CHAPTER IV

THE IMPLEMENTATION OF EUROPEAN UNION EMISSIONS TRADING SCHEME AND THE LINKING DIRECTIVE

This chapter explains the implementation of the European Union's Emissions Trading Scheme and the Clean Development Mechanism projects done by the Union. The Scheme and the projects that are done between 2005-2009 are as the fulfillment of the Union's commitment toward the Kyoto Protocol as an International Regime.

A. The Implementation of European Union Emissions Trading Scheme

The GHGs emissions trading held by the Union through the EUETS is implemented through three periods. The first period is also called the pilot phase of the EUETS which lasts from 2005-2007. It is the phase of learning by doing of all the Union's member states before really entering the Kyoto Protocol commitment period to see how things related to the emissions trading will work. The second phase of the EUETS runs from 2008-2012, coinciding with the Kyoto Protocol phase, as the fulfillment of the EU's commitment to the Protocol. The third phase is the phase after the commitment period of the EU to the Protocol.

A.1. The First Phase of EUETS (2005-2007)

The first phase of the scheme itself was started in 2005 and ended in 2007. This first phase is intended to be the pilot phase or the 'learning by

doing' phase for the Union and its member states to prepare before really entering the commitment period of the Kyoto Protocol.

There were 25 member states involved in the first phase of the EUETS, they were: Luxemburg, Germany, United Kingdom, Sweden, Denmark, France, Netherlands, Finland, Belgium, Italy, Austria, Greece, Ireland, Spain, Portugal, Lithuania, Latvia, Estonia, Slovakia, Czech Republic, Poland, Hungary, and Slovenia. There were also over 11.500 energy-intensive installations across the EU, which represent close to half of Europe's emissions of GHGs emissions from 25 member states, were trading the CO_2 emissions within 2005-2007.

Prior to the Kyoto Protocol commitment, these installations in the 25 member states were expected to cut their CO_2 emissions only before they have to reduce other GHGs emissions. The installations were also only from limited six sectors covered in the first phase, they were: 1). Power and heat industries, 2). Combustion plants, 3). Oil refineries, 4). Coke ovens, 5). Iron and steel plants, 6). Factories producing cement, glass, lime, ceramics, pulp and papers.

The ETS Directive states in the Article 10 that during the first phase of EUETS (2005 – 2007) member states should allocate at least 95% of all of its allowances free of charge. The rest was by auction system, which was

the 5% of it.[26] Prior to the first phase of EUETS with a decentralized system, every member state was given the authority to set their NAPs. The government of every member state would then entitle holders from every installation or company within their region to emit a specified quantity of regulated substance or the 'cap' or the 'credit'. Summing up all these companies and installations' estimated allowances, the member states then call them as the NAPs. All NAPs from each member states were then sent to the Commission. After being accepted and confirmed by the Commission, each member states will break down the NAPs to the installations and companies within their states. Then, the installations and companies themselves are becoming the ones who should try to reduce their CO_2 emissions levels by their own ways.

Later on, the installations were the ones who try to reduce their CO_2 emissions level, based on their own choice, whether they would use the environment-friendly technology to reduce their CO_2 emissions and generate profits from their unused allowances that they can sell; or they would do the exact same manufacturing process like they always do in the past but then cover the exceeding emissions through buying them from other installations. At the end of each year, every installation has to report their

[26] Hofmann, Yvonne, 2006, European Commission Direcorate General for Environment, retrieved on July 5th, 2010. Taken from http://ec.europa.eu/environment/climat/emission/pdf/etsreview/ets_co2_emission_auctioning.pdf

annual emissions to the state. Member state also has to make sure that a sufficient number of allowances are surrendered by each company. Each Member State will also have to write a regular annual report and submit it to the Commission.

Those installations whose emissions exceeded the permitted quantity or the allowances and did not make it up by buying the extra allowances would get penalty. The penalty is in the form of sanction or tax that they have to pay according to agreed prices. In the first phase, anyone who exceeds the allowances has to pay a penalty of €40 per ton of CO_2.

In this first phase started from 2005, almost all of the member states of the scheme were agreed to distribute the CO_2 emissions allowances freely through grandfathering and benchmarking to all installations or plants in coverage areas. Although there were some countries who decided to auction some of their allowances to the installations within their regions. Exceptions were Denmark that sold 5% from all of its allocation by auctioning; Hungary auctioned 2.5% of its total allowances; Ireland auctioned as much as 0.75% and Lithuania auctioned 1.5% of its allowances.

A.1.1 Implementation of the First Phase of EU ETS

Based on the report of CITL established on May 8, 2008,[27] there were 10.282 installations within the EU-wide areas. They emitted

[27] CITL Reports

2.012.043.453 tons of CO_2 EUA. In the second year of the first phase there were 10.605 installations with the total amount of emissions of 2.033.636.557 tons of EUA. In the last year of the first phase, or the year 2007, there were 11.186 installations and emitted 2.049.927.884 tons of EUA. The average allocations distributed within the EU-wide was 2.151.926.173 tons EUA per year from year 2005-2007.

If we look at the data and compare the numbers of average allowances per year that is 2.151.926.173 tons and the emissions they emitted that are only 2.012.043.453 tons in 2005; 2.033.636.557 tons in 2006; and 2.049.927.884 tons in 2007; the data is fine and shows that the emissions were lower than the allocations level, which like what we are expecting, and it means that the emissions did not exceed the allocations. However, if we look and compare the data on the emissions per year, there were the rising of emissions showed there, like between the year 2005 to 2006, the emissions increased 21.593.104 tons; between the year 2006 and 2007, the emissions has risen as much as 16.291.327 tons. It means, from the very beginning the operation started which was in 2005 until the last year of the first phase of EUETS that was in 2007, there were the rising of 37.884.431 tons of emissions in the EU-wide areas.

Scientists working for Sandbag, a non-profit organization based in the United Kingdom, whose job is to campaign real actions to tackle the issue

and the development of climate change, focusing on the emissions trading issue believe that there were reasons why there was this rising of CO_2 emissions. Thus, Sandbag published a report in July, 2009 about the first phase that has already been done by the EU. The aim of the report was to draw the evidence from the data taken within the three years of the first phase's operation.

According to Sandbag's report, the rising of emissions at the end of the first phase was because of the two main factors, namely:

1). Over-allocations of allowances

2). The falling demands of the permits

The carbon or the emissions trading is done by establishing a cap or limitations on how much an installation can emit, and paying extra caps if they emit the emissions beyond their caps. As the scientists examine, the allocation of the allowances or the permits to emit the emissions for the industrial sectors in the first phase was too high. This was because the distribution of the allocations was always by grandfathering system, not by auctioning system. As what is stated earlier that in the grandfathering system, they measured the emissions level of each of the industrial sector based on the historical records on how many each installations emitted emissions. Given the condition that the allowance of the permits or caps were too many, the installations felt free to do their production without

bother thinking about the emissions they should cut. This, resulted in the higher emissions level, or, in other word, the installations were not even reducing their emissions level because they had enough permits to do so. This over-allocation of permits made the market of carbon or emissions trading do not work well during the first phase. The market would have worked if there were only limited allocations to each installation then they felt like would have to try to cut the emissions or they would have emitted carbon emissions beyond the caps and they would felt like they had to buy the permits from other installations, like how the emissions trading was expected to work.

The report explains deeper that this over-allocation circulated in the market causes the carbon price to reach zero during the year of 2007.[28] Previously, on May 2006, the carbon prices under the EUETS crashed on 2 May 2006, falling from around 30 Euro to approximately 11 Euro per EUA, as several member states released data indicating that there had been over-allocation in their NAPs and actual emissions were in some circumstances lower than the allocations.[29]

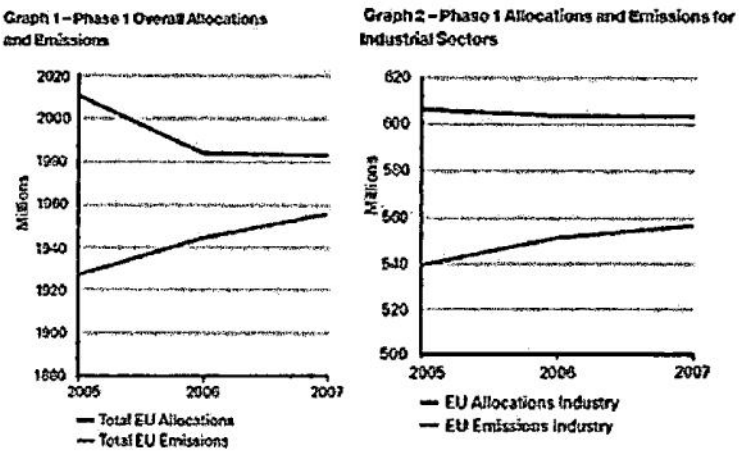
---

[28] Pearson, Anna and Worthington, Bryony, 'ETS S.O.S: Why the flagship 'EU Emissions Trading Policy' needs rescuing, taken from http://sandbag.org.uk/files/sandbag.org.uk/Sandbag_ETS_SOS_Report_0.pdf, retrieved on September 22, 2009

[29] Freshfields Bruckhaus Deringer, 2007, EU Emissions Trading Scheme: Key Principles and Developments, taken from http://www.freshfields.com/publications/pdfs/2007/17437.pdf, retrieved on May 21, 2010

Graph 1 below is taken from Sandbag's report of 2009,[30] picturing how the allocations level was higher than the emissions level not because they have succeeded to reduce their emissions level but because of the over-allocation given to every installation within the scheme. This has made the market did not function because there were no single installation needed the extra permits to cover their exceeding emissions as they had more permits than they have ever needed.

Figure 4.1 Graph of EU's Allocation and Emission in 2005-2007



Source: Sandbag Report 2009

The graph 1 also obviously shows that instead of decreasing the emissions, the total of EU's emissions has been increasing year by year,

[30] Pearson, Anna and Worthington, Bryony, 'ETS S.O.S: Why the flagship 'EU Emissions Trading Policy' needs rescuing, taken from http://sandbag.org.uk/files/sandbag.org.uk/Sandbag_ETS_SOS_Report_0.pdf, retrieved on September 22, 2009

even though the amount of allocations has been cut sharply from 2005 to 2006.

Graph 2 shows that there were huge gaps between the allocations and the emissions from the industrial sectors within the scheme. This is obvious that this is the main reason there has been an increasing level of emissions at the end of the first phase.

The industrial sectors were the ones that emitted the dangerous gases that are contributing to the climate change. Since the installations under the industrial sectors had more allocations than what they needed, they could emit more emissions compared to what they have been done before entering the first phase, as what it is seen on the graph 2.

Sandbag reports that the second factor causing the rising of emissions level at the end of the first phase is because of the falling demand of the permits. Sandbag explains using the economic theory of 'Supply and Demand'. The theory assumes that demand and supply will tend to equal out in most markets through a series of adjustments. Thus, when demand falls, prices will fall forcing marginal producers to close down operations. With the EUETS, the EU is the producer as it creates the supply of EUA permits. However, unlike other markets, there is no mechanism in the Emissions Trading Scheme to reduce the supply of permits when demand drops.

The demand on extra permits of EUA falls drastically, simply because the installations under the industrial sectors within the scheme did not need any extra permits to cover their exceeding emissions, as they had more allocations available for them, for the over-allocation existed during the first phase.

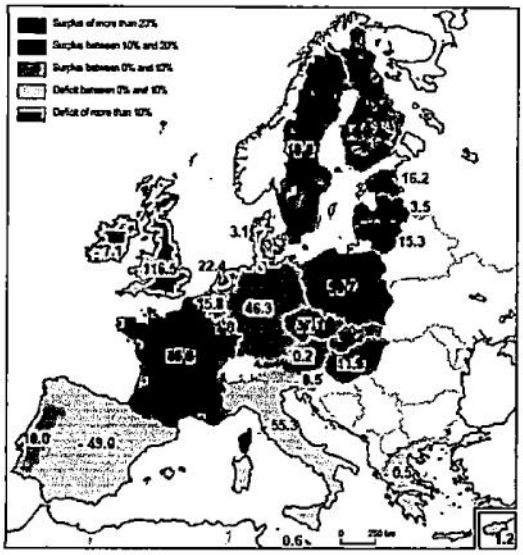
The following picture is taken from an online article reporting the over-allocations found during the first phase of the EUETS, viewed through a map.[31] Member states in orange had more than 10% of deficit, which means that they had a short position as the emissions were higher than the allowances. Member states in yellow suffered deficits from 0% to 10% which also had to pay taxes as their emissions exceeded the allowances. The light pale blue member states had surpluses from 0% to 10% which made them in safe levels of emissions, as they still had some allowances left at the end of the period. While the light blue indicated that those member states which had surpluses from 10% to 20% which means they could easily generate profit from the sale of their unused allowances. The biggest profit went to member states in dark blue color, as they had more than 20% surpluses they could sell.

---

[31] Trotignon, Rapael, Delbosc, Anais, 2008, Climate Report 'Allowance Trading Patterns During The EUETS Trial Period : What Does The CITL Reveal?' retrieved on January 26, 2011 from http://environmentalfinance.groupsite.com/uploads/files/x/000/00a/854/Allowance_trading.pdf

The following picture shows that there were varying outcomes from the distributions of allowances. There were some member states which received more allowances as they asked more allowances from their NAPs especially those of the eastern part of the Europe, like Estonia, Latvia, and Lithuania. They had more than 20% surpluses of allowance because they set their allowance too high that they went beyond their own CO_2 emissions that year which made them could sell their surpluses and got more money from the sale but doing nothing because they had their emissions level high, too.

Figure 4.2 Map of European Countries with Surpluses and Deficits



Notes: Since emissions data from Romania and Bulgaria were not available at the date of publication, no results have been calculated for these newest members of the EU ETS. Malta 2007 emissions were not yet reported at the time of writing and have been approximated by the average 05-06.

Source: CITL, cumulated results 2005 - 2007.

The ones with lower surpluses also experienced the same case with those of Sweden, Finland, Poland, Czech Republic, Slovakia, Hungary and

France. They got interests for doing almost nothing to reduce their CO_2. This also happened to member states whose surplus between 0% and 10%; they were Netherland, Belgium, Germany, Austria, and Portugal.

On the other hands, some other member states had their allowances too little that they could not barely cover their CO_2 emissions level. Thus, they had to buy extra allowances from those who had surpluses of allowances to cover their exceeding amount of CO_2 emissions. This happened to those whose deficit between 0% - 10%, they are Spain, Italy, and Greece. The states like the United Kingdom and Ireland suffered the biggest deficit from the very first year of the first phase of the trading. The exact data from the CITL showing the first trading year of EU ETS' first phase can also be seen in the following table.[32]

Member states which had surpluses were Germany, Poland, France, Czech Republic, The Netherlands, Belgium, Finland, Denmark, Portugal, Slovakia, Hungary, Sweden, Estonia, Lithuania, Slovenia, Latvia and Luxemburg. These states had 'long position' like it is seen in the following bar-graph. Having long position here means that they were having more allowances as they emitted fewer emissions, not to mention that they barely cut the emissions itself.

---

[32] Ellerman, Denny, Buchner, Barbara, 2006, *Over-Allocation or Abatement? A Preliminary Analysis of the EU Emissions Trading Scheme Based on the 2006 Emissions Data*, taken from http://dspace.mit.edu/bitstream/handle/1721.1/35837/MITJPSPGC_Rpt141.pdf;jsessionid=198FB721DDD11B6AE54F1B2DCBAB356A?sequence=1, retrieved on October 1, 2009.

On the other hand, the member states that experienced deficits were Italy, the United Kingdom, Spain, Greece, Austria, and Ireland. In the following graph, they were in the short position as they emitted more emissions than their permitted limits, or the allowances.

Figure 4.3 EU Countries' Allocation and Emissions in 2005

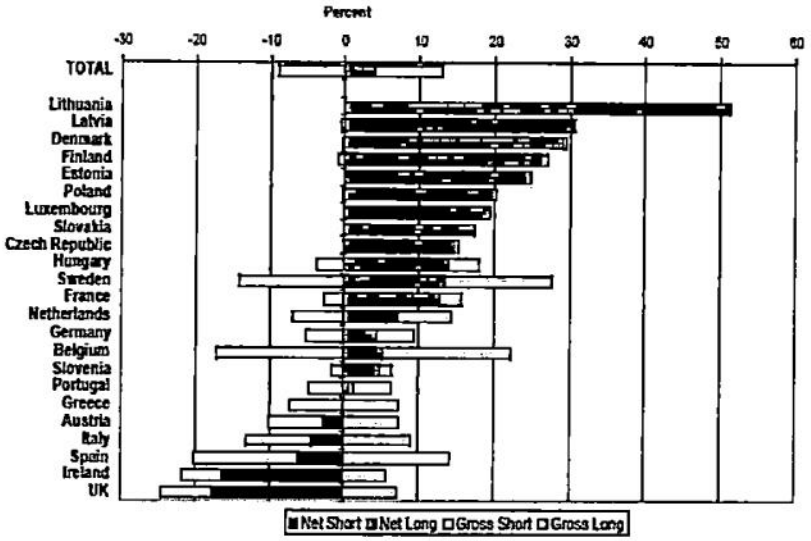
	Allocation 2005 (Mt CO_2)	Emissions 2005 (Mt CO_2)	Difference (Mt CO_2)	Difference (Percentage)
TOTAL	2,087.9	2,006.6	81.3	3.9
Germany	495.0	474.0	20.9	4.2
Poland	235.6	205.4	30.1	12.8
Italy	215.8	225.3	-9.5	-4.4
UK	206.0	242.5	-36.4	-17.7
Spain	172.1	182.9	-10.8	-6.3
France	150.4	131.3	19.1	12.7
Czech Republic	96.9	82.5	14.5	14.9
Netherlands	86.5	80.4	6.1	7.1
Greece	71.1	71.3	-0.1	-0.2
Belgium	58.3	55.4	3.0	5.1
Finland	44.7	33.1	11.6	25.9
Denmark	37.3	26.5	10.8	29.0
Portugal	36.9	36.4	0.5	1.3
Austria	32.4	33.4	-1.0	-3.0
Slovakia	30.5	25.2	5.2	17.2
Hungary	30.2	26.0	4.2	13.9
Sweden	22.3	19.3	3.0	13.3
Ireland	19.2	22.4	-3.2	-16.4
Estonia	16.7	12.6	4.1	24.6
Lithuania	13.5	6.6	6.9	51.1
Slovenia	9.1	8.7	0.4	4.6
Latvia	4.1	2.9	1.2	29.9
Luxembourg	3.2	2.6	0.6	19.4

Source: Own calculations based on data provided by the CITL.

Other scientists believe that the decentralized system the Scheme used was also influencing the outcome from the first phase itself. Joseph Kruger, Wallace E. Oates and William A. Pizer, in a discussion paper discuss that the decentralized system of the Scheme hampers the trading at the Scheme. Decentralization creates the different systems used by each of the member state to allocate the EUA. It is said that some countries did it

with auctions but some other countries just distributed their allowances freely and without limitation.

Figure 4.4 Short and Long Position by Member States (in Percent)



Source: CITL and Kettner *et* al (2006)

Instead of having one central institution regulating everything about the EUETS, the Union gave each member states their authorities to hold the trading of CO_2 among them. Thus, decentralized system means that each member state or jurisdictions runs its own system with no automatic links or connections to other jurisdictions. There were four member states out of twenty five total member states within the first phase of the EU ETS,

used the auctioning method in the trial phase; they were Denmark, Ireland, Hungary, and Lithuania.[33]

Denmark auctioned 5% of its total allowances, made up about 5,025,000 UEA during the EU ETS' first phase, to be sold nationally and internationally and was open to any potential purchases. In October 2006, Denmark sold 2,762,000 EUA through the broker when the price ranged from 0, 90 € to 2,20 € with few more unused allowances to be sold before April 30, 2008.

Ireland government was the first to auction its allowances to over one million EUAs, as much as 0,75% of its total NAPs. To avoid the low season of the trading, Ireland's government decided to auction its allowances in two auction sessions, the first was on January 2006, and the second was on December 2006. This strategy was running well, as the permit prices was still high during the first session of auctions, that is as much as 26 € in January 2006. 1,18% of Ireland's total allowances were sold by auction system.

Hungarian government decided to auction 2,5% of its total NAP or as much as 790,000 EUAs to be auctioned. The first auction took place on December 11, 2006, resulted in total of 1,197,000 EUAs with a price of

---

[33] Fazekas, Dora, *Auction Design, Implementation and Result of the European Union Emissions Trading Scheme.* Retrieved on July 22, 2010 from http://www.aprec.net/documents/08-04-28_eu_ets_auctions_fazekas.pdf

7.42 Euro per EUA. The second auction was on 26 March 2007, resulted in 1.177,500 EUAs that were sold with a price of 0,88 Euro per EUA.

The Lithuanian Environmental Investment Fund offered 552,000 EUA to be auctioned. The permits were sold on September 10, 2007 with a price of 0,06 Euro per EUA, made up a total of 33,120 Euro which barely covered the administration costs.

A.1.2 Lesson Learned from the First Phase of the EUETS

There are some features in the first phase that have caused the Scheme did not run well thus resulted the market of GHGs permit did not run effectively. The Commission in the Union has revised the system so the System will help the Union comply with the Protocol in reducing the GHGs emissions level by the time given.

A.3.1 Tighter Caps for Each of Member States

Lesson learned from the First Phase that over allocation hinder the market to run uneffectively. Since almost each member states got more than enough caps and did not consider the need to buy more to cover their exceeding emissions. Tighter caps for all installations is a must as the allowances that are smaller than what is likely to be needed would push better CO_2 emissions cuts and forces the market to run effectively.

It can be seen from the following table that Austria had 33.0 million tons of allowances during the First Phase of EU ETS and emitted 33.4 million tons in 2005. In the Second Phase, Austrian government proposed 32.8 million tons of EUAs but then the Commission only gave as much as 30.7 million tons. It means that the Union has expected Austrian government to better cut its emissions at least up to 3.4 million tons if it is compared to the emissions in 2005.

Another example is from the Denmark case. At the First Phase, Denmark got 33.5 million tons of EUAs and emitted 26.5 million tons of CO_2 emissions. The Commissions only granted Denmark as much as 24.5 millions tons for the second phase. It shows the high commitment of Denmark government to cut their emissions, as they also proposed the same amount of EUAs as the Commissions granted. On the other hand, during the First Phase Estonia got 19.0 millions tons of EUA and emitted 12.6 million tons in 2005. The Commissions only gave 12.7 million tons the Second Period for Estonia even though Estonian government proposed for 24.4 million ton s EUAs.[34] Through this tighter caps or emissions that can be emitted, the Union has expected Estonia to try harder to cut more emissions.

---

[34] (Table taken from:) Tilford, Simon, 2008, 'How to Make EU Emissions Trading A Success', retrieved from http://www.cer.org.uk/pdf/p_769.pdf. Retrieved on April 12, 2010

More examples are from the Germany case. Germany got 499,0 millions tons of EUAs during the first phase and emit ted 474,0 millions tons which means that Germany succeeded in keeping the emissions lower than the allocation.

Figure 4.5 CO_2 Caps First and Second Phase in the EU ETS

(millions of tons percentage change)

Member-state	1st period cap 2005-2007	2005 verified emissions	Proposed cap 2008-2012	Cap allowed 2008-2012	CDM/JI limit 2008-2012 in %*
Austria	33.0	33.4	32.8	30.7	10.0
Belgium	62.1	55.6	63.3	58.5	8.4
Cyprus	5.7	5.1	7.1	5.5	10.0
Czech Republic	97.6	82.5	101.9	86.8	10.0
Denmark	33.5	26.5	24.5	24.5	17.0
Estonia	19.0	12.6	24.4	12.7	0.0
Finland	45.5	33.1	39.6	37.6	10.0
France	156.5	131.3	132.8	132.8	13.5
Hungary	31.3	26.0	30.7	26.9	10.0
Germany	499.0	474.0	482.0	453.1	12.0
Greece	74.4	71.3	75.5	69.1	9.0
Ireland	22.3	22.4	22.6	21.2	21.9
Italy	223.1	225.5	209.0	195.8	15.0
Latvia	4.6	2.9	7.7	3.3	5.0
Lithuania	12.3	6.6	16.6	8.8	8.9
Luxembourg	3.4	2.6	4.0	2.7	10.0
Malta	2.9	2.0	3.0	2.1	n/a
The Netherlands	95.3	80.4	90.4	85.8	10.0
Poland	239.1	203.1	284.6	208.5	10.0
Slovakia	30.5	25.2	41.3	30.9	7.0
Slovenia	8.8	8.7	8.3	8.3	15.8
Spain	174.4	182.9	152.7	152.3	20.0
Sweden	22.9	19.3	25.2	22.8	10.0
UK	245.3	242.4	246.2	246.2	8.0
TOTAL	2109.0	1947.9	2101.6	1903.4	-

Source: European Commission

The Germany government proposed 482,0 millions tons of EUAs for the second period of the trading but the Commission only granted as

much as 453,1 millions tons of EUA means that the Union has expected Germany to cut at least 20,9 million tons of GHGs emissions.

These data show the Commission's commitment in trying to make the system works better than the last phase.

A.3.2 More Allocations to be Auctioned

The Directive 2003/87/EC states that in the First Phase, the allowances are distributed only 5% through auctions and mainly through grandfathering and benchmarking system. Now that the Scheme has entered the Second Phase, the same Directive states that up to 10% of total allowances of each member states may be distributed through auction system and the rest through grandfathering and benchmarking but with stricter affirmation process from the Commission. With that, some member states have began to set total allowances they wanted to spend on auction system within the 2008-2012 periods. They are for instance;

a. Austria; as much as 400,000 EUAs or about 1,22% of its total allowances will be auctioned per year, which means by the end of the second period, Austria will have auctioned about 2 millions of EUAs.
b. Belgium will auction 0,29% of its total allowances or about 922,000 EUAs during the second phase.

c. Germany will allocate as much as 8,8% of its total allowances to be auctioned.

d. Hungary will auction its 4,3% allowances from its total allocation.

e. Ireland allocate 0,5% of its total allowances to be auctioned.

f. Lithuania; 2,7% of total allocation will be auctioned.

g. Netherland; 4% of total allocation will be auctioned.

h. The United Kingdom; 7% of total allocation will be auctioned.

i. Demark will auction as much as 0-2% of its total surpluses from the new entrants reserve.

j. Greece will auction up to 10% from its total allowances.

k. Italy is not planning on auction but about 5,7% of its total allowances or about 12 millions tons will be sold at a fixed price.

l. Poland will auction 10% from its total allowances.

m. Spain government decided to auction only those unused allowances from June 30, 2012.[35]

A.3.3 More GHGs Emissions to Cut

Another change in the Second Phase of the EUETS is the emissions elements that the installations in every member states have to cut. During the First Phase of the EUETS, the installations had to cut

---

[35] Fazekas, Dora, Auction Design, Implementation and Result of the European Union Emissions Trading Scheme, taken from http://www.aprec.net/documents/08-04-28_eu_ets_auctions_fazekas.pdf retrieved on July 22, 2010

the CO_2 emissions only. Meanwhile in the Second Phase, the member states can opt-in other GHGs to be included in their emissions reductions efforts. For example, the Netherlands has opted-in N_2O in their second phase trading period.

Other GHGs emissions to be opted-in and included within the reduction itself is intended to make the cuttings more effective to foster reducing the effects of the climate change. Other GHGs that can be opt-in in the Second Phase are CO_2, CH_4, N_2O, HFCs, and SF_6. These GHGs are the ones to cause the rising temperature of the earth surface according to the IPCC reports that their existence in the atmosphere should be reduced to a safe level to avoid the worse effects of climate change. The Union has began to include these gases to be reduced within the Scheme and began to set caps together in the NAPs of each of member states.

A.3.4 More Sectors Included

The sectors that are included in the First Phase are limited to: 1). Power and heat industries, 2). Combustion plants, 3). Oil refineries, 4). Coke ovens, 5). Iron and steel plants, 6). Factories producing cement, glass, lime, ceramics, pulp and papers. Now that the Scheme is entering the Second Phase of EU ETS, the sectors included are wider.

The aviation sector is now included. The companies, firms and installations working under the aviation sectors are now have to cut their GHGs emissions also. They are for example, the airlines companies, the machinery factories, and the airports.

A.3.5 More Sanction Proposed

The sanction of the second phase is higher than that of the first phase which was 40 € per one ton of exceeded emissions. It is now 100 € the installations have to pay per one ton exceeded emissions during the second phase of the EU ETS. This is to force the installations to try harder to cut their GHGs emissions and to have the Scheme work better, as the sanction functions as the deterrence effect for those working at the industrial field. Once they realize that if they do not cut enough GHGs emissions and do not cover it with the extra allowance they have to buy from the other installations whose emissions are unused then they will have to pay for the sanctions which are now much more expensive.

A.2 Second Phase of the EU ETS (2008-2012)

The first phase of the EU ETS has served its intended purposes. They are for instance; to see how things will work, to prepare the infrastructures needed by the trading, and also to gain experience on the emissions trading in direct way before really entering the Kyoto Protocol commitment period.

Data from CITL show both pitfalls and the potential of the EU's liquidity. It is that more than 1.6 billion tons were traded in 2007, with a value of $41 billion, over twice the total in 2006.[36]

The lessons are learned. Now that the Scheme has entered the second period of emissions trading, the Union has prepared for a better system and intended to achieve better emissions cuts. The infrastructure for international emissions trading is in place and functioning. Crucially, the EU now has verified emissions data for over 10,000 major users of energy across 25 states. Moreover, by mid-2007 the member states had also committed to invest 7,5 Euro billion by 2012 under the CDM and JI to provide reduction of more than 2 billion tons of CO_2 emissions.[37]

In order to better cut the emissions during the second period of the trading, the Union has made several changes in their system, as what has been learned from the first trading period. This is all done to show strong commitment of the Union member states to achieve its commitment toward the Kyoto Protocol to really tackle the climate change problems by reducing its GHGs emissions level.

---

[36] Point Carbon, 'Point Carbon Special Report: 2007 Carbon Market Review', January 2008. Taken from Tilford, Simon, 2008, 'How to Make EU Emissions Trading A Success', retrieved from http://www.cer.org.uk/pdf/p_769.pdf April 12, 2010

[37] Llewellyn, John, 2007, 'The Business of Climate Change: Challenges and Opportunities', Leman Brothers.

A.2.1 Implementation of the Second Phase (2007-2008)

European Environment Agency published a technical report in 2010 about the progress achieved by the Union through the Scheme. With better features of the system in the second phase, better cuts in the GHGs emissions within the Scheme can be seen done very effectively. From the first year of the Second Phase, 2008, the EU-15 has reduced its GHGs emissions up to 76 million tons of CO_2 equivalent or about 1.9% from the last year of the First Phase period, 2007. Moreover, the EU-15 has cut up to 274 million tons of CO_2 equivalent or about 6.5 % below the base year level, the 1990.[38]

The cut of the GHGs emissions was mainly done by some countries paying high attention to it environmental commitment, like Spain and Germany. The decrease of 60.5 million tons or about 6% of the GHGs emissions equivalent CO_2 was mainly from public electricity and heat production in 2007-2008. Spain has cut about 17 million tons of CO_2 equivalents for the strong decline in coal use for power generations. German also made good reduction of GHGs emission, about 19 million tons of CO_2 equivalents for the increasing use of

---

[38] EEA Technical Report No. 6/2010, Annual European Union GHGs Inventory 1990-2008 and Inventory Report 2010. Retrieved on June 21, 2011. Taken from http://www20.gencat.cat/docs/canviclimatic/Home/Politiques/Politiques%20europees/Les%20emissions%20de%20GEH%20a%20la%20UE/Summary%20EU%20GHG%20inventory%202010.pdf

nuclear electricity generations and the decreasing use of thermal power plants.[39]

With the cut up to 6.5% in 2008 in the first year of the Second Phase of EUETS, the Union is optimistic that it can afford better cuts in the incoming years to achieve its commitment toward the Protocol.

B. Implementation of Linking Directive

While the developed countries are trying to curb their GHGs emissions, the developing countries do not stop emitting GHGs emissions from the environmentally un-sound technologies they are using. Here is the list of top developing countries emitting GHGs emissions, which also means the list of countries with biggest CERs.

Having the same impacts on the climate change, the developing countries are less able to handle the possible problems and consequences. With its concern on the developing countries' ability to adapt with the changing of the earth's climate, the European Union aims at helping the developing countries through the Clean Development Mechanism and the Joint Implementation through the Linking Directive.

---

[39] ibid

Figure 4.6. Top Countries by Issued CERs

Unit: Million tons (MT)

Top countries by issued CERs	MCERs	Share
China	100.0	41.6%
India	54.1	22.5%
South Korea	35.5	14.8%
Brazil	28.4	11.8%
Mexico	5.0	1.9%
Vietnam	4.5	1.2%
Chile	2.9	1.2%
Egypt	2.4	1.0%

Source: UNEP Risoe Center, CDM pipeline statistic, 1 January 2009

From the abovementioned list, the European Union has invested some CDM projects in some biggest CERs producers, including China.

B.1 European Union - China

The growing of China's population since 1949 has accelerated the deforestation, desertification, soil erosion, water shortages and pollution. Based on the World Bank, in 2005, China's population is 1.305 million or 1.3 billion people. With its large population, some scientists believe that it may have exceeded the number that the country can hope to support at a good standard of living. The problem with large population does not end up to standard of living alone, but it also affects more problems like water shortages, forest loss, soil erosion and nutrient loss, desertification and salinization-alkalinization, and pollution and other environmental degradation problems.

More people to feed means more energy needed. It is stated in the Communication from the Commission to the Council and the European Parliament dated 15 May, 2001 that;

> China is the world's second largest consumer of energy and the third largest producer. The size of its energy sector renders the country's energy policy and its potential impact on the world scene a matter of great international importance particularly for air pollution and climate change.[40]

As China is a large state, it needs massive energy to fulfill its basic needs like electricity to be distributed to installations, factories, offices, public facilities, and houses. It is stated in the Communication that China is also the third-largest producer of energy. This is a good thing for China, as it indeed has to fulfill its needs.

During the past three decades, China's economy has grown rapidly. It can be seen from the percentage of GDP growth in the bar graph below.[41] According to the statistics, in 2007 China's GDP was 24.952.99 billion Yuan, approximately 2.496 billion Euros and its annual average growth rate was 9.8% during 1979-2007. Along with its economic rapid growth, China's energy consumption is also raising. It was 1.859 million tons in

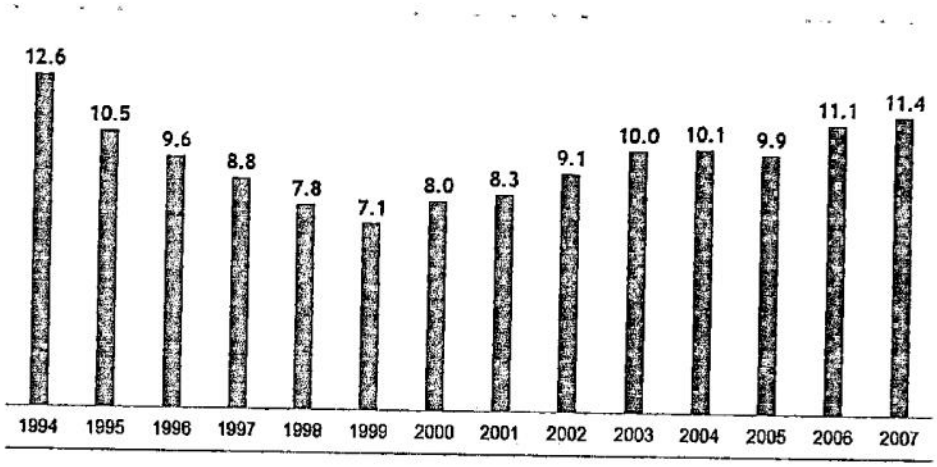
---

[40] *Communication From The Commission to the Council and the European Parliament, EU Strategy towards China: Implementation of the 1998 Communication and Future Steps for a more Effective EU Policy*

[41] Bar graph of China's GDP growth, taken from http://www.euroekonom.com/graphs-data.php?type=gdp-growth-china

2007, and annual average growth rate of 5.44% during 1979-2007.[42] A result of energy consumption is the GHGs emissions and air pollution caused by environmentally un-sound technology from the industrial activities, domestic heating and also vehicle emissions.

Figure 4.7 Gross Domestic Product (GDP) Growth – China (%)



Source: National Bureau of Statistics of China

Unfortunately, China's development is not sustainable. It is because China is not using sustainable development, for the environmentally un-sound technologies they are using in the process of their industry, the fuel they use in generating electricity, the export activities mainly to the west countries, and even in the house-hold levels of energy consumption. China is mainly using coal as its main fuels to generate energy, which of course produces more pollution. The use of coals in their energy productions

[42] Country Profile for Zhejiang Province of China, taken from http://setatwork.eu/downloads/SETatWork_China_Profile_0911.pdf retrieved on April 16, 2011

accounts for up to 69.5% of its total fuels used in 2007. Other fuels used by China are oil which comprised for 19.7%, natural gas for 3.5% and the rest that are hydro, nuclear and wind power which is only 7.3% of total fuels used in the year.[43] The table below shows that in the electricity sectors it can be seen that there is a wide gap of quantity used from the sources of energy China is using among thermal, hydro, nuclear, and the renewable sources.[44]

The use of environmentally un-sound technology and the non-renewable sources China is using make China's economic growth is unsustainable. In other words, China's economic growth is in line with the environmental degradation they are causing as they cause more and more pollutions in the process of their energy fulfillment.

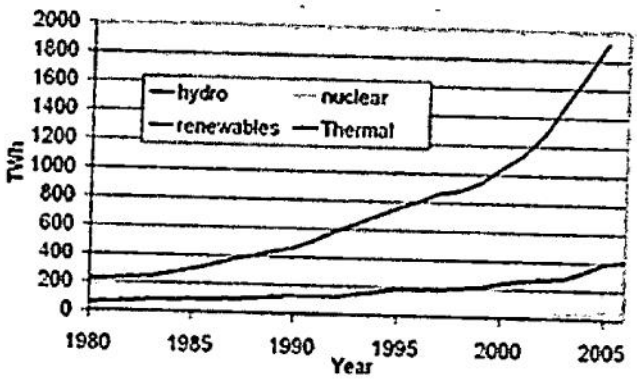
Listed as non-Annex country, or the developing country, China is a big emitter, while it emit massive amount of emissions it does not have the responsibility to cut the emissions level. Looking at China's economic development in recent years, China is now, or soon will be, the largest emitter of GHG globally. In 1990, China emitted 2.545 MMT (million metric tons) of CO_2 equivalents.

---

[43] ibid

[44] Energy Policy of the People's Republic of China, taken from http://en.wikipedia.org/wiki/Energy_policy_of_the_People's_Republic_of_China, retrieved on April 1, 2011

Figure 4.8. China's Electricity Production by Source



Source: CITL Reports

Also, in 2005 China emitted 5.843 MMT of CO_2 equivalents, which means there was an increase of 144%. While the GHGs emissions increased from 3.905 MMTCO2 to 7.527 MMT CO_2 at the same years, meaning 152% increased of GHGs emissions. This is in line with their GDP growth. It is reported that from 1992 to 2005, China's GDP grew at an average annual rate of 10.2% while the annual rate of energy growth was 5.6%, most of which is driven by increased consumption of electricity generated from coal.[45] The growth of China's GDP is partly because of the exports that China is doing to the west countries. This makes the emissions problems is partly the west countries' responsibilities, too.

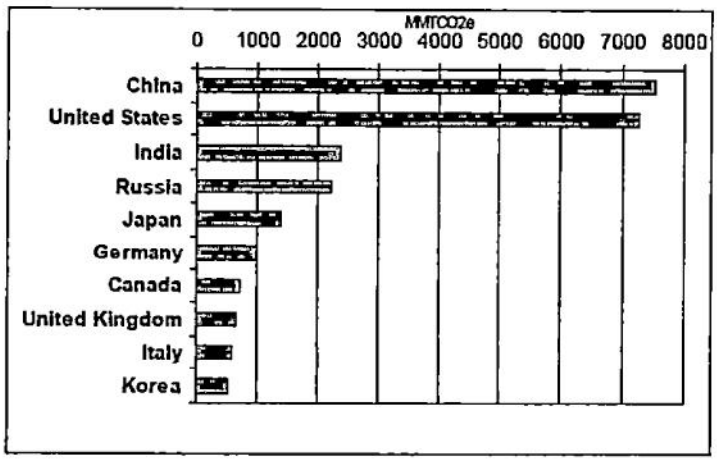
Fatih Birol, Chief Economist of the International Energy Agency, warns that if China does not begin curbing its current rate of GHG

[45] *ibid*

emissions within 25 years, China's output of CO_2 emissions could amount to twice the combined emissions of the world's richest nations - including the US, EU and Japan.[46]

The bar graph below shows that China in 2005 was the biggest emitters of GHGs, emit more than 7.000 MMT CO_2 equivalent just in a year, a bigger amount for a size of developing country's emission with so little of GDP which is 2.244 US$, if compared to GHGs emissions of thee United States, a developed countries which consists of fifty countries with bigger GDP of 12.398 US$. It is because China is still using environmentally un-sound technology which is not so efficient in

Figure 4.9 The World's Top GHGs Emitters in 2005[47]



Source: CRS graphic from IEA estimates (extracted January 8, 2008).

consuming the fuels and producing energy needed.

---

[46] *ibid*
[47] *ibid*

With this knowledge, the Union tries to take advantage of it. The Union needs to cut more GHGs emissions, and the Union can now take advantage of using Clean Development Mechanism projects to reduce GHGs emissions in China by helping it to apply environmentally-sound technologies, so it can reach the sustainable development and continue fulfilling its needs without generating massive GHGs emissions which can endanger people in the whole world for the climate change effects.

> The transfer of EU environmental knowledge, skills and technologies to China will become increasingly necessary if China is to achieve sustainable patters of production and consumption, energy balance and other key targets, to optimize future economic evolution. Input from the EU will assist China's pursuit of better environmental performance...[48]

The amount of China's GHGs emission is alarming and it is obviously dangerous if it continues with this condition. China would emit more GHGs emissions just because they are trying to fulfill their basic needs of electricity. The relationship between the EU and China in terms of 'interdependence on energy and climate security' is now developing. China needs environmentally sound technologies to generate its energy requirements in a right way, while the EU sees this as an opportunity to make cooperation. As the EU has what the China needs and China can give the EU opportunities to provide CERs for the EU to be exchanged with

---

[48] *Communication From The Commission to the Council and the European Parliament, EU Strategy towards China: Implementation of the 1998 Communication and Future Steps for a more Effective EU Policy*

their NAPs through CDM. That is why; the Union through CDM establishes projects to help China in this matter.

The goals of the EU and China's cooperation is first, to demonstrate, to develop and to advance near 'zero-emissions' coal technology. With cleaner technology in China's industry, China's development will become sustainable and produce less GHGs emissions. The second goal is to significantly reduce the cost of key technologies. Sometimes, investing sustainable projects abroad like in China take less cost than cutting emissions at home.

B.2 Possible Projects of CDM in China

China is the world's largest developing country and is also the largest host to CDM projects because of the level of its GHGs emissions. The volume of CDM projects in China by the end of October 2008 has increased rapidly. Chinese government had already approved 1.595 CDM projects. 286 or about 24% of them had been successfully registered with the EB or the Executive Board of Kyoto Protocol. Since 2007, European Union has been the biggest buyers of CERs in Chinese CDM market.

The CDM projects to address China's problems are classified into three possible projects, they are; 1). Converting the use of non-renewable source to generate energy; 2). Implementing the energy efficiency of the energy use; 3). Transferring of technology.

1. New and Renewable Energy Projects

As China's main source of generating energy was mainly the coal which brings bad effects to the atmosphere because of sulfur dioxide (SO_2) and the nitrogen oxides (NOx) emitted from the burning of coals, the possible projects in the Clean Development Mechanism projects is the new and renewable energy projects. This is hoped will reduce the use of coals and will reduce the level of China's GHGs emissions. The renewable source of generating energy can be derived from; a) Hydropower; b). Biogas; c). Natural gas-fueled power generation and wind power generation; d). Biomass energy development projects.

1. Energy efficiency projects

Energy efficiency projects are needed by China; because China's industrial sectors are mainly poor in efficiency. There are three sectors in which the energy efficiency projects can be done;

a. Industrial sector

The energy consumption in the industrial sectors in many areas in China like Zhejiang are largely consumed by heat consuming industries like metallurgy, chemical industry, paper industry, textile industry and chemical fiber industry, which all together comprised for 50% of energy consumption, which mainly are using coal. The possible projects for energy efficiency in industrial sectors is aimed to improve energy

efficiency of industrial installations such as boilers and kilns, pumps, renovate industrial process and improve heat insulation and transmission, are key to industrial energy saving in Zhejiang.

b. Building sector

Building energy consumption takes 30% of total energy consumption used for the cooling and heating purposes of China's houses due to the hot-summer and cold-winter condition forced to generate more electricity for the air conditioners. The possible projects for energy efficiency in building sectors is aimed to build energy saving design, utilize renewable energy technologies in buildings, and energy renovation of heating, ventilation and air conditioning system.

c. Transportation sector

The transportation energy consumes 20% of total energy consumption in China, especially in Zhejiang. Zhejiang has huge petroleum consumption, as the fuel consumption for 100km ride is almost 20% higher than that in developed countries due to poor maintenance of vehicles. Therefore, the possible projects for energy efficiency in transportation sectors are the alteration of diesel vehicles instead of

petroleum, promoting hybrid cars, and applying strict maintenance system.[49]

2. Technology transfer

Beside the Renewable Energy Projects and the Energy Efficiency Projects, the Technology Transfer is also included to the Clean Development Mechanism in China. IPCC defines technology transfer as;

> "Technology transfer [...] as the broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, non-governmental organizations (NGOs) and research/education institutions. The broad and inclusive term "transfer" encompasses diffusion of technologies and technology cooperation across and within countries. It comprises the process of learning to understand, utilize and replicate the technology, including the capacity to choose it and adapt it to local conditions."[50]

To understand deeper about the technology transfer, here are the elements that have to be exists in a project; A). 'Foreign origin and degree of novelty', this means that the project has to bring new technology that has never been used in the certain developing country (China, in this case) originated from the developed countries. So there will be enrichment of technology used in the developing countries; B). 'Capacity building', the technology transfer is not only about the physical equipments and

---

[49] Country Profile for Zhejiang Province of China, taken from SETatWork, http://setatwork.eu/downloads/SETatWork_China_Profile_0911.pdf, retrieved on April 16, 2011

[50] EU-China CDM Facilitation Project: Technology Transfer in CDM Projects in China. taken from http://www.euchina-cdm.org/media/docs/EU-China%20CDM%201st%20Policy%20Study%20Tour%20Report.pdf retrieved on March 25th, 2011

technology, but it is also has to cover the spreading of related knowledge about how to improve the developing countries' ability to manufacture, to operate, to maintain and also to master the new technologies; C). 'Performance improvement', the outcome of the technology transfer is not the new technology itself. It is hoped that through the technology transfer of new technology and the knowledge on how to use it, the developing countries' performance on manufacturing will develop, not only to produce more products faster but also, most importantly, to improve the environment performance, that is, to do manufacturing process without harming the environment with more GHGs emissions.

B.3 EU-China CDM Projects in China

It is estimated that industry accounts for over 80% of China's total waste gas emissions. This can be dated back from the 1980s where China's industry began to be rapidly developed. The development of China's industry encouraged bigger use of coal as China's main resources of energy to generate electricity. Over 76% of China's energy was produced by burning coals. Less than 20% of the coal undergoes washing to remove particle impurities, and most coal is burned in small to medium-sized furnaces with poor efficiency.

The use of non-renewable energy like coal can be dangerous as the burning of coals emit sulfur dioxide (SO_2) and nitrogen oxides (NOx).

China is the third-largest emitter of sulfur dioxide (SO_2) in the world after the former Soviet republics and the US. These gases emitted from the burning of coals used in the industrial sectors in China made China as one of few areas in the developing countries with a major acid pollution problem.[51]

From varying projects conducted in China shown in table below, the EU mainly is involved in the projects of renewable energy sectors which intended to shift the use of coals and other non-renewable energy resources that emit GHGs emissions to the renewable energy resources to generate electricity.

B.3.1 Renewable Energy Projects - Hydro-Power Station Projects

China has great hydro-power resources and great potential for the development of hydro-power-based on CDM projects. Currently, there is about 32% of these resources have been developed and the remaining 68% which are equivalent to 860 million KW hydro-power resources are a good projects for CDM. If 10% of these 860 million KW hydro-power resources are successfully developed, there will be a reduction of 28 million tons of CO_2 emissions achieved annually.

UNEP Riso Centre states that there are 2.091 CDM projects in China which fulfils an annual emission reduction of 396 million tons.

---

[51] Gamer, E Robert (ed), Understanding Contemporary China, Adelaide, Grawfrd House Publishing, 2000

Among these, there are 998 hydro-power projects representing an annual emission reduction of 112 million tons. Some undergoing projects are:

B.3.1.1 Hunan Xiaoxi Hydro-Power Station

Xiaoxi hydro-power station is located in Xinshao County, beside the second largest river of Hunan Province, Zishui River. The overall investment of this projects amounts to 1.09 billion Renminbi. After the station is put into formal operation, the installed capacity will reach 100k KW, with the annual power generation capacity to 448k KW/hour, and annual sales turnover about 150 million RMB.

It, estimated will replace fossil fuel power plants and will achieve an annual GHGs emission reduction up to 432.339k tons of CO_2 equivalent. The NDRC approved the PDD of this project on July 2nd, 2007 and was successfully registered at the EB on December 19th, 2008. The CER buyer is the German RWE Company.

Figure 4.10 CDM Projects in China

Type	Industrial Nature	Case Name	EB Reg. ID/Ref.	EB Reg. Time
Energy Conservation and Energy Efficiency Improvement	Cement Heat Utilisation	Anhui Conch Ningguo Cement Factory	CDM1086/898	May. 4th, 2007
	Steel Heat Utilisation	Hebei Handan Steel Group CCPP Power Generation Project	CDM1547/1262	Oct. 10, 2007
		Complementary coke dry quenching power generation for No.9 & No.10 coke oven in Wuhan Iron and Steel Corporation	CDM2346/1695	Apr. 20, 2009
	Ultra-supercritical Power Generation	Jiangsu Guodian Taizhou USC Power Generation	CDM4488/NA	Not registered, under review
Renewable energy	Hydro power	Yunnan Hei'er	CDM1068/1102	Jul. 15, 2007
		Hunan Xiaoxi	CDM1765/1749	Dec. 19, 2008
	Wind power	Dongshan wind power project in Chifeng, Inner Mongolia	CDM0696/689	Dec. 31, 2006
		Jiangsu Rudong Dongling Wind Power Project	CDM0908/833	Apr. 8, 2007
	Biomass power	Hebei Jinzhou Straw Power Generation Project	CDM1001/778	May. 4th, 2007
Fuel Substitute	Natural Gas	Beijing No.3 Thermal Power Plant NGCC	CDM2257/1373	Feb. 15, 2008
Methane Recycle and Use	Coal Bed Methane Recovery	Shanxi Yangquan Coal Group	CDM1347/892	May. 22, 2007
	Landfill gas power	Nanjing Tianjingwa Landfill gas power Project	CDM0128/71	Dec. 18, 2005
Non-CO2	HFC23 Decomposition	Jiangsu Changshu San'aifu Group	CDM0472/306	Aug. 8, 2006
	N_2O Decomposition	Shanxi Tianji Chemical Group	CDM1788/1436	Mar. 10, 2008

B.3.1.2 Yunan Heier Hydro-Power Station Project

The hydro-power station is located in the convergence of the Heier River and Nanpan River within Yunan Province. The planned annual power generation volume is 124,075MWh. It was registered at the EB on July 15, 2007. The CER buyer is a Dutch company, Global Energy System. This project is expected to achieve an annual GHGs emission reduction of 82.663 ton of CO_2 equivalent.

With the hydro-power, there is no fossil fuel needed so there will be no GHGs emission exhausted. If it is compared with the coal-powered power stations to supply the same amount of electrical power, the operation of the hydro-power station will reduce the pollution of SO2 and NOx produced by the ones with the coal-powered power stations. Yunan reduced GHGs emissions up to 82.663 ton of CO_2 equivalent/year. Hunan reduced 432.395k ton CO_2 equivalent.

Small-sized hydro-power CDM products could fulfill the objective of pollution reduction and create sound emission-reduction effects. Hydro-power CDM projects is renewable energy projects. It uses no fossil fuels and achieves emission-reductions in SO2, NOx, CO2, CH4 and other pollutants.

B.3.2 Renewable Energy Projects - Wind Power Project

Wind power is a type of clean renewable energy that makes positive contribution to China's sustainable development. Compared to fossil-power generation, wind power generation produces no pollution and consumes no water resources. Therefore, wind power has great potential to reduce the GHGs emissions.

China is rich in wind power resources; it is estimated that China's wind power resources could amount to 1 billion KW. With the Great

North China which covers the Northeast, the North and the Northwest of China's area's wind power density ranges from 200 W/square meter to 300 W/square meter, the state will build up large-sized and ultra-large-sized wind power farms. Other area of China is the coastal and island areas are also rich of wind power reserves.

Given these geographical conditions, China's wind power industry has developed rapidly. The total number of CDM projects has multiplied quickly. In June 2009, there were 127 wind power projects out of 579 Chinese CDM projects that are registered at the EB. These wind power results 14.579 million tons of annual emissions reduction.

B.3.2.1 Dongling Wind Power Project

Dongling wind power project is one of many China's wind power generators located in Rudong County, Eastern China, facing the Yellow Sea. There are 67 units of 1.5MW wind turbines with capacity of 100.5MW. The Annual power generation volume is expected to reach 228.44GWh and to reduce 199k ton of CO_2 equivalent. The CER buyer of this project is Kommunalkredit Public Consulting GmbH, the biggest Austrian consulting company and represents Austrian ministries of agriculture, forestry and environment protection and water conservation to conduct carbon reduction transactions. The accumulated issued volume is 131.769 ton of CO_2 equivalent.

B.3.3 Renewable Energy Projects - Biomass Energy Power

China is a large agricultural country that is very rich in biomass resources. Not only it is more economical, using biomass to generate electricity is also reliable and high in power quality. There are more than 600 million tons of straw produced by variety of crops each year, and about 400 million tons of them can be used as resource of energy.

In June 2009, there were 12 biomass power generation, accounting for about 2.1% of total 579 projects registered at the EB. The annual reduction is 36.900 million tons of CO_2 equivalents.

B.3.3.1 Jinzhou Straw Power CDM Project

The main fuel materials of the project are corn, cotton stalks and fruit branches. The project uses about 20 million tons of straw which replace about 100 thousand tons of coal and reduce about 183.009 tons of GHGs emissions each year. This project was approved by DNA in 7 November 2006, registered at the EB in March 4th, 2007. The first CER of 1.8 tons was issued on January 2009 and the buyers are NATIXIS and the European Carbon Fund.