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BALANCING ECONOMIC GROWTH WITH CLIMATE CHANGE – THE CASE OF CHINA

China is a country highly exposed to climate change; however, it has not cared about the topic for a long time. Recently Beijing's attitude has been changing. The article gives first an overview of the Chinese climate policy institutions and the initial steps against the threat, than we examine today's treatment of the subject. Our main goal is to understand, whether the new climate policy measures are compatible with its growth objectives and whether the high growth – low carbon development strategy is a viable option in China.

KEYWORDS: CLIMATE POLICY, CHINA, CARBON EMISSION, CLIMATE CHANGE

JEL O53, Q1, Q40, Q54, Q58,

1. INTRODUCTION

Climate change universally concerns every single country of the Earth; however, there are some regions that are more endangered than average. Southeast Asia is among them. According to forecasts, the stock of freshwater in the region will decrease to a great extent by 2050; the danger of inundation on the territories along the sea and the bigger rivers is increasing. The environmental change also affects the availability of natural resources and the health condition of people (disasters, feeding problems, epidemics). (IPCC, 2007)

Within the region, China's vulnerability is also significant: by the year of 2050 its average temperature will increase by about 1.7% compared to the level in 2000. The danger that affects China is increased by the fact that it is the most populous country of the world and has a huge seaside. That is the reason why China has suffered natural disasters already in the past decades. During the period from 1971 to 2008, China was among the first countries as far as the average number of death per year is concerned caused by the droughts, high floods, and storms. During the period, these incidents affected more than 5% of the population. (WB, 2010) Global warming weakens the country economically too and it causes serious economic damage.

According to the scientists who calculate with a warming of 2.5°C (Nordhaus and Hope), China is belonging to those countries that suffer higher GDP loss than the world average because of the climate change. The opinion of Mendelsohn who calculates with a warming of 2°C is that the loss of the country is on the same level as the world average. If we try to break it down after those that cause the GDP loss, then, in case of China, the increased number of disasters caused by the climate change contribute to it to the largest extent. (IMF, 2008)

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The handling of the climate change takes on a special character in China in relation to other countries. In the past years, a relative consensus has developed at international level in respect that the climate change has to be regarded as an issue of security policy. According to Freeman (2010), both the USA and the EU accepted that the climate change and international security are directly related but China is still showing some reluctance as yet. However, the statement can be questioned to some extent; it is a fact anyway that the country considers the fact from the viewpoint of its development and economic prosperity.

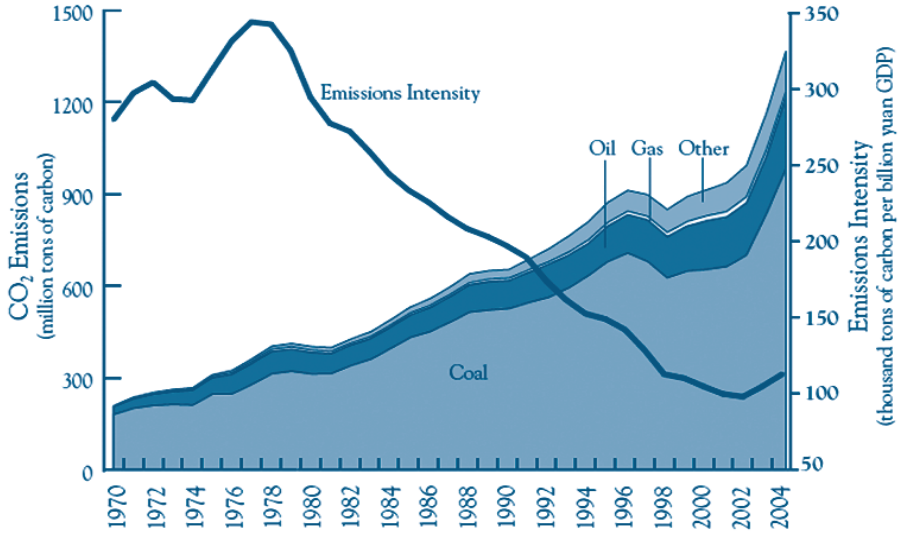
2. BEGINNING OF A CLIMATE POLICY

China's climate policy does not have significant traditions; in the giant country of the Far East people have not been dealing with the questions of climate change for a long time at all. Since the opening in 1978, economic growth has appeared on the political agenda as the main target for a long time. As it is well known, the country can not only keep its target of growth but it has surpassed it considerably for many years. As a result, China started to develop rapidly and the crowds of Chinese people could break free from poverty. The spectacular change also required great sacrifices: as they covered the energy needed for speedy developments, industrialization and urbanisation by the use of fossil energy resources, the detrimental effects of pollution expanded radically. China's environmental problems became worsened by the fact that the global climate change also picked up a higher speed, which also increased the need of China's intervention.

The carbon dioxide emission of the world calculated from 1990 approached 1,400 billion tons in 2006. The proportion of pollution was not steady, and after the year 2000, the rate of growth of the emission speeded up. (Oberheitmann–Sternfeld, 2009) China's proportion still fell behind 10%. According to the prediction, this figure will increase significantly but the data of the USA will not be exceeded in 2030 either.

Thanks to the steps made by the country for the energy conservation, China's environmental problems only spread after the turn of the millennium (Zhang, 2003). Contrary to other countries with similar advanced stage, in parallel with the spectacular miracle of growth (which meant a yearly average growth of 9.7% of the GDP between 1980 and 2000), China could cut on its energy consumption per unit of the GDP. At the same time, the income elasticity of the energy consumption of other developing countries on the same level of income as China was well above 1, which means that their energy consumption increased faster than their GDP. To put it another way, it means that during this period the energy intensity (the proportion of energy consumption to the GDP) and the intensity of emission (ratio of carbon dioxide – equivalent emissions to GDP) decreased. Without these trends, the country would have consumed much more energy even this time too. 2002 was a turning point because China's energy consumption speeded up and its rate exceeded the swing of the economic growth, which means that the tendency turned on its wrong side. This change radically influenced the China's greenhouse gas emission, which started to grow very fast.

As the peak of the process, China became the biggest carbon dioxide emitter of the world in 2007.



Source: Lewis (2007, pp 157).

Figure 1. Carbon dioxide emission from energy use according to source and emission intensity trends

Today, as a result of outside and inside pressures, it became clear that China could not carry on its usual growth oriented economic policy it has pursued so far. In order not to deliver further growth at the price of environmental injuries, it is important to increase the role of renewable, green energies and to raise their energy efficiency. According to Zhang (2010), if China really determines itself to make steps to realize the aforementioned, it can achieve the decrease of its problems decrease and it can become a so-called low-carbon economy, which is capable for sustainable development in the long run.

3. EVOLUTION OF THE INSTITUTIONS

The early development level of the institutions also provides some information about the fact that the country has not been dealing with the question of the environmental problems for a long time. (Lewis, 2007) In the 1980's, the subject was assigned to the scope of the State Meteorological Administration. Pretty late, at the end of the 1990's, the question came to the National Development and Reform Commission (NDRC) after having realized that the subject needs further measurements. NDRC is one of the key organizations of the economic management of China, the strategies of the economic development, it develops the one-year, medium-term, and long-term plans, coordinates the policies and monitors the performance of the macro economy. Since the problem of climate change was assigned to an organization that is a main decision maker also on the field of energy policy, the management admitted that the problems of environment are not allowed to be handled only as a scientific issue.

From here on, the activity of the Government in connection with the subject became more intense step by step; then, from 2007 it became even faster: the central Government announced the establishment of the National Leading Group on Climate Change (NLGCC). The method was not recent because the State Council often establishes organizations in an ad-hoc manner in order to emphasize the importance of a case. Their duty is to coordinate the related policies and to make specific steps. They are usually led by the Vice President and in case of national questions of special importance (such as NLGCC) by the President. (Qi et al, 2008) Regarding the climate change, the new organization significantly strengthened the capacity of the central government to make decisions. However, NLGCC also had a predecessor, and the set-up of the new institution can be considered as a positive message anyway because it clearly shows that Beijing is dealing with the fight against climate change as a key question.

Before 2007, local governmental bodies did not pay much attention to climate change either. However, by this time it became fully clear that it is a danger worldwide, local institutions still not felt the need to take actions against it. The main reason for that was that people felt on these levels, too, that any steps taken against the climate change would prejudice their interests: since, if they cut on their energy consumption and gas emission with greenhouse effect, the growth of the economy will come to a sudden stop. After all, in 2007, in line with the central policy, the approach of the majority of the local levels also changed and they worked out specific plans for research, mitigation and adaptation. In China's case, we cannot speak about a federal system; however, owing to the hierarchical structure of the state, the change in the line of policy on the lower levels depends on central expectations. On the other hand, it must also be admitted that the local answers for the central direction are strongly influenced by whether local people are concerned by the change or they have the capacity to it. According to Qi et al (2008), several factors had an influence on how much the provinces increased the level of their efforts against climate change. It was important to what extent they were conscious of the problem of climate change at all, how many capital and personnel they had available to work out a new system and how they recognized that the international cooperation also includes possibilities.

4. THE FRAME OF RULES

For a long time, China's leadership has not even mentioned in its five-year economic plans (in which they usually set forth the main principles of their economic development) the importance of the fight against climate change. The period from 2006 to 2010 was the first time when Beijing included the question of sustainable development in its 11th five-year-plan. The appearance of the topic is clearly due to the fact that the former trend reversed in 2002 and from then on, the energy intensity of the economy started to increase. (Lewis, 2011) The demonstration of the commitment to prevention developed a concrete reference indicator: they ordained the decrease of the energy intensity by 20% for the period 2005–2010. For the sake of the cause, the Government also launched a national campaign

named "TOP 1000 Energy-Consuming Enterprises Program". After Price et al. (2008), the program proved to be a success: participating companies contributed to the target, which was set at about 10–25%.

It is a milestone in China's climate policy that the State Council adopted the Chinese National Climate Change Programme in June 2007 to unify the former fragmented efforts. The main point of the event is that not only did they set forth in a document the general pieces of information in connection with the climate change and the early actions against it, which can also be called unimportant at the same time, but they also summarized the targets to be realised in the future as well. The document, which can be deemed as a self-defence, also mentions the main challenges that make the situation of the country difficult. According to this, China will be able to cut on the carbon intensity per unit of energy with more difficulty than other countries because the energy composition of the country is very concentrated: the proportion of the use of carbon in the country's primary energy consumption was nearly 70% in 2005, while the world's average was only 28% in the same period. It also has to face difficulties because it does not have the modern technologies suitable for efficient industrial production and energy exploitation, delivery and distribution. Its out-of-date technologies greatly contribute to the fact that the country's greenhouse gas emission is very high; its energy efficiency falls behind that of the developed countries by 10%. During its fast improvement, China performs large-scale infrastructure-developments and building projects these days. If these developments go together with the use of the old technologies in the future as well, it means that the country cannot switch to environmentally friendly technologies very soon and it will face more difficult problems. Moreover, it is also a challenge for the country that, as a result of climate change, meteorological disasters are very frequent and agriculture is not prepared for the defence against their detrimental effects; furthermore, another problem is that the density of population is the biggest in the seashore regions the most endangered because of the rise of sea level, since economic activity is concentrated here.

To demonstrate that China is ready to make efforts against climate change, in 2007 the decision makers set as a target that by the year of 2010:

- they will reduce the level of energy consumption per unit of the GDP by about 20%,
- they will increase the proportion of renewable energy to 10% in the primary energy supply.

Besides, they declared that they will increase the proportion of territories covered by forests, develop agriculture, increase the social dialogue to strengthen the fight against climate change and they will seek ways to modernize technologies. (NDRC, 2007) However, it is important to emphasize that although China declares its targets explicitly and in the case of the most important ones it also determines a concrete value, it adds after all that in the course of history it was proved that an explicit positive connection could be identified between the per capita carbon dioxide emission and the level of the development of the economy. Taking it as a starting point that China still belongs to the states with relative low level of development, it is evident that during its catching up with developed countries, it will increase its per capita energy consumption. How far this process will be accompa-

nied by an increased carbon dioxide emission will depend on the fact after how long time China will be able or will be ready to switch to the sustainable model of development.

In the 12th five-year-plan*, Beijing confirmed that it seeks ways of sustainable development. They decided about the principles and targets for the period between 2011 and 2015 in the 4th Session of the 11th National People's Conference. One of the main messages of the document is that China feels even more that the growth and the development of economy must be differentiated. Its commitment to the latter is indicated by the fact that they are ready to cut on the target value of the annual growth of the economy by half a percentage to 7% for the next five years and, in parallel with this, to focus on the developments and the reorganisation of the structure of the economy. Handling sustainable growth as a priority has already appeared in the previous five-year plan too; the social interests and the conditions of the harmonious social life were emphasized more strongly, and the pressure of implementation seemed to be even smaller (see above). The essential element of the new strategy is that China increases its innovation performance in the future. According to the plans of the Government, the innovative sectors become the leading players of the economy in the future. Innovation can be a balm for several problems, too. The possession of more developed technologies decreases the dependency on foreign countries and results in competitive advantages. Environmental innovations can also help reduce the negative externals of production. Through modern procedures, dependency on energy gets into a different perspective as well.

The decision makers laid down serious undertakings in the latest five-year plan. In the 12th five-year plan they followed the targets of the previous 11th five-year plan and they built on the support programs that were created for its implementation. They targeted a decrease of the energy intensity by 16% (energy consumption per unit of GDP) before the end of 2015; they declared that within the entire energy consumption, they wanted to increase the proportion of non-fossil energy resources (including water, nuclear, and renewable energy) to 11.4% and they made a decision about a cut of 17% in carbon intensity, too. Considering the fact that in early 2011 Zhang Ping, chairman of the National Development and Reform Commission, announced that the country reached the decrease of 20% determined in the previous plan, the question arises why they want to reach a cut of only 16% for the second time. According to Lewis (2011), the target seems to be less ambitious, and in reality they have to face a bigger challenge in this case because earlier, in the frame of the TOP 1000 Program, bigger and less efficient companies performed the possible developments. Smaller companies and those with more problems remained in the second run. The plan also announced the introduction of new industrial policies. The main point of the achievement is that China is planning to change its old-fashioned strategic industrial branches. Instead of them, it wants to support those industrial branches that promote green transformation. This change means a modification in the context as well: traditional industrial

* Original text: http://news.xinhuanet.com/politics/2011-03/16/c_121193916.htm

branches were supported by the state, while they also want to include private capital in the financing of branches using renewing technology.

Table 1: Details of China's strategic shift

	The *old* pillar industries	The *new* strategic and emerging industries
1	National defense	Energy saving and environmental protection
2	Telecom	Next generation information technologv
3	Electricity	Biotechnology
4	Oil	High-end manufacturing (e.g. aeronautics, high speed rail)
5	Coal	New energy (nuclear, solar, wind, biomass)
6	Airlines	New materials (special and high performance composites)
7	Marine shipping	Clean energy vehicles (PHEVs and electric cars)

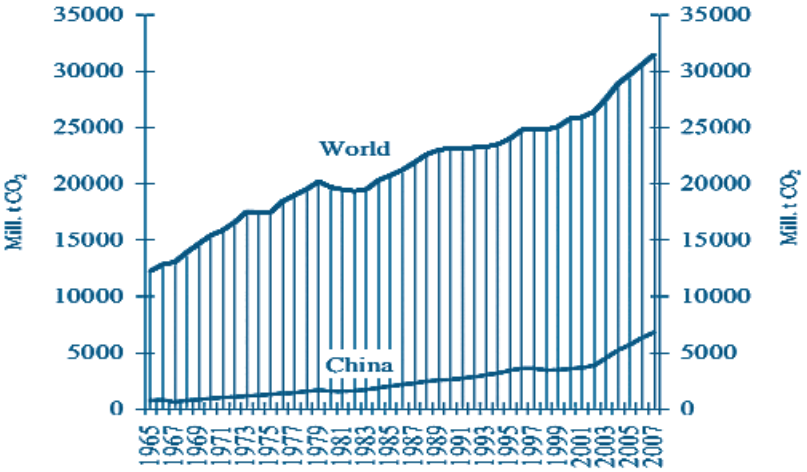
Source: Lewis (2011, pp 3).

5. CHINA'S ROLE IN THE INTERNATIONAL COOPERATION

China belongs to those countries that immediately signed the international environment protection agreement formulated on the United Nations Conference on Environment and Development (UNCED) held in June 1992. The country also ratified the document, which does not contain any responsibility and deadlines some months later. China did not delay to sign the Kyoto Protocol either, which was attached to the agreement, however not among the first ones: China also ratified it in 2002. For China, which belongs to the non-Annex I countries, the regulation that came into force in 2005 did not mean any quantitative restriction. This way China did not have the responsibility to restrain pollutant emission; it only received the duty to prepare regular reports at national level about the emission and to perform the kind of steps it is planning to introduce in order to stop climate change. With the Protocol coming into force, China acquired a right to implement projects under the Clean Development Mechanism (CDM). This device enables Annex I parties to perform the kind of investments in non-Annex I countries that promote a cut on pollution. Both parties can profit from this: the developed country (if the investments prove to be useful) receives an emission certification that will be included in its original undertaking, while the developing country obtains modern technology easier.

In the beginning, China did not play an important role in the Kyoto process. The main reason for this was that in 1998 they did not calculate with the fact that the country would boom very much. At this time, people assumed that China would overtake the USA only in about 2030 regarding emission. In reality, China has already become the biggest carbon dioxide emitter of the world in 2007. On the other hand, China fell well behind the other significant economies in the average per capita emission still in 2005: while the relevant figure for China was about 4 tons of CO_2 at this time, 19 tons for the USA, above 10 tons for Russia, 9 tons for Japan, and 8 tons for the Western European countries. According to predictions, it

will catch up with the European countries by 2030, as expected, however it will still fall behind the other great powers. (Oberheitmann–Sternfeld, 2009) In respect of the absolute emission data, it became obvious that in the interest of the climate change, China has to be forced to implement restrictions, otherwise the work of other countries is just for nothing. After the Turn of the Millennium, China made a more radical advance in the development, which was inevitably accompanied by an ever higher pollution. It became unquestionable that the regulation of the control of the emission has to be reorganized, but China was unwilling to admit it. Still today, it is arguing against its integration: if it was allowed for today's industrialized countries to achieve their present level of development with the use of fossil energy resources, by what right people want to forbid it for their country. The reasoning is rightful, but one has to see as well that the circumstances have changed significantly since then. The opposition of China is strongly influenced by the behaviour of the other responsible country, the USA, as well.



Source: Oberheitmann–Sternfeld (2009, pp 138).

Figure 2. CO_2 emissions in China and the rest of the world

As the expiry date of the Protocol of Kyoto was approaching, international brushes were increasing on the negotiations. The annual climate summit meeting of the UN in 2007 was held on Bali in Indonesia, the central topic of the conference being the preparation of the new undertakings. At the meeting they laid down the course of further negotiations (Bali Roadmap). The experts considered the event successful, when the players agreed that the dialogue has to be continued, which actually happened in the frame of COP 15.

To illustrate its commitment to the cut on greenhouse gas emission, China announced shortly before the Climate Summit in Copenhagen that it is committed to limit the carbon intensity by 40–45 percent before the end of 2020, compared to the level of 2005. The country's energy saving target was received with mixed feelings all over the world. However, a lot of Western experts received the announcement with doubts. Zhang (2010) thinks that in this case it is not only about a shallow, high-sounding commitment. Notwithstanding, according to Zhang, if we want to get to know the real importance of this commitment, we have

to take a lot of aspects into consideration. On the one hand, as China is the first carbon dioxide emitter of the world and its proportion in the whole emission of the world is increasing continuously, the reduction they undertook is not really significant compared to the world's entire emission. On the other hand, it is not entirely impossible to reach the target but it requires a hard and very meticulous work. Furthermore, even if China announces the fulfilment of its targets, it is also questionable whether we can believe the data published because the reality of the country's statistics can be questioned in many cases. In spite of the worries, the target is foreshadowing progress anyway. It is also positive that if the country really fulfils the reduction announced, its absolute emission will be close to the level advised by the IPCC. In contrary to the Chinese commitment, the United States declared only a 17 percent emission reduction plan before the conference.

The COP 16 was anticipated very much, the target they set was the improvement of the protocol, however, the conference could be characterised by the inability of the main polluters to reach a compromise, the lack of success, and disappointment. The two big powers, China and the USA did not agree in several questions. The Americans criticized that China is authorized for an annual support of several billion dollars from the USA and Europe, the purpose of which is that developed countries help developing countries ever more to switch to the use of the clear energy resources. The USA wanted to achieve that China get out of the circle of the favoured countries in need, but China could not accept it. They also rejected that the reduction of their emission would be controlled internationally. The bad atmosphere between the two countries was also strengthened by the fact that they could not agree on other economic questions, besides the differences of opinions about the climate policy, either. Finally, a legally not binding agreement without any deadlines was drafted at the conference. Some pro forma advances happened in connection with the Climate Funds on the next meeting in Cancun; in reality, the problems remained unsolved.

6. THE RESULTS OF FIGHT AGAINST CLIMATE CHANGE AND THE CHALLENGES FOR THE FUTURE

The steps of China against the climate change can mostly be noticed in its activity in the Clean Development Mechanism. At first, China had doubts in connection with CDM and it also joined the carbon market only later. Partly, the reason for the sceptical approach was due to the fact that China has held protectionist views and it did not let the foreign investors into a number of sectors, particularly in branches of industry that were regarded as special because of the safety of its national economy. In the course of time, China's leaders realized that the mechanism contains an excellent possibility for the developing countries; this way the country became an active player of it. Having realized that it is worth joining both from economic and political reasons, CDM became the main engine to encourage the reduction of GHG emission in the country and to introduce the low-carbon technologies. Beyond the fact that they can obtain new technologies more cheaply, it is also an important view that China, with its activity on this field, presents a picture of

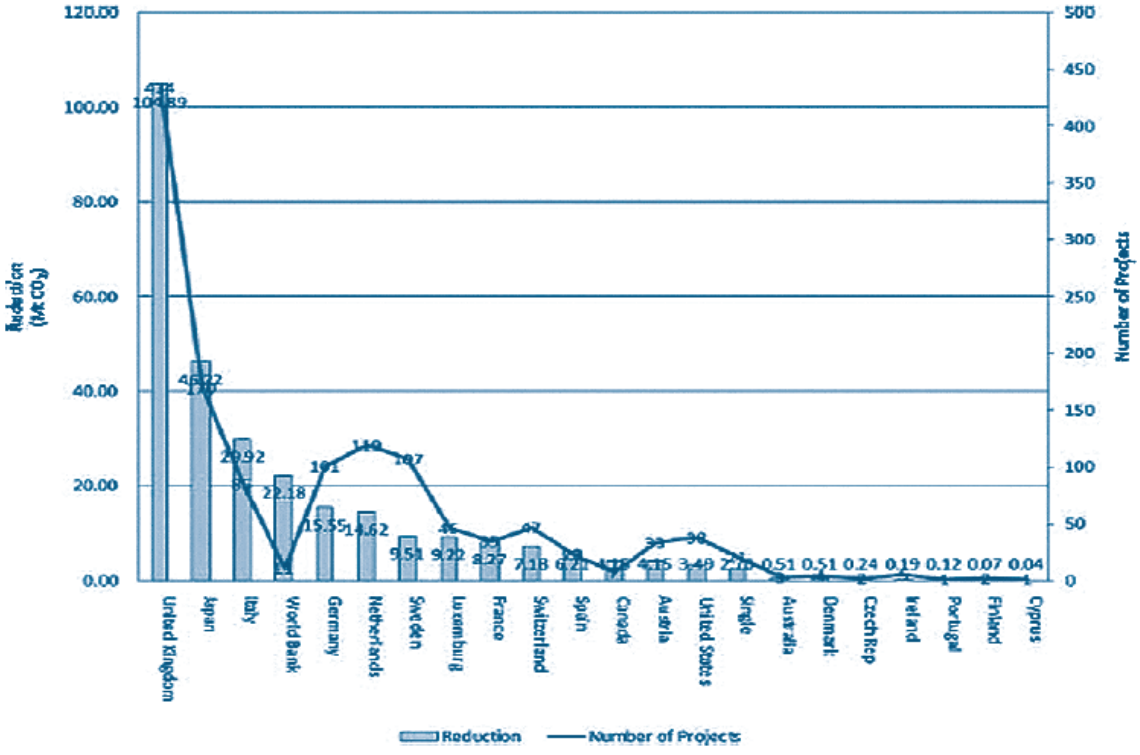
itself on the international scene that reflects that it is concerned by the issue of climate change. (Lewis, 2007)

China increased its role to the extent that it has become the first receiver country in the CDM projects by now. From the about 3,400 projects targeting the cut on the emission that were registered until summer of 2011, China was the host of about 1,500. Thanks to those investments that became successful, more than 700 million emission reduction credits were distributed in the world, from which the number of the CER's emitted by China is the highest. The geographical distribution of emission is strongly concentrated: more than 40% can be connected to 3 provinces (Zhejiang, Jiangsu, Shandong). The most CER's emitted in China, on the basis of the distribution after scope, are related to the reduction of chemical pollutants (HFC-23) per year and on average (66 million t of CO_2e), followed by renewable energy (61 million t CO_2e). This covers 60% of the total CER. N2O decomposition is still notable (21 million t CO_2e) in the category of "Afforestation and reforestation", there has not happened any emission yet.

The United Kingdom is the first in the field of the climate political to conclude bilateral cooperation with China, but several other European countries have also made significant business with this emerging country. The fact that the European Union is China's main partner in this respect can be explained by several factors. On the one hand, the European Union is fully committed to the fight against climate change, it made very important steps in this issue, and, however without success, it usually recommends very radical responsibilities for the players of the climate conferences as well. On the other hand, China is the fastest growing low carbon product market of the world, which means that they complement each other very much. Otherwise, the EU is the second largest commercial partner of China, and vice versa. Beyond this commercial dependence, the significant FDI that arrives from Europe to China makes it self-evident that it is worth cooperating in the climate policy as well. Since the EU has been providing China with developed technology for a long time, it is logical that they are expanding their cooperation in low carbon technologies, too. Third, both China and the EU have to face serious duties, so their cooperation can lead to a win-win situation.

From the number of the initiatives and the continuously increasing cooperation programs, one can assume that China set out to follow a new way, and it became open for the green revival. This is in conformity with the fact that the market of renewable energies, which was at first narrow all over the world, started to widen, and the value of the investments has increased by 630% globally since 2004, and the efficiency of this new energy is rising remarkably. Examining the geographical distribution of the investments, Europe continues to take the lead but, considering only the individual countries, it means that, disregarding the integrations, China has been the first in the world since 2009, when it preceded the USA. After the developments, increasingly more people speak of China as being among the winners of the new energy revolution. (Cuttino–Liebreich 2011) In 2010, China received clean energy investments of a record volume, 54.4 billion dollar, which means an increase of 39 percent compared to the previous year. The main part of the investments in China is focusing on the use of wind power; however, the solar energy sector also became a well developing one. To be able to reach the targets

for 2020 (installing 150 GW of wind) 17 GW of wind power plant was installed in China in 2010. In respect of the development of the wind energy, the country is considered to be a great power because about the half of the global wind energy investments (45 billion dollar) happens there. As far as the resources for the investments are concerned, the asset finance is predominant. (PEW, 2011)



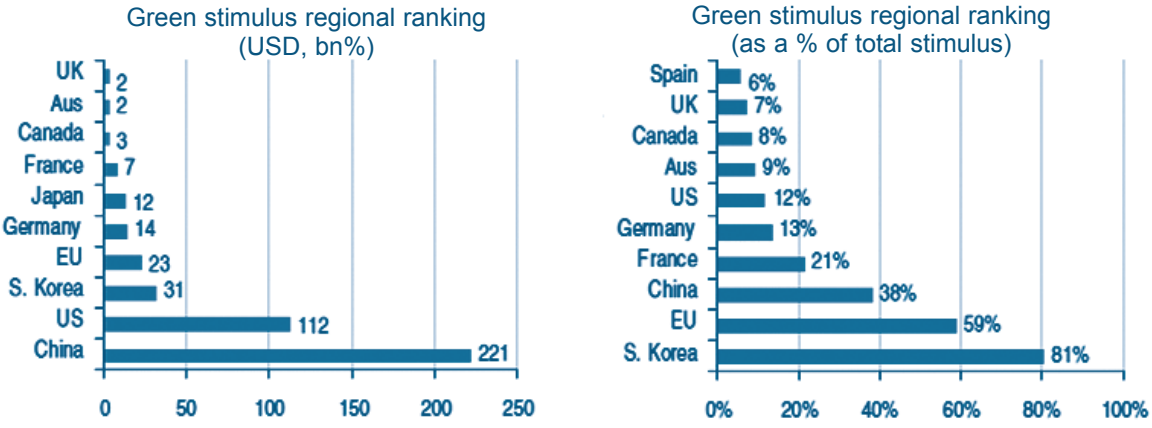
Source: Qi et al (2008, pp. 387).

Figure 3. CDM Copartners with China and Their Estimated Annual Emission Reduction

The increase in the quantity of these investments is a positive message to the world; however, one has to see too that not only quantity but quality counts as well. Of course, one cannot talk in generalities because of a number of flagrant cases; notwithstanding, it is worth becoming acquainted with an ambivalent example, namely the case of the Three Gorges Dam. The building is a huge hydroelectric dam, which was built on the river Yangtze and it counts for the biggest capacity power plant of the world. Its purpose it to generate electricity in the region using renewable technology, and it also serves flood-prevention purposes on the river. The project, which was originally developed to reduce pollution actually has a lot of negative effects, which is the reason why it is welcomed with mixed emotions both in China and all over the world. Its construction demanded the life of many people; more than one million people had to leave their homes because of the construction of the water-basin. The investment also influenced local fauna and flora: it caused loss of agricultural lands and also serious environmental problems (floods, earthquakes). However, blocking the water brought some advantages as

well; however many consider the changes induced as an ecological disaster anyway. (Ponseti–López-Pujol, 2006)

The responsible attitude of China towards the climate change is also reflected by the behaviour of the country demonstrated in the recession broken out in 2007. As the countries had to develop recovery plans to solve not only the economic recession but the shortage of energy supply as well, a lot of countries built the so-called green dimension into their encouraging plans. As a result, the proportion of the green elements amounted to 15% within the total of the plans published globally. The leaders were China and the USA, the sum of the stimulus (and within this, the proportion of the funds directed to climate change too) were the highest in these two countries. The proportion of the green new deals amounts to 38% of the package of 584 billion dollar of China.



Source: HSBC (2009, pp 3).

Figure 4. Climate change investment dimension of economic stimulus plans 2009–2010

In the frame of the high-growth and low-carbon strategies, China subsidized investments that resulted in savings and improved efficiency. To cut on transaction costs, China subsidized the development of the network infrastructure of renewable energy resources, and it also encouraged the building of roads and railways. From the total sum devoted to recovery, China set aside 50 billion dollar for biological conservation and environmental protection. To encourage the use of environmentally friendly cars, it reduced the sales tax for cars with engines smaller than 1.6 litres from 10% to 5%. Furthermore, China increased the tax on fuel oil and diesel several times. (HSBC, 2009)

In the past years, China has multiplied its efforts related to climate change: it has determined self-limiting targets in the interest of the energy efficiency and the reduction of GHG emission; it has taken an active role on the carbon markets; furthermore, it has committed itself to the use of renewable energy sources to a larger extent. Notwithstanding, it still faces a lot of challenges. According to the prediction of the International Energy Agency (IEA), the energy consumption of the world will rise to 25.3 billion tonnes of coal equivalent (TCE) by 2030, which

means that it will double compared to 1990. Within this, by 2030, China's proportion will increase to 21.6%. The increase is sharp; in 1990, this figure was only 10% in the China's case. According to calculations, the world's total carbon dioxide emission will double within 40 years; its amount will be close to 42 billion tons. China's share will be 13 billion tons from this, because its carbon dioxide emission will quintuplicate in comparison to 1900, as expected. After the prediction of IEA, it means that more than 30% of the world's entire carbon dioxide emission will originate from China in 2030. However, other countries also play a role in the increase of the consolidated world data. China's responsibility is illustrated very well by the fact that it causes 48.3% of the global growth. Consequently, China has to take a significant role in stopping the global climate change because, in the lack of their assistance, the adverse processes cannot be stopped. (Oberheitmann–Sternfeld, 2009)

Table 2. Consumption of primary energy in China and the world as a whole

Reference scenario	1990	2005	2015	2030
Consumption of energy (million TCE)				
Coal	763	1,563	2,670	3,427
Oil	166	467	776	1,154
Gas	19	60	156	284
Nuclear power	0	20	46	96
Hydroelectric power	16	49	89	123
Biomass and refase	286	324	321	324
Other renewable sources of energy	0	4	17	47
Sum total for China	1,249	2,489	4,073	5,456
Sum total for the world	12,507	16,327	20,516	25,316
China's world share (%)	10.0	15.2	19.9	21.6
CO_2 emissions (million tonnes)				
Coal	2,201	4,509	7,703	9,888
Oil	356	1,004	1,667	2,481
Gas	31	99	256	467
Sum total for China	2,588	5,612	9,627	12,836
Sum total for the world	20,688	26,620	34,071	41,905
China's world share (%)	12.5	21.1	28.3	30.6

Source: Oberheitmann–Sternfeld (2009, pp 150).

However, many are sceptical about China's climate policy. Pan (2011) thinks that one has to admit that the country has taken essential steps in the past years to handle the problem. Of course, it is also true that the work has to be carried on: progressive, coordinated measures are needed in the future too. In addition, one cannot disregard the fact either that the emerging country is facing a special dilemma situation. As a developing country, it has to fulfil the transformations, so that its development does not become endangered. It is clear that it cannot be successful alone; international support and within this, technological cooperation, is essential to the change. As some developed countries showed that the growth of a coun-

try and the population's standard of living can be maintained at low carbon dioxide emission too, China cannot use it as an excuse that as a latecomer it has to follow the same way to rise. The fact that the developed countries argue with this can be partly accepted, which should really encourage China to follow their steps. However, the reasoning is incomplete, because China is still on the lower level of its development and the funds it would spend on the transformation would hinder back its growth for a while anyway. To put it another way, the amount of the capital available determines China's possibilities. If the developed countries are willing to help China with technology transfer and other cooperation, it is also expected to make sacrifices. If China accepts these conditions, it can also reasonably expect other big polluters to change their habits too. In the judgement of the problem, it is very important to consider the question from China's viewpoint as well. Although the country's relevant duties are very difficult and its position differs from that of the developed countries in many respects, it sets very ambitious targets for itself, which, if it can really achieve, can set a precedent.

REFERENCES

Cuttino, P.–Liebreich, M. [2011] Who Will Win the Clean-Energy Revolution? *Project Syndicate*, downloaded 2011-09-03 http://www.project-syndicate.org/commentary/cuttino1/English

Freeman, D. [2010] The Missing Link : China, Climate Change and National Security, *BICCS Asia Papers*, vol. 5.[8]

HSBC [2009] A Climate for Recovery The colour of stimulus goes green, HSBC Climate Change, downloaded 2011-09-01 http://www.globaldashboard.org/wp-content/uploads/2009/HSBC_Green_New_Deal.pdf

IMF [2008] World Economic Outlook April 2008, Housing and the Business Cycle, downloaded 2011-04-12 http://www.imf.org/external/pubs/ft/weo/2008/01/

IPCC [2007] Climate Change 2007: Synthesis Report, An Assessment of the Intergovernmental Panel on Climate Change, downloaded 2011-07-15 http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf

NDRC [2007] China's National Climate Change Programme, People's Republic of China downloaded 2011-07-31 http://www.ccchina.gov.cn/WebSite/CCChina/UpFile/File188.pdf

Lewis, J. [2007] China's Strategic Priorities in International Climate Change Negotiations, *The Washington Quarterly*, Winter 2007–08

Lewis, J. [2011] Energy and Climate Goals of China's 12th Five-Year Plan, Pew Center on Global Climate Change, downloaded 2011-08-25 http://www.pewclimate.org/international/factsheet/energy-climate-goals-china-twelfth-five-year-plan

Oberheitmann, A.–Sternfeld, E. [2009] Climate Change in China – The Development of China's Climate Policy and Its Integration into a New International Post-Kyoto Climate Regime, *Journal of Current Chinese Affairs*, 3/2009, pp. 135–164.

Pan, J. [2011] China's low-carbon transformation, *East Asia Forum*, downloaded 2011-08-22 http://www.eastasiaforum.org/2011/01/04/chinas-low-carbon-transformation-2/

PEW [2011] Who's winning clean energy race? Edition 2010, G20 investment powering forward, The Pew Charitable Trust, downloaded 2011-09-02

Ponseti, M.–López-Pujol, J. [2006] The Three Gorges Dam Project in China: history and Consequences, *Revista HMiC*, nr. IV. pp. 151–188

Price et al [2008] China's Top-1000 Energy-Consuming Enterprises Program: Reducing Energy Consumption of the 1000 Largest Industrial Enterprises in China, *Berkeley Lab Working Paper*, LBNL-519E http://www.pewenvironment.org/uploadedFiles/PEG/Publications/Report/G-20Report-LOWRes-FINAL.pdf

Qi et al [2008] Translating a Global Issue Into Local Priority: China's Local Government Response to Climate Change, *The Journal of Environment & Development*, vol. 17, nr. 4. pp. 379–400.

WB [2010] *World Development Report 2010,* Development and Climate Change, downloaded 2011-08-23 http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTWDRS/EXTWDR2010/0,,contentMDK:21969137~menuPK:5287816~pagePK:64167689~piPK:64167673~theSitePK:5287741,00.html

Zhang, Z. [2003] Why did the energy intensity fall in China's industrial sector in the 1990s? The relative importance of structural change and intensity change, *Energy Economics*, vol. 25, pp. 625–638.

Zhang, Z. [2010] Assessing China's Carbon Intensity Pledge for 2020: Stringency and Credibility Issues and their Implication, *FEEM Working Paper*, No. 158.2010