adjust the industrial structure; better the energy structure; promote the energy saving; increase the carbon sink in forest and ecological system; control the emission in industry, urban construction, transportation, business and waste disposal dealing; and promote low-carbon style life.</td>
</tr>
<tr>
<td>2 To adapt the impact of climate change</td>
<td>To improve the adaptation capacity of urban infrastructure, agriculture and forestry, sea and seashore, and human health fields; improve the water resource management and facility construction; improve the adaptation of ecologically weak region; and promote the construction of disaster prevention and mitigation.</td>
</tr>
<tr>
<td>3 To execute pilot demonstration project</td>
<td>To promote the provincial and city pilot demonstration projects, initiate the low-carbon park, business district and community, execute the carbon decreasing and climate change adaptation demonstration projects.</td>
</tr>
<tr>
<td>4 To better regional policies to combat climate change</td>
<td>Policies of urban area, rural area and key ecological function area to combat climate change.</td>
</tr>
<tr>
<td>5 To establish incentive and constraint mechanism</td>
<td>To develop related law, regulation and standards, establish carbon trade system and CO2 emission authentication system, better the finance, investment, tax and price policies.</td>
</tr>
<tr>
<td>6 To strengthen the support of science and technology</td>
<td>To develop basic research, promote research and development, and speed the spread and application of technologies.</td>
</tr>
<tr>
<td>7 To strengthen the capacity</td>
<td>To develop statistic system of measuring GHG, cultivate talents, strengthen the training and public opinion leading.</td>
</tr>
<tr>
<td>8 To deepen the international exchange and cooperation</td>
<td>To promote the establishment fair and reasonable global climate system, strengthen the cooperation with international organizations and developed countries, carry out cooperation among developing countries actively.</td>
</tr>
<tr>
<td>9 The organization of policy execution</td>
<td>To strengthen the overall coordination and establish the evaluation mechanism.</td>
</tr>
</tbody>
</table>

Source: “The national Plan to combat climate change of China (2014-2020)”, CNRC 2014.9

The Recent Economic Policies of China in Combating Climate Change

Compared with the past, a lot of economic policies have been proposed in recent years to combat climate change in China. The following are the examples from many fields.

The new “Law of Environment Protection” is formally executed since January 1, 2015. This is the first revision of this basic law in the environment domain since 25 years ago. It is believed as a law which can combat seriously pollution. It, together with another draft, the Revision Draft of the Prevention and Control of Atmospheric Pollution, will provide sound support to Chinese government to combat climate change.

The work related to combating climate change has moved forward very fast since 2007 with an outstanding speed. Externally, Chinese government takes part in the global negotiation actively; internally, the top-level design and front line pilot demonstration are carried out. So the work is developed jointly in terms of statistics, strategic plan, and regional execution. The international emission trade system is studied, and 7 pilots have been established, which already provide some experience, forming the base of unified carbon market.

Special funds have been collected to fight atmospheric pollution. The central government provides 15 billion RMB to help Beijing, Tianjin and Hebei Province to decrease the usage of coal. In 2008, the Beijing Olympic Games witness the multi-region joint combating model upon atmospheric protection. Now the joint project among the above three provinces has been normal, which clearly demands the PM2.5 decrease by 25% in 2017 than 2012. This has driven the three provinces to start a series of abnormal policies to protect the environment. According the government statistic report, the PM2.5 density decreased by 6.3% in Beijing during the first 9 months of 2014, 19.1% in Tianjin, and 12% in Hebei. The funds mainly support two kinds of energy structure change project, one is natural
gas project; the other is decreasing coal project. In 2012, Beijing itself used 23 million tons of coal, which is demanded to decrease to 10 million in 2017.

The National Bureau of Energy is to initiate 7 important measures, to promote the revolution in the production and consumption of energy, to promote the transformation and update of energy, to establish safe, stable, diversified and clean modern energy system, to further promote the upgrade and reform of emission from coal, vigorously promote the clean and efficient application of coal, to establish pilot demonstration projects of coal gas.

Clean energy is actively developed in China. According to “Bluebook of Industry: the Report of Industrial Competitiveness in China (2014) No. 4”, In terms of the market share of new energy industry globally, China, Germany and South Korea rank the top three. The countries who have the competitiveness in new energy are China, Germany, US, Denmark and South Korea. The competitive advantage of China and South Korea is the Photovoltaic industry, whose tradability is higher than wind power.

The carbon trade market is entering pilot demonstration phase. In National Response Plan to Climate Change (2014-2020), the carbon trade system is to be set up. Seven pilot exchanges have been initiated in 7 provinces, in order to offer insights and direction for the future common national market. Up to now, from their operation of about one year, generally the pilot project is smooth, the turnover amounts to 500 million RMB, the price ranges from 20 to 70 RMB.

Tax reform. In November and December of 2014, two tax reforms have been undertaken in China. The first is to raise the consumption tax of refined oil, which makes the turnover tax of gasoline and diesel raise from 32% and 29% to 34% and 31%, respectively. The other is to raise the coal resource tax in the whole country, ad valorem is followed, which will contribute to the reasonable exploration and application of resource, hence benefit the energy saving and CO2 emission reduction.

PM2.5 is monitored in the whole country according to new standard. Since January 1, 2015, in 338 cities 1436 monitor posts are established, which will monitor the air quality by new standards, and the related information is publicized in the air quality information platform in China Environment Monitor Station.

Social organizations are encouraged to sue against pollution behavior. The Supreme People’s Court has issue the explanation on January 6, 2015, that social organizations are granted more power to sue those people or organization who are against the Law of Environment Protection, which is commonly believed as a sound new measure to combat pollution in big cities such as Beijing.

CO2 emission of key industries is monitored and the low-carbon product certification system has started. Since October 3, 2014, the General Administration of Quality Inspection and the Commission of Certification and Inspection launched the research and demonstration of CO2 emission of key industries and the low-carbon product certification.

National electricity reform is speeding, the national power grid will become the service provider of power transmission and distribution. In January 2015, Shenzhen City started the pilot reform program of electricity transmission and distribution price, which will lead the national market reform of power market. It is believed that China will gradually promote the reform of electricity market, grant the final consumers more alternative rights. Furthermore, the price change signal of primary energy will pass to the sale price, so the price can represent more reasonably the demand of the market, resource scarcity and the cost of environment damage.

The insights of international experience to China

Historically speaking, the environmental problems facing China has made our country launch a series of policies to combat climate change. In the world, many countries and international organizations have a lot of experience in this field, which can insight China in the decision making in applying economic tools to response climate change.

The Conflict between Economic Growth and Environmental Protection Should be Highly Emphasized. According to Jeffrey Sachs, the Director of the UN Sustainable Development Solutions Network, a global framework for achieving the 2-degree C limit on temperature rise. But in order to achieve this aim, which means by 2050, current 35 million CO2 emission should decrease to 10-15
million, but the economic growth in current speed makes it very hard to realize. In China, the economic growth has realized very high speed, keeping the growth of economy must be balanced with environment concern, hence China should not only pay high attention to the growth of economy, but also to the environment cost.

The Possible Green Finance to Match the Aim of Response to Climate Change in a Large Scale Should be Researched and Carried out. A lot of problems face the countries in combating the climate change, finance support is one of them. Only enough fund can support countries, including China to successfully fight the climate change. The IMF's research can offer some insights. In its latest book “Getting prices right”, IMF proposed that given the powerful incentive effect that prices have on economic behavior, the application of basic tax principles is critical. “Getting prices right” means that taxes on fossil fuels should be set at a level such that energy prices reflect their associated environmental side effects. For example, just like Table 2 shows, if tax reform are carried out, China will have 65.9% reduction in pollution deaths from coal tax, and 32.8% reduction in nationwide energy-related CO2 emissions. Hence it is valuable to research deeply, how to initiate such reforms in China.

The Policies should be Scientifically Evaluated. According to Prof. Bjørn Lomborg, the director of the Copenhagen Consensus Center and a former director of the Environmental Assessment Institute in Copenhagen, to research and develop cheap green energy is vital for the future. He had drawn a conclusion that governments have invested billions of dollars in inefficient, feel-good policies. For example, German taxpayers have poured $130-billion into subsidizing solar panels, but ultimately by the end of the century, this will postpone global warming by a trivial 37 hours. But there are far better ways to improve environmental prospects for humanity and our planet. A lot of policies have been proposed and launched, but during this process, careful evaluation should follow.

To sum up, like many countries in the world, China is facing great challenges in response to the climate change. As the biggest CO2 emission country, China has realized the importance of environment affairs. The top leaders have expressed the high concern to the issue, the central government has also design a comprehensive framework to combat the climate change; a series of policies and reforms have been started in recent years. But compared with the reality demand of economic growth, the policies should be scientifically evaluated and carried out, some international experiences provide valuable insights.

References
[1] Intergovernmental Panel on Climate Change, [2013], the Fifth Analysis Report
[3] International Energy Agency, [2013]: Four energy policies can keep the 2℃ climate
[6] World Resources Institute, [2014]: Creating a sustainable food future