Technology Transfer And Global Climate Change Recommendations for the Future At Chulalongkorn University's Energy Research Institute

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Abstract

Global Climate change is a problem that confronts the entire world. Chulalongkorn University's Energy Research Institute (ERI) is at the forefront of clean energy technologies in Thailand. To help the ERI position itself for the future we assessed the current climate for technology transfer related to climate change. Through document review, attending a regional conference on global climate change, and interviewing professionals in the field of global climate change we assessed the current climate. Recommendations were made to allow the ERI to take advantage of the current situation of technology transfer and global climate change.

Executive Summary

Global warming is an issue that, if not confronted properly, could yield devastating effects on Earth. These devastating effects will be felt around the world, including in Thailand. With potential dangers such as global climate change and rising sea levels, Thailand could suffer both economical and ecological damages. Fortunately, the United Nations officially recognized the problem in 1992 when the United Nations Framework Convention on Climate Change was adopted. Despite opposing views and debates, a proposed solution was developed in 1997 when the third Conference of Parties (COP3), the working arm of the UNFCCC, developed the Kyoto Protocol (KP). The Kyoto Protocol is a legally binding document, which will force industrialized countries in agreement to achieve target goals by the deadline of 2012. With the flexibility mechanisms within the protocol, nations are able to achieve these goals in a more cost effective manner. Perhaps the most notable mechanism is the Clean Development Mechanism (CDM), which is flexibility mechanism under Article 12 of the Kyoto Protocol. Clean development mechanism allows a developed and developing nation to work together to both provide sustainable development and help achieve the Kyoto Protocol Targets. However, Thailand is not the only developing nation with whom a developed nation could collaborate on a CDM project. More specifically we set our goal to be an assessment of the current climate for technology transfer relevant to climate change and make recommendations based this analysis to Chulalongkorn University's Energy Research Institute (ERI).

In order to achieve our goal we needed to accomplish three primary objectives. The first objective was to become familiar with the current situation of technology

transfer with regards to the environmental and economic aspects of climate change. Our primary sources of data gathering for this objective consisted of a current situation document review and attending a regional conference on climate change, which allowed us to gather a plethora of viewpoints on the issue of technology transfer related to climate change. From the information gathered there, we moved on to our second objective, which was to conduct an analysis to identify preliminary themes based on what we received from the conference. This allowed us to move onto our third objective, which was to conduct interviews with individuals who are in this field of research, to prove, or maybe even disprove our themes that were previously developed.

To ensure our findings would be relevant we sought out individuals who are known authorities in the field of global climate change. We interviewed members of the United Nations Development Program (UNDP) in Bangkok, the Embassy of the United State of America in Bangkok, UNOCAL, the Thai government, the New Energy and Industrial Technology Development Organization of Japan (NEDO), the Institute for Global Environmental Strategy (IGES), and private sector consultants. These varied opinions and perspectives allowed us to obtain a unique view of the current situation of technology transfer activities associated with global climate change.

In carrying out our methodology five main themes came to light. The first theme identifies the necessity of private sector involvement in climate change projects in developing countries, in order to insure the transfer of technology and stability of funding. The second theme affirms that the energy sector has the most potential for emissions reductions and thus for managing climate change. The third theme illustrates the effectiveness of efficient energy technology compared to renewable energy

technology projects in CDM situations led by the private sector. The fourth theme reaffirms the numerous barriers poised against the current suggested climate change related technology transfer under CDM. The final theme suggests the eventual solution to climate change that involves technology cooperation will by based on the same three principals as CDM, emissions trading through CERs, technology transfer, and sustainable development.

In completing our goal we were able to develop five recommendations to Chulalongkorn's Energy Research Institute to address our five conclusions. The first recommendation observes the likely hood of CDM-like opportunities in the future and suggests the continuation efforts at ERI related to CDM issues that may contribute to the future solution of climate change. Due to our finding of the energy sector's importance to CDM-like activities, we applaud the ERI's current mandate and urge them in their efforts as they are crucial to the reduction of global climate change. Our third recommendation suggests an investigation on partnerships between the foreign private sector and the local private sector to work on the projects facilitated by the ERI. Based on our results of the efficient energy projects are more commercially viable than the renewable energy projects, however an organization such as ERI could be of great service to the community by implementing small scale of renewable energy projects, especially in the rural areas of Thailand. Recognizing the barriers that CDM may be facing, our fifth recommendation suggests ERI to promote public education on climate change issues to combat the problem of the lack of public awareness. Additionally, it is essential for Thai CDM-like opportunities to take place for there to be a centralized, clear and complete source for information on conducting CDM-like activities in Thailand and a

central academic coordination organization for climate change projects; this could become a subset of the ERI's mandate, or be spin off into a separate organization.

As this topic is so vast, these recommendations, especially our final recommendation, requires further investigation to determine specifics and the associated costs if implemented. The specifics surrounding a number of our recommendations need to be investigated to obtain the best benefits possible. The soon to be released report by the Thai Ministry of Science, Technology, and the Environment will provide a large amount of information about Thailand and CDM for the interested reader.

All steps that are eventually taken by the ERI should bear in mind the issues related to global climate change. ERI can make large contributions to Thailand's battle against global climate change. With a little hope, faith, and love the problem of global climate change can be mitigated.

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Table of Contents

Authorship

We, the members of this project team feel that we all put an equal time and effort into the completion of this project.

Abstract	Joseph O'Boyle
Executive Summary	Joseph O'Boyle
Introduction Chapter	Jarred Gallagher Joseph O'Boyle
Literature Review Chapter	Kasemtas Dardarananda Jarred Gallagher Joseph O'Boyle Jia Yu Zhao
Methodology Chapter	Jarred Gallagher Joseph O'Boyle Jia Yu Zhao
Results and Analysis Chapter	Kasemtas Dardarananda Joseph O'Boyle Jia Yu Zhao
Conclusions and Recommendations Chapter	Kasemtas Dardarananda Jarred Gallagher Joseph O'Boyle Jia Yu Zhao

1. Introduction

The threat of global warming and the resulting global climate change is plaguing the entire international community. There is evidence that the rise in average global temperature could be as high as 1.0 – 5.8 degrees Celsius by the year 2100 (IPCC 2001). If the average temperature rises, the polar ice caps will melt, causing sea levels to rise 15 – 95 centimeters and weather patterns to fluctuate to great extremes (Cutajar 10).

Thailand is a nation that is at great risk if all these potential disasters become a reality. Bangkok, Thailand's capitol city, is a metropolitan area that is located directly on the gulf of Thailand. If sea levels do rise, Bangkok would possibly become uninhabitable due to major coastal flooding. In addition to the flooding, deforestation is a large problem. Forests, also known as 'sinks', absorb carbon dioxide (CO_2), reducing the amount of excess CO_2 released into the atmosphere (Kerr, private conversation).

While Thailand may become a victim of global warming, it is also necessary to note that it is a contributor of greenhouse gas (GHG) emissions, a primary cause of global warming. GHGs, most notably carbon dioxide (CO_2), are emitted in the atmosphere primarily through power generation plants, which causes a lot of pollution. Unfortunately, Thailand does not have the resources to lower their GHG emissions without harmful economic effects. (Cutajar 10)

As a reaction to these conditions and possible threats, the United Nations Framework Convention on Climate Change (UNFCCC) was developed by the United Nations in 1992 to create ideas and facilitate actions to help alleviate the problem of global warming. Perhaps the most notable accomplishment of the UNFCCC was in 1997 when the Kyoto Protocol was developed. The Kyoto Protocol is a legally binding

agreement, which has yet to be put into legal force, between participating nations to lower their CO_2 emissions levels. To add flexibility to the participating nations, the Kyoto Protocol includes three mechanisms to help them reach their goals in a more cost-effective manner. The Clean Development Mechanism (CDM) is one such mechanism. CDM promotes developed nations to invest money in technology transfer projects, which transfer more advanced and environmentally friendly technologies while also providing sustainable development for developing nations. (UNFCCC http://www.unfccc.de)

Thailand is currently making efforts to address both technology transfer and helping to solve the global warming issue. While there is technically no clean development mechanism yet, due to the fact that the Kyoto Protocol is still in the process of being ratified, Thailand is conducting CDM feasibility projects. The New Energy and Industrial Technology Development Organization (NEDO) of Japan is currently conducting projects with Thailand in order to test the effectiveness for both developed and developing countries. (NEDO http://www.nedo.go.jp)

Chulalongkorn University's Energy Research Institute (ERI) is an institution that is also helping the fight against global warming. The ERI conducts research, organizes seminars and provides consulting services to all parties (government, academic, and industry) interested in energy matters. The ERI has also been concerned with issues of sustainable energy development since 1998. Since then, conferences on climate change have been hosted by the ERI in 1999 and 2000. However, there are many possible steps that the ERI can take to better promote technology transfer and sustainable development. (Energy Research Institute n.pag.)

The goal of our project was to assess the current climate of technology transfer related to CDM opportunities in Thailand and make recommendations to Chulalongkorn University's Energy Research Institute, helping the ERI to address global climate change. We accomplished our goal by gathering various views from members of different organizations related to global warming and CDM opportunities at a regional workshop in Bangkok. We developed general themes from the views of the workshop participants. Interviews were conducted with various representatives of both public and private sectors to gain more insight towards our themes. Once our themes were solidified, recommendations were made to the Energy Research Institute of ways it can better promote a more efficient means of technology transfer.

2. Literature Review

Global warming and the resulting global climate change is an issue that, if not confronted properly, could yield devastating effects. With potential dangers such as climate change and rising sea levels, Thailand could suffer both economical and ecological damages. Fortunately, the United Nations officially recognized the problem in 1992 when the United Nations Framework Convention on Climate Change was adopted. Despite opposing views and debates, a proposed solution was developed in 1997 when the third Conference of Parties (COP), the working arm of the UNFCCC, developed the Kyoto Protocol. The Kyoto Protocol is a legally binding document, which will force countries in agreement to achieve target goals by the deadline of 2012. With the flexibility mechanisms within the protocol, nations are able to achieve these goals in a more cost-effective manner. In Thailand's case, perhaps the most notable mechanism is the Clean Development Mechanism, or CDM. CDM provide a framework and incentive for developed and developing nations to work together to both provides sustainable development and helps achieve Kyoto Protocol Targets. However, Thailand must compete with many other developing nations for CDM projects sponsored by developed nations.

2.1 Global Warming

Global warming is an issue that can cause catastrophic effects if it is not recognized and confronted immediately. In order to successfully reduce and control this issue, global warming must be understood, in terms of how it is caused and what could happen if not prevented. It is also important to know about greenhouse gasses, the

primary cause of global warming, in terms of how they are produced and how they can be lowered. According to Intergovernmental Panel on Climate Change, by giving scenarios of possible outcomes, that if global warming continues at its current rate, problems such as the polar ice caps melting and other new disasters are a possibility.

2.1.1 Causes and Current Effects of Global Warming

To better understand the real issue concerning global warming, it is necessary to understand what exactly GHGs are and where they come from. It is through this way that major steps can be taken towards GHG reduction. The greenhouse gases are carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), and chlorofluorocarbons (CFC). Carbon dioxide (CO_2) is the primary greenhouse gas, as it is responsible for half the warmth of the Earth. Around the time period of 1850, the CO_2 levels in the atmosphere increased because of the burning of lumber, coal and natural gas. Despite the fact that plants and trees took a portion of the CO_2 in, most of it was released into the atmosphere, trapping heat that it absorbed (Abrahamson 213). Observations starting in 1958 have shown that the increase of CO_2 in the atmosphere is growing tremendously. However, these observations unfortunately are nearly impossible to confirm, due to the complexity of the earth.

The CO_2 concentration rose quickly in the atmosphere due to the change of human lifestyle and the agricultural modernization over the past 100 years. Beginning in the 1900s, human lifestyle began to modernize and the demand of energy usage increased tremendously. In addition to the agricultural modernization, the concentration of CO_2 in the atmosphere grew rapidly. The gas was 315 PPM by volume when American scientist

Keeling began his observations of CO_2 in 1958. Between 1958-1986 the atmospheric concentration of CO_2 had increased by 9.5% (Kneese n.pag.).

As the population of the world grew larger, people burned forestland to make room for farming and housing. Unfortunately, they did not realize that the mass burning would cause a great deal of CO_2 emissions as well. The deforestation caused approximately one to three billion tons of CO_2 emissions per year. Animal farms and coal create CH_4, which will get release into the atmosphere. Also traffic, transportation, and industrial sectors release CO_2, N_2O, and other GHGs in to the atmosphere (Abrahamson 102).

Carbon Dioxide content of the atmosphere is determined by the equilibrium established with the oceans, meaning that they are to both holds an equal amount of CO_2. However, the ocean takes in the CO_2 a lot slower than the atmosphere does. With the rate that CO_2 is being released now, the ocean cannot catch up to the atmosphere to achieve that equilibrium. (Abrahamson 102)

2.1.2 Predicted Consequences of Continued Global Warming

Gases trapped inside the atmosphere cause global warming, a trend of raising global temperatures. If something is not done about this, it will cause the icecaps to melt and the sea levels to increase. During the time before the industrial age, the temperature of the earth was very consistent. However, since temperature data started being recorded the average temperature of the world has already increased by 0.7 degrees Celsius. While this does not seem like a great increase of temperature now, there are many things that will happen if we do not do anything about it and let the temperatures rise some more (Abrahamson 102).

The earth's temperature depends on the balance of incoming, short wavelength radiation of the hot sun and the outgoing radiation of much cooler earth. If the atmosphere were stripped away, the normal earth's temperature would be approximately 3.5 degrees Celsius cooler than it is now. The reason for this is because the atmosphere is used as a 'blanket' for the atmosphere. (Kneese n.pag.) Water vapor, CO_2, and O_3 are the most important elements of the atmosphere that cause the warming though out the world.

Scientists are currently developing theories of what could happen in the future if the world does not react and confront the growing global warming issue. Scientists can only predict consequences of greenhouse buildup. It is comparable to how medical researchers deal with cancer; it is very hard to predict when it will strike. The same thing applies to greenhouse buildup. The understanding of the operation of the joint hydrosphere, atmosphere, biosphere, and cryosphere systems is as complicated as the understanding of cancerous cells. Therefore, the range of possibility outcome for greenhouse effect is rather large. From educated guesses by experimentation, the records illustrate that Earth's climate does not respond in a smooth and gradual way to increase in Green House gases. There are sharp jumps in the response, which seem to involve large-scale reorganization of the Earth's systems. (UNFCCC http://www.unfccc.int/)

Despite the fact that science cannot accurately predict the earth's responses to global warming, there are evidences of the changing of climate. Each year there is about a foot of ice forming from snowfall in the ice cap environment, which is recorded from the ratio of isotopically heavy to light water in the ice. It is a way to measure the air temperature in the environment. Besides these records, measurements of dustiness in the

air and measurement of the ice cap atmosphere's greenhouse capacity are also taken. All of these records show that climate change is happening frequently and in great leaps (Kneese n.pag.).

There are many possible negative effects that may happen in the future if we do not reduce the levels of the greenhouse gasses. The sea level may rise and cause the floods in low land level countries. Agriculture could get destroyed due to the heat from the sun, because plants cannot survive in the strong heat. The rainy season may get pushed back and summer may extended longer. However, along with all the possible effects just mentioned, another big problem is the decline of ocean ecosystems, which will lead to a global economic problem.

Global warming is affecting the oceans in many ways. A scientific proof in the past three decades shows that the world has begun to get warmer because of the build up of emissions of greenhouse gasses. As the temperature rises, the ocean water gets warmer every year, which disturbs the marine ecosystems by melting the ice on the both poles. It provides excess freshwater in the oceans, which dilutes the concentration of salt. This large amount of freshwater will shutdown the deepwater format in the Labrador Sea where the global thermohaline circulation is taking place. (Heat http://www.worldwildlife.org/)

The thermohaline circulation is an ocean circulation, which is driven by the differences in the dense of seawater. These differences control by the seawater's temperature (thermal) and salinity (haline) properties. A few studies have been done in the University of Bern about the circulation, which is believed to be reducing and will

shutdown completely in the next 140 years. (Draft Fact-sheet Thermohaline Circulation http://www.climate.unibe.ch/)

Labrador Sea has two major functions in this circulation. It recycles the oxygenated surface water by bringing it down to the deep ocean and brings up the nutritious seawater to the surface. Another function is redistributing heat from the equators towards the poles. If the two functions of the Labrador Sea decline, food chain of the marine ecosystems will be unbalanced. When the warm surface layer in the ocean gets thicker, the wind from the deep ocean floor is harder to break through and creates a difficulty in providing the nutrients that are needed for phytoplankton, which is having photosynthesis on the surface. Since phytoplankton is the food basis of all sea organisms, it will lead to an overall reduction in fisheries around the world. Global warming may lead to an economical crisis. With the potential loss in fishery product industry, it is quite clear that this is a problem that must be dealt with now. (Heat http://www.worldwildlife.org/)

2.2 The Possible Impacts of Global Warming on Thailand

Global warming has been threatening many places around the world, however, since our project concerns mainly Thailand, we will be discussing some possible effects that global warming may bring to the country. These possible impacts can be categorize into three kinds: possible ecological and agricultural changes resulting from the change of local climate, outcomes from the rise of ocean water, and possible diseases caused by the increase of temperature. These impacts will bring economic and health problems to

Thailand. With regard to these impacts, the Thai government tried to reduce the amount of GHG emission produced by the industries in the country.

The climate change in Thailand brings some possible ecological and agricultural changes. According to a Thailand Environment Institute (TEI) report on GHG emissions, the rain forests in the country will eventually turn into deciduous forests. The country's economy has been mostly based on its agricultural products, such as rice and pineapple. If its major export crops and fruits are no longer being produced, there will be a loss in its national income. (Climate Changes http://www.bkkpost.samart.co.th)

The rise of ocean water will affect Thailand in many aspects, such as flooding, loss of fishery, and loss of coastal lands. By the year of 2100, sea level is predicted to increase 15 to 90 cm above the current level; indeed, Bangkok is only approximately 1 meter above the current sea level, which means it will face a danger of constant flooding. Other areas in Thailand will also be having the threat of flooding because of the limited number of dike systems to drain the great amount of water (Study on Global Climate Change Impacts on Coastal Resources in the Gulf of Thailand). One of the consequences of global warming (as mentioned in section 2.1.2) is the direct impact on the fishery production. When the ocean circulation shuts down, there will be a great reduction in the fishery production. Since Thailand's economy is partially based on its marine products, the upset in the marine ecosystems will hurt its national income (Heat http://www.worldwildlife.org/). The excess of ocean water will also be leading to inundation of the brackish culture ponds, coastline erosion, shrinking in width of beaches, decrease in mangrove forest areas, and higher risk of damage from storm surges. These disasters will significantly impact the west side of the upper gulf of Thailand, especially

to coastline between Petchburi River Mouth and Mae Klong River Mouth where the brackish culture farms are located (Study on Global Climate Change Impacts on Coastal Resources in the Gulf of Thailand).

Thailand will also be facing spreading diseases because of the great heat. According to the global research done on infectious disease, diseases will spread faster in hotter climates (Synergism http://www.shpm.com/). Mosquitoes play an important role in the spreading of many diseases. Mosquitoes favor heat. As the heat gets higher, they will reproduce themselves at a faster rate. They can infect among people by carrying some blood from an infected person and inject the blood into another one when they are having their meals. The number of infected population multiplies through mosquitoes that deliver diseases included malaria, dengue fever, yellow fever, and several kinds of encephalitis. The high temperature will raise the chances of contacting other diseases within the Southeast Asia area (Health http://www.sciam.com/). Besides the infectious diseases, global warming can also indirectly increase the incidence of skin cancer. As the ozone layer is being reduced by the growth of the carbon dioxide level, it cannot filter the ultraviolet radiation, which harms human health (Effects of Global warming http://home1.pacific.net.sg/).

As an industrialized country, Thailand produced a fair amount of greenhouse gases every year even the Thai government had put efforts in the mitigation plans. Comparing the GHG inventory of the year of 1990 and 1994, an increase of emission is obvious (Thailand's Country Study on Climate Change 1990, & Thailand's National Greenhouse Gas Inventory 1994). Since the Thai government had recognized the climate change problem, actions were taken in effort to reduce CO_2 emissions. Mitigation plans

are promoted on the energy production sector such as using renewable energy, especially burning biomass, which produces fewer CO_2 emissions than using fossil fuel. However, these mitigation projects need financial support and new advanced technologies. Since the Asian economic crisis (1997-98), Thailand is in a condition of lacking financial support in the mitigation projects. Financing these projects may not be possible for depending on the government alone.

2.3 International Response to Global Warming

On May 9, 1992, the international community officially recognized the global warming threat when the United Nations put into effect the United Nations Framework Convention on Climate Change (UNFCCC). According to the guidelines of the United Nations, the UNFCCC will come into legal force ninety days after it has received its fiftieth ratification, meaning it must be ratified internally by fifty nations, this was achieved on March 21, 1994 (UNFCCC). The Conference of Parties is a conference held approximately every year of the UNFCCC, attended by delegates from participating nations, which finds possible solutions to combat the global warming threat. The most notable of which was the third, bringing to us the Kyoto Protocol.

2.3.1 The UNFCCC's Conference of Parties

The UNFCCC's conference of parties is where all decisions are made regarding the climate change issue. It is comprised of many different representatives and officials from different governments to discuss actions that should be taken in order to combat Global Warming. A different Conference of Parties is held approximately once a year and is hosted in a different area each time, for a total of six COPs all together.

The first COP took place in 1995 in Berlin, Germany, where the Berlin Mandate, an agreement to negotiate stronger commitments for GHG emissions reductions between developed nations (known by the UNFCCC as Annex-I nations), was adopted. (Morlot, 12) This became the first official working step where countries were going to make a serious attempt at lowering their GHG emissions.

A few items of worthy note happened at the second COP, namely the intensification of negotiations of the implementation of the Berlin Mandate. The Ad Hoc Group on the Berlin Mandate (AGBM), the people who are working on the technical analysis of the Berlin Mandate has met four times in between the first and second meetings of the COP. The main focus of their work was to move the Berlin Mandate to even stronger negotiations. Also introduced were talks of technology transfer. Technology transfer is essentially the idea of sharing or giving technologies from one nation to another who may not have it, with regard to climate change. As stated in Article 4.5 in the UNFCCC, both Annex-I and Non-Annex I countries must 'promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other parties, particularly developing country Parties, to enable them to implement the provisions of the Convention'. COP II set this task into motion by urging the secretariat of the UNFCCC to do the following things: (1) Enhance the progress reports of the transfer of technologies so that further improvements could be made easier; (2) To give higher priority to the completion of a survey to determine the technological needs of non Annex-I nations; (3) Organize a roundtable discussion on the transfer of technologies in conjunction with the third COP.

The third COP developed the Kyoto Protocol, which makes it arguably the most well known. The Kyoto Protocol is and agreement by members of both Annex-I and Non Annex-I nations that legally binds them to meet target deadlines and objective with regards to CO_2 emissions. One of the primary goals of the Protocol is to bring CO_2 emissions to 5% lower than their level in 1990, by the timeframe of 2008 – 2012. More of the mechanics of the Kyoto Protocol will be discussed later in this section.

The fourth COP took place in 1998, in Buenos Aires, Argentina. The Buenos Aires Plan of Action was adopted at this convention. This plan was to develop a work plan to reach an agreement of operational details of the Kyoto Protocol and to strengthen the implementation of the UNFCCC itself (Earth Negotiations Bulletin Vol. 12 #163). The critical deadline where all things were to be worked out and agreed upon by all parties was to be at COP VI.

To further discuss the technicalities related to the Kyoto Protocol, the fifth COP took place in Bonn, Germany. This conference had the hope where all parties involved could come to an agreement on a solution of how the Kyoto Protocol should be worked out in terms of technical aspects. Tentative agreements were made, setting high hopes for the next convention where there would be a possibility of an official agreement.

The most recent COP took place in October-November of 2000, which was in The Hague, Netherlands. This conference was expected to be the one where most proposals would be worked out and officially agreed upon. Unfortunately, however, that is not what happened due to the fact that despite the tone from the previous COP, negotiations became more intense rather than lighter on how the Kyoto Protocol should be implemented.

2.3.2 The Kyoto Protocol and its Flexibility Mechanisms

As mentioned previously in section 3.1, the Kyoto Protocol was developed during COP III. Essentially, it is an agreement between participating nations to be legally bound to reach quantitative targets. Such targets include: (1) strengthen the commitments of Annex-I nations to reduce their emissions by legally binding targets; (2) to achieve at least a 5% reduction below 1990's level in Annex-I emissions by the target time frame (2008-2012); (3) report regularly on progress of obtaining goals. (Morlot 16)

Obtaining these goals would be of great cost. To help add flexibility and feasibility to reach their target, the Kyoto Protocol comes with mechanisms that allow the participants to make their target time frame much easier. These mechanisms are Emissions Trading, Joint Implementation and Clean Development Mechanism.

Emission trading is a system that is based off Quantified Emissions Reduced credits (QERs). QERs are a quantified amount of emissions values that can be bought, sold or traded on the open market, more specifically, it is a quantified value per amount of emissions values reduced (the current proposed rate is $9.80US per ton of CO_2 reduced). The way that this mechanism works is that a nation may have credits that it did not need to use before the end of a deadline, with these left over QERs, a nation may sell them to another that is in danger of going over their limit. A nation may want to take advantage of this to gain a profit if it has extra QERs and does not want to use the Banking Mechanism.

Banking is when a nation has extra QERs the end of a target deadline. Instead of selling them, the nation can choose to hold them for use during the next time frame.

Nations may want to take advantage of this if they are not sure targets may be met at the next deadline.

Joint Implementation is a project that is done cooperatively by Annex-I nations. Two Annex-I nations can work together to develop an environmentally sound project, this way, both nations will get credit towards their target emissions reduction commitment. An example of this would be if Japan and the United States both implemented a new power plant that is more environmentally sound and helped to reduce their overall emissions rate, Japan and the United States would receive credit towards their target.

Clean Development Mechanism (CDM) is the mechanism that is of the most concern to non Annex-I nations. The keyword for any CDM project is *sustainable development*. Sustainable development is when a developed nation creates a project with new technologies inside the host underdeveloped country. When the developed country leaves the project, the underdeveloped country can take over the project on its own and be totally independent of the developed country when it comes to that new technology, thus sustainable development. To be considered as a CDM project, it must have the following requirements: (1) Must be environmentally sound, so that the participating nations can work toward their commitment; (2) Promote sustainable development towards the non Annex-I nation; (3) Both Annex-I and non Annex-I nations must be involved in the project. This mechanism will benefit both the developed and developing nation in different ways, the developed nation will gain CER's towards their target, while the developing nation will gain newer environmentally sound technologies.

While the protocol has a lot of mechanisms and targets and deadlines, it still, to this date, has not been put into actual force. The reason for this is because the Kyoto Protocol must be ratified by 55 states. Of these 55 states, it must include Annex-I nations that are responsible for at least 55% of the total carbon dioxide (CO_2) emissions for 1990. Meaning, if the Kyoto Protocol was ratified by 55 non Annex-I nations, it would not be put into force. Once the fiftieth ratification takes place, the Kyoto Protocol will be in affect 90 days thereafter.

It is most helpful, for the sake of ratification purposes, that the United States does ratify the Protocol. Since the United States is a big contributor to CO_2 emissions, it would be very difficult to reach the 55% quota needed for ratification.

No country can take advantage of these opportunities since the Kyoto Protocol has not been ratified. However, Thailand is making use of a program created in an earlier COP known as Activities Implemented Jointly (AIJ) Program. AIJ is a project where, much like CDM, an Annex-I and non Annex-I nation work together on an environmentally sound project. These types of projects are considered to be a precursor to CDM projects because they hold the same criteria as a CDM project, but you do not get CERs as a result of their progress (due to the fact that the Kyoto Protocol has not been ratified yet).

Currently there are AIJ projects that are taking place in Thailand. Some of these have to do with the energy sector, while others have to do with ways to cut down emissions in a business. An example of these projects is Japan's New Energy Industrial Technology Development Organization's (NEDO) involvement with Kobe Steel of Japan and Siam Steel of Thailand. The Project is titled 'Effective Utilization of Energy in Re-

heating Furnace in Steel Industry'. The goal of this project is to reduce the annual amount of CO_2 to 3,001 tons from 2001 on.

3. Methodology

In order to achieve our goal, to assess the climate for technology transfer relevant to climate change in Thailand, and from there make recommendations to Chulalongkorn University's Energy Research Institute, we needed to accomplish three primary objectives. The first objective was to identify key issues of technology transfer with regard to economic and ecological aspects of climate change. Our primary sources of data gathering consisted of current situation document review and attending a regional conference on climate change, which allowed us to gain a plethora of viewpoints on the issue of technology transfer. The information that was gathered there allowed us to develop primary themes, which would be followed up with interviews, our second objective, to gain more insight of the issues at hand. Finally, once our interviews are completed and transcribed, we were able to complete our third and final objective, which was to conduct a current situation analysis so that we were able to make solid recommendations to the Energy Research Institute.

3.1 Identifying Key Issues

There were two primary methods that we used for data gathering with respect to gaining familiarity of the current situation. Our first method was to review documents of current CDM feasibility projects that are currently underway. This allowed us to gain a better understanding of how a CDM project may work. Also, it allowed us to find what results come out of what technology (for example, a more efficient coal power plant may create more energy per the amount of GHG emissions reduced). The documentation review also allowed us to become better prepared for the regional conference that was

attended so we would be able to gain information more effectively. The conference also allowed us to network with other individuals who are more familiar with this area in order to probe further into the themes we developed.

Documentation review was an essential first step in understanding the current situation. It is however important to note that the documents that were reviewed were not strictly restricted to Thailand's CDM feasibility studies alone. Documents were received from both the Energy Research Institute and the regional conference explaining current feasibility studies of different nations, including Thailand, Columbia and Japan, showing what technology was used and how much carbon dioxide was reduced. These documents also triggered possible themes that were developed from the conference. An example of this is knowing from the literature that some forms of renewable energy is not to feasible in Thailand, such as the wind power plants in southern Thailand. Such examples made it easier to develop themes in the conference.

The regional conference on climate change hosted in Bangkok by the Ministry of Technology Science and Environment, New Energy and Industrial Development Organization of Japan and the Energy Research Institute was very helpful in helping us achieve our first objective. While at the conference, many presentations were given which allowed us to see different viewpoints and some that agree. It was these presentations that were our source for developing our primary themes. Following up these themes was necessary, that is why during coffee breaks and at lunch we made contact with professionals that are more experienced in this area, allowing us to move onto our second objective.

3.2 Examining the Issues In Depth

In order to follow up on our themes, we had to decide which data gathering technique would be most useful. As stated in the previous section, contacts were established with individuals who have experience in the energy field. Taking into account the social exchange theory, our interviews were designed so that the respondent would be more likely to answer truthfully.

Interviews were chosen over surveys and focus groups for two primary reasons. The first reason is time constraints. A survey will take approximately 7-8 weeks to accurately complete (Jameson Private Conversation). Due to the time constraints of this project, that is not nearly enough time. Focus groups would not be feasible due to time constraints of the participants. It was extremely difficult to schedule one on one interviews, to be able to have 4 or more available at the same time would be nearly impossible. Our other reason, which is more specific to surveys, is the fact that surveys, even with acceptable time, would not have been accurate enough with our means. Generally, surveys allow limited answers. They are also anonymous, so we would not be able to follow up on answers from certain responses we may have found particularly intriguing.

A total of 6 representatives from different organizations, belonging to both public and private sector alike, were gracious enough for us to set time aside. More specifically, individuals from the United Nations Development Programme, UNOCAL, Mitsubishi Research Institute, along with others whom choose to remain anonymous allowed us to probe more deeply with questions that were developed specifically to probe the key

issues that were developed from the conference. Some participants requested to remain anonymous.

When preparing our interview questions, which can be found in the appendix, we were aware that we had to take the social exchange theory into account. The Social Exchange Theory explains that all human interactions involve a cost-benefit analysis before any response is given. In any situation there are a number of costs and benefits associated with any given response. If the costs of a response outweigh the benefits of the response, then the response will not be truthful. Being aware of the social exchange theory prompted us to conduct our interviews using the attitudinal and behavioral method.

The attitudinal and behavioral (A&B) style of interviews is an interviewing style that allows us to conduct an interview in order to build the respondent's, or the interviewee's, trust. The respondent is more relaxed due to the more conversational manner of the interview. During the interview, questions are asked so that the interview funnels down into one point. It is important to note that the questions in the appendix are only questions that we funneled down to and A&B interviews are not based on a script of questions.

3.3 Content Analysis

Once our interviews were completed and transcribed, we conducted a content analysis to analyze to relevance of each interview to our themes. We conducted our content analysis by writing all of our themes down and categorizing key notes from our interviews under a specific theme. This allowed us to be confident that if we were to make recommendations we would have specific reasons to think why they were justified.

Our content analysis began when we wrote all of our themes on a white board. We all then looked at our interviews and listed a point under a topic when we found one that we thought was relevant. This continued until we felt we exhausted all information given to us that was relevant to our cause. Following our content analysis, we saw problems that could be solved in our themes. We brainstormed for a bit and thought of ways the ERI could address these situations.

4. Results and Analysis

Through our methodology five themes emerged that describe important aspects of the current climate of technology transfer related to global climate change. Our methodology identified these themes by a comprehensive review of literature, attending a regional conference on global climate change and interviewing professionals working on the topic of global climate change. The five themes generally describe the importance of private sector involvement, the importance of the energy sector, the feasibility of efficient energy and renewable energy technologies, the barriers that face the clean development mechanism (CDM), and the future of similar activities.

4.1 Private Sector Involvement

The first theme identifies the necessity of private sector involvement in climate change projects in developing countries, in order to ensure the transfer of technology. The private and public sectors have different but equally important role to play in CDM activities. The private sector provides financial backing in proven situations and facilitates the transfer of technology, while the public sector ensures the local market is protected and that sustainable development takes place.

The financial support that the private sector can provide for CDM projects, if the projects are profitable, is far more stable than governmental funding. Due to the Asian economic crisis of 1997, the Thai government has reduced its budget for public agencies. This reduction has led to financial constraints on many of Thailand's development plans, including CDM pilot projects (Zola 90). One of the purposes of CDM is to bring sustainable development into the host country, which helps Thailand in further development without worrying about lack of budget. René Anderson of the United

Nations Development Program (UNDP) in Bangkok stated in our interview with him, if the CDM projects are only funded by the governments of the developed countries, they may not be sustainable, because once the funding is cut, the projects may collapse. The private sector's involvement will eliminate such risk and form a stable support of the projects in the host country, Thailand.

The diffusion of the technology transferred to a host country is essential for sustainable development to take place. Aki Maruyama, a research associate at the Institute for Global Environmental Strategy (IGES), explained our interview with her that defusing the technology transferred into a host country by developing the capability to manufacture the technology locally enables the CDM project to have far reaching effects and become more profitable. Local businesses can also make profit by using the recently transferred technology in various ways. One possibility is to manufacture the hardware of such technology in the host country, because the cost of labor is much lower in a developing country. These activities also generate new employment in the host country. If the hardware of the projects can be commercialized, as an intermediate measure, it will keep the investment certifiable as long as it is commercially profitable (Goldemberg 123).

If the private sector is mainly driven by the motivation of profit, it is difficult to ensure advanced and appropriate technologies to transfer into the host country and sustainable development to take place without a strong public policy protecting the host country. Intellectual property rights are a large concern of investors when looking to invest in a CDM opportunity. The needs of the local people must also be taking into account; any CDM project that exploited the local work force, or did not provide

sustainable development. CDM is supposed to ensure against these possibilities. Thus strong a good public policy is needed to protect the rights of all parties participating in CDM activities. (Zola 19)

The private sector is very hesitant to invest in projects that have not been proven to be profitable; therefore, the public sector needs to act a catalyst by proving the feasibility of CDM projects (US Embassy Interview). Projects run by the public sector for the purpose of demonstrating feasibility must be planned and run similar to the way that a business would approach project planning and execution. Yamaguchi, a private sector environmental consultant, stressed the importance that the decision to fund should be based on an assessment of a project's Net Present Value (NPV), which accounts for a project's present and future cash flows (Yamaguchi Private Conversation).

4.2 Importance of the Energy Sector

The second theme affirms that the energy sector has the most potential for emissions reductions and thus for mitigating global climate change. There are a number of factors that highlight the importance of the energy sector in CDM activities. On the supply side factors such as the percentage of emissions that come from the energy sector, the ease of calculating emissions, and availability of technologies to help reduce emissions help make the energy sector so import in solving global climate change. Demand side management programs have also been implemented in the energy sector with some success.

The global energy sector is estimated to account for 50.4% of global CO_2 emissions contributing to global warming by the year 2020 (Kerr 6). Therefore efforts spent to reduce the emissions of the energy sector have a large impact on reducing total

emissions leading to global warming. Yamaguchi, a private sector consultant and speaker at the regional workshop, reiterated this fact private conversation.

Of the CO_2 emitting sectors, the energy sector can most easily calculate its emissions. Similarly, CO_2 emission reductions can be more accurately monitored that other sector such as transportation or agriculture Yamaguchi stated in email correspondence. Therefore Certified Emission Reductions (CERs) for CDM projects based in the energy sector will be able to be calculated clearly.

There are many different technologies available for use in the energy sector for the reduction CO_2 emissions. Possible options, ranging from geothermal to lignite, provide flexibility in emissions reduction. Paul Tish, a leading representative of UNOCAL in Thailand, stated in our interview with him that this decision can be made by the energy provider in order to take advantage of the natural resources of the host country.

The effectiveness and ease of implementing demand side management (DSM) programs also makes the energy sector an excellent sector for curbing emissions. Thailand is credited as a leading nation in this aspect. Sources such as the UNDP have noted that programs, including EGAT's DSM program, are highly effective in educating the public in energy consumption awareness. Evidence shows that these programs are so successful that consumption reduction targets were not only met but doubled (Phumaraphand presentation). However, some sources are critical of the EGAT study and question its findings (US Embassy Interview).

4.3 Efficient Energy Technology

The third theme illustrates the feasibility of efficient energy technology[1] compared to renewable energy technology projects in CDM opportunities led by the private sector. The cost of capital[2] for efficient energy technologies is lower than renewable energy technologies. The high cost associated with renewable energy projects compared to the predicted market value of CERs causes renewable energy projects to not be commercially viable. The transfer of efficient energy technologies is more appropriate than renewable energy technologies on the large scale. However, small-scale renewable energy projects implemented by public and non-governmental organizations (NGOs) are highly appropriate.

The cost of capital for a renewable energy project is significantly higher than the cost of capital for an efficient energy project (Yamaguchi Private Conversation). Aki Maruyama, a representative from the Institute for Global Environmental Strategies (IGES) stated in her presentation that the costs associated with discovering which type of renewable energy technology is best suited for an area add to the already high costs making renewable energy CDM projects less attractive to private sector investors.

In addition to the costly technology, the marginal cost[3] of renewable energy is higher than the predicted market value of Certified Emissions Reduced (CER). This means renewable energy CDM projects would be run at a loss. Such projects may not receive investments from private companies, because they are not profitable. Mr. Black of Columbia illustrated this point by explaining the marginal cost of a renewable energy

[1] Efficient energy technologies are energy technology that use traditional energy sources, such as coal, but uses those sources so that they product fewer pollutants and are more efficient.
[2] Cost of capital is the expense of the assests required to started the project, such as equipment and land.
[3] A marginal cost is determined by finding the total cost of the project and dividing the total cost by the projected number of CERs the project expects to earn.

project would be about $14, compared with the predicted CER market value of $9.80; this shows a marginal loss of $4.20. (Black Presentation)

Efficient energy power plants are profitable on the large scale (>500 MW for example). On the other hand, renewable energy project plants are not effective in producing a decent amount of energy and storing it properly for commercial usage (US Embassy Interview). Paul Tish of UNOCAL suggests that the improvement of resources readily available, such as natural gas in the case of Thailand, is more economical than renewable energy sources. Sources from the UNDP suggest that a solar energy power plant capable of producing large amounts of power requires such expensive technological equipment and large amount of land that it is not feasible.

Small-scale renewable projects sponsored by public and non-governmental organizations (NGO) have a large potential to help the people of rural Thailand that cannot be reached by EGAT's power grid. Sources at the Embassy of the United States of America in Thailand suggest that solar projects of this nature would best be concentrated in northeast Thailand. The UNDP is currently working on small-scale biomass projects in Thailand.

4.4 Barriers to Clean Development Mechanism

The fourth theme reaffirms the numerous barriers poised against the current suggested climate change technology transfer mechanism, CDM. The largest of the barriers is the uncertainty surrounding the ratification of CDM's parent protocol, the Kyoto Protocol. Additionally, there are very large questions pertaining to the exact specifics of what constitutes a valid CDM project. The regulatory process for the verification of baselines and projects is still a very highly contended topic in the

international arena. At local levels there is a lack of information available and public awareness about global climate change. Currently, in Thailand, there are no organizations actively bringing the public and private sector together to work on CDM projects.

The largest barrier facing CDM opportunities is the lack of ratification of the Kyoto Protocol, the parent protocol of CDM. The recent election of George W. Bush as president has cast a great deal of uncertainty over the United States' stance on the protocol (Yamaguchi Private Conversation). This sentiment became evident at the regional workshop when most of the presentations alluded to this feeling. Without ratification from the United States the Kyoto Protocol, and therefore CDM, cannot become a reality.

With the lack of a precise, universally accepted definition of what constitutes a CDM project, investors are unwilling to invest in CDM opportunities. Without clear guidelines to follow many businesses will not invest in CDM opportunities (Yamaguchi Private Conversation). Currently there are a number of disputes in the international negotiations on this issue. Kerr noted in private conversation that the largest is the inclusion or exclusion of sinks as valid CDM projects. The outcome of these disputes will have a large effect on what can be considered a CDM project; therefore affecting how private companies will invest in CDM projects.

For CDM projects to be successful there needs to be a way of insuring that the baselines and CERs given by developing counties are accurate before CERs can be traded. If these baselines are not accurate, investors will not be able to estimate the

potential CERs they could receive. As a result, the CDM project may not be successful, thus scaring off other investors from potential projects (Goldemberg 123)

Currently there is a lack of information available for the private sector about CDM opportunities and public awareness of global climate change issues. Businesses will not be able to participate in these opportunities if they are not aware of the opportunities. Sources at the US Embassy in Thailand suggests that the general public needs to be aware of the issue of global warming, so that the political discussion about environmental issues becomes more informed and the resulting public policy becomes stronger.

For the private and public sectors to work together there needs to be some sort of organization to interface the two. Currently there is no sure organization in Thailand. A source at the US Embassy highlighted how both public and private sectors have different views on what needs to be done in order to efficiently make the transfer of technologies possible. The private sector is mainly motivated by profit, whereas the public sector may be driven more by environmental issues. However, an organization to interface the two will help both sides to reach a middle ground (UNDP Interview).

4.5 Future activities

The final theme suggests that the eventual solution to climate change that involves technology transfer will be very similar to CDM. There are three fundamental parts of CDM that will continue to be are part of future activities of this nature: emissions trading such as CERs, technology transfer, sustainable development. These provide a 'win-win' situation for both developed and developing countries participating in future activities.

The vested interests of both developed and developing nations are served through working jointly to reduce CO_2 emission. Therefore the solution to climate change will need to include a mechanism similar to CDM (US Embassy Interview). Wahnschafft, an economic affairs officer for the Energy Resources section of Economic and Social Commission for Asia and the Pacific (ESCAP), feels that this shows that while CDM may not be ratified, the potential CDM projects/feasibility studies that are currently underway are not a waste of time and money.

In order to attract investors a free market mechanism is needed to provide incentive for CDM-like projects; therefore CERs must be present. An investor must be able to sell, trade of buy CERs in order to maintain freedom in their investment. Yamaguchi stated in private conversation that if there are no CERs to receive in these investments, the private sector would not willingly involve itself in solving global climate change; then the burden would rest upon the public sector.

The private sector must be present in order to facilitate technology transfer in any eventual solution to global climate change. They will be the main source of funding of these projects, because they can earn a potential profit from them. The government can only initiate a limited number of projects whereas the private sector has the resources to be the driving force behind a large number of projects. (Yamaguchi Private Conversation)

If a developed nation is to transfer technology to an underdeveloped nation, both sides must gain something in return. In the case of transfer of technologies through CDM, the developed nation gains CERs while the developing nations gain sustainable development through the new technology. Therefore, to entice the developing nations to

help the developed nations concessions must be made to the developing nations in the form of sustainable development and technology transfer (Kerr Private Conversation).

Technology transfer, sustainable development, and CER trading have been including in global climate change solutions since the formation of the UNFCCC. All the participating parties have agreed to these three fundamental aspects. For this reason these aspects will continue to be a part of the solution for this reason.

5. Conclusions and Recommendations

To fully address our findings we developed five recommendations for Chulalongkorn University's Energy Research Institute. Each recommendation addresses a specific finding, or findings. In order to remind the reader, we will present a brief summary of our writings. With these findings in mind we will continue on to a discussion of our recommendations. Some suggestions as to further questions that have been raised by this projects and the relevance of our recommendations are discussed to conclude this section.

In carrying out our methodology, five main findings came to light. The first identifies the necessity of private sector involvement in climate change projects in developing countries, in order to ensure the transfer of technology. Our second finding affirms that the energy sector has the most potential for emissions reductions and thus for mitigating global climate change. The third theme illustrates the feasibility of efficient energy technology compared to renewable energy technology projects in CDM opportunities led by the private sector. The fourth theme reaffirms the numerous barriers poised against the current suggested climate change technology transfer mechanism, CDM. The final theme suggests that the eventual solution to climate change that involves technology transfer will be very similar to CDM.

We recommend first that the continuation of efforts in the CDM-related projects that may contribute to the future solution of climate change, even if the Kyoto Protocol fails to be ratified. As we have found in our results, any eventual solution to the problem of climate change will be very similar to the currently proposed Clean Development Mechanism (CDM). In addition, we have affirmed the view that the energy sector

provides the best opportunities for emissions reduction. In light of these factors, we applaud the ERI's current work and urge them to redouble their efforts to find clean energy technologies for Thailand and show the feasibility of CDM-like opportunities.

As our second recommendation, we feel that the ERI can investigate partnerships between the local private sector and foreign private sector, acting as an interfacing organization. As shown in our results, private sector involvement is essential to the success of any large scale CDM activity, due to the fact that a larger investment is more likely to return a larger profit. Private companies will provide the majority of the funds and capitol for bigger projects that have the potential to make a bigger difference. The ERI would be an excellent organization to interface to two sides, due to its academic, unbiased nature.

Since renewable energy projects are currently only feasible in a smaller scale, our third recommendation is for the ERI to plan to implement projects of this nature. This could be especially beneficial for rural communities who are not assessable from the Electricity Generating Authority of Thailand's (EGAT) power grid. Currently there are projects that are being conducted of this type, however, the ERI could use these as stepping-stones towards such technologies being used on a larger scale.

Recognizing the barriers that CDM may be facing, our fourth recommendation suggests that the ERI promote public education on climate change issues. There are many ways that public education can help reduce global warming. Such ways include EGAT's DSM program. If more people are aware of this program it will greatly help in the reduction of CO_2 emissions. Education of the public has the additional benefit of

making the political discussions and resulting public policy more aware of the environmental issues.

In addition to the lack of public awareness, another perceived barrier to CDM-like opportunities in Thailand is the lack of central coordination of climate change projects. To address the problem, our fifth recommendation proposes the formation of such a new organization to coordinate technology transfer related to climate change projects. The mandate of such an organization being purely informational would best be served by an academic institution such as the ERI. A central academic coordination of climate change projects in Thailand will be beneficial for implementation of these projects by educating and bringing together interested parties. Setting the ERI as a mediator between the public and private sectors has many benefits because academic institutions are unbiased and are looking for the best logical solutions. The ERI could also serve as a primary source for information in regards to climate change issues whether it has to do with the Kyoto Protocol, or newer technologies to be transferred, thus making it an authority in this particular field.

The recommendations that we have concluded with, especially the last two, need further research into the correct way to implement them so as to maximize the benefits received by the ERI and Thailand. What is the best information to educate the public with? What is the best way of reaching people? What would be the structure of an organization to interface public and private interests? All of these questions require further investigation.

It is clear that the ERI should consider the needs of global climate change in its future research decisions. The problem of global climate change is not going to

disappear in the foreseeable future; therefore all steps that can be taken to address it should be taken. Collaboration with other institutions (public, private, and academic) is an excellent way of gaining access to more expertise and capital. The ERI has the potential ability to make a large difference in Thailand's battle against global climate change.

6. Appendix

6.1 Acronyms and Abbreviation

AIJ	Activity Implemented Jointly
CDM	Clean Development Mechanism
CER	Certified Emission Reduced credit
COP	Conference of Parties
DSM	Demand Side Management
EGAT	Electricity Generating Authority of Thailand
ERI	Energy Research Institute
ESCAP	Economic and Social Commission for Asia and the Pacific
ET	Emissions Trading
EU	European Union
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
JI	Joint Implementation
KP	Kyoto Protocol
NCCC	National Climate Change Committee
NEDO	New Energy and Industrial Technology Development Organization
NEPO	National Energy Policy Office
NGO	Non-Government Organization
NPV	Net Present Value
OECD	Organization for Economic Co-operation and Development
OECF	Overseas Economic Cooperation Fund
OEPP	Office of Environmental Policy and Planning
TDRI	Thailand Development Research Institute
TEI	Thailand Environment Institute
TFMP	Thai Forestry Master Plan
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

6.2 Personal Summaries of Regional Workshop

6.2.1 Kasemtas Dardarananda

I think CDM is beneficial for both developed and developing countries. For developing countries like Thailand, we will get many things from this process such as new technologies, a decrease in the rate of unemployment since the CDM will have many job opportunities, and help the country stop polluting the environment, etc. For developed nations, I think the benefit is they can live the same way you always do without have to upgrade their technologies to clean technology which will cost to much to do.

So both parties are happy about this idea, but from my understanding is that the annex-I nations still would not take action due to the United States who they call "Big Brother." They still will not ratify, as soon as President Bush sign the CDM agreement most of the annex-I nations will follow the United States footstep. In other hands most of the non-annex I is already for CDM process for years, they cannot do anything except wait for those annex-I nations.

For Thai people, I think we need CDM due to the economic crisis back in 1997, we have big amount of debts, which soon or later we have to payback to the IMF. CDM could bring in big amount of money to the country; CDM also will bring in the employment opportunity as mentioned earlier, which I think to this process, we have nothing to lose or another words it is a 'win-win' situation.

I think the only productive way for Thai citizen can do right now is to educate people who have no idea about global warming and CDM which only a small percentage who know about this thing. We should let everyone in the country know, and convince

them to care. If we can get everyone attention I think soon Thailand will be developed country and help out the world environment.

6.2.2 Jarred Gallagher

The regional convention on climate change, hosted by both Chulalongkorn University's Energy Research Institute (ERI) and Japan's New Energy Development Organization (NEDO) opened up a new window of opportunities and ideas that seemed to spark hope and energy that a solution (or solutions) to solving the climate change problem by cooperation of Annex-I and non Annex-I nations will appear. I feel that this is apparent for three main reasons. The first reason is the fact that despite the fact that the Kyoto Protocol may not be ratified, the mechanisms pertaining to it, namely CDM, will be here to stay in some shape or form. The fact that different organizations, including organizations from both the private and public sector and other nations, provided progress reports of current technology transfer projects, provided my second reason. Finally, the fact that nations need these potential CER's from CDM projects, in order to be able to keep their current situation the same in terms of GHG emissions, which forced me to think of an interesting question...is CDM being used to promote underdeveloped nations to start of on the right foot, or is it used to allow developed nations to spend money to prevent cleaning up their act domestically?

Due to the fact that nearly all presentations dealing with the potential ratification of the Kyoto Protocol alluded to the fact that the United States may not allow this to happen. This possibility was followed up to ask the question 'what was in the future for CDM?' Many presenters agreed that while CDM itself may not be the mechanism to transfer technologies between developing and developed nations, there would be

something similar to take its place. From many presentations, it seems apparent that both sides, Annex-I and non Annex-I, need CDM equally, even if it is for different reasons.

One of the themes that was developed by my colleagues and I from this conference was that while the private sector should be the driving force behind these potential CDM projects, the government should be the one to jump start these projects. While this is true or not, it was very pleasing to see that by both parties participating in this conference, it shows that there is a possibility of collaboration projects or ways where the public and private sectors can cooperate to benefit each other in order to makes these projects work.

Finally, to answer the question of really what is the motive behind the Annex-I nation's participation, it was necessary for me to listen intently on why Annex I nations are participating in these projects. I talked to one representative of an Annex I nation, which sounded like to me that they are using the potential of large CER gains to prevent cleaning up their act, so to speak, domestically. To me, this may help global warming in the long run worldwide to prevent the developing nations from using non-environmentally sound technologies, however the big polluters will still be active in the future. It is for this reason that I feel that while CDM opportunities are a good idea in helping out developing nations to get on the right track. CDM cannot be the only mechanism that is used, and it must be used in conjunction with other mechanisms.

6.2.3 Joseph O'Boyle

Climate Change is a problem that faces the entire world. The time to act to prevent future catastrophe is now. The regional workshop, sponsored by NEDO, MOSTE, and ERI, allowed me to gain insight into the current issues facing the

international response to global climate change. There will be continued efforts to prevent climate change; mechanisms similar to clean development mechanism (CDM) will be near the center of any solution. Renewable technologies are not feasible on a large (>500MW) scale.

Clean Development Mechanism (CDM) is based on fundamental principles that will continue to be a part of the international response regardless of the ratification of the Kyoto Protocol (KP). CDM is defined in article 12 of the Kyoto Protocol as a method of CO_2 emissions reduction through cooperation between Annex 1 (developed) and non-Annex 1 (developing) nations, which has components of technology transfer and sustainable development. The underlying principles, technology transfer and sustainable development, benefits for the non-Annex 1 nation; and CO_2 emissions reduction through free market pressures, benefits for the Annex 1 nation, are necessary components to any eventual solution. For CDM to become a reality its parent protocol, the Kyoto Protocol, must be ratified by more that 55 nations that represent 55% of global CO_2 emissions. Due to the recent election of Present Bush in the United States of America, the ratification of the Kyoto Protocol by the United States of America is unlikely and therefore cannot fulfill the 55% of global emissions requirement for the international implementation of the protocol. The previous administration of the United States was unwilling to sign the Kyoto Protocol until an agreeable solution was found to the question of sink inclusion in the protocol. It is unlikely that this opinion will change with the change of administrations. The workshop was therefore notable for the exclusion of discussion on this topic. The non-Annex 1 nations will need to come to a common

agreement on sink inclusion with the Annex 1 nations in order for CDM or any future flexibility mechanism to succeed.

Renewable technologies, in the short term, are not feasible to meet the large energy demands of developed and developing nations. Prior to attending the workshop, I felt that renewable technology projects were possible with the funding drive that CDM provides. However, the evidence and general attitude that was presented showed that renewable energy projects are not feasible on the large scale at the current time. Constructing more efficient power generation facilities and producing fewer CO_2 emissions is much more feasible and provides larger profit margins for investors. This does not preclude the use of renewable energy. In small scale, non-commercial endeavors renewable energy technologies are very well suited. Example of these types of project can be found, such as the implementation of solar technologies in rural Thailand to provide electricity for villages without access to EGATs power grid.

6.2.4 Jia Yu Zhao

There are several motives from different nations on the Kyoto Protocol and CDM. The only Annex I nation that participated in this workshop is Japan. They seem more interested in the potentials of CDM and some new sources of energy such as renewable energy power plants and efficient energy systems. Some other countries such as the host of this workshop, Thailand showed a strong interest in efficient energy system. However, many countries have had shown their the interests in promoting economic benefits through the free market of CER trading and hope the future CDM projects will bring a good impact into their domestic economies. In this workshop, an interesting appearance of the international interests in CDM I found, not all of them believed in the existence of

global warming. However, they are more interested in finding a new source of energy or at least some way in reducing the energy use so they will be able to deal with someday the natural resources of energy is gone. Despite the fact that the participated nations in this workshop may look at it differently, China seems to be more concern on the environmental protection and hope to have more advanced technologies in reducing the GHG emissions rather than economical benefits or new energy supply.

Despite the fact that the participating countries have different interests in the future of CDM projects, they showed their willing of taking initiatives in approaching developing such projects. However, I do not believe that global warming and GHG emission reduction is the motive that they wanted to participate but the fact of running out of natural resouces of energy.

6.3 Interview Questions

6.3.1 Verbal Interview Questions

Themes to Verify

I. For sustainable development and technology transfer to take place and be effective, it must be lead by the local and foreign private sector.

II. Technology transfer in the energy sector will yield the highest amount of emission reductions.

III. The transfer of efficient energy technologies is more likely than renewable energy technologies in a free market situation.

IV. The main purposed mechanism for technology transfer between developed and developing countries, CDM, has many barriers.

V. Even though CDM may not be ratified the future solution to the problem of global warming will be very similar to CDM.

Introduction Speech:

We are students from **Worcester Polytechnic Institute** in Mass, currently studying at Chulalongkorn University's **Energy Research Institute (ERI)**. We are conducting a current situation analysis on **technology transfer** related to **climate change** for the ERI. In doing this we would like to gather the **opinions** of people currently involved in areas that may be relevant to technology transfer. To do this we would like to interview you to gain insight into you opinions on these topics. We will insure confidentiality if you would feel more comfortable.

I: May we use a tape recorder? It helps us greatly in remembering what has been said.

I: Would you like your name and/or organization withheld in our finial report?

I: Are there any questions or concerns you have before we begin?

I: Could you explain to us what your organization does and what are your main responsibilities?

I: Are you familiar with the problem of Climate Change and the international communities response?

I: If yes: Would you please briefly explain to me your understanding of Climate Change and the international communities response.

I: If no: explain Climate Change, UNFCCC, Kyoto Protocol, CDM

I: Can you tell me your thoughts on the clean development mechanism, CDM. (1&4&5)

I: What do you see as being necessary for CDM-like opportunities to take place? (2&4)

I: What do you see as barriers to CDM-like opportunities? (4)

I: Where do you think efforts should be concentred in developing countries to elevate climate change? (2&3)

I: In the energy sector how should efforts best be directed? (3)

I: Which do you think is more feasible for the reduction of emissions through CDM-like activities, renewable technologies or energy efficiency technologies? Why? (3)

I: Is this true for Thailand as well? Why? (3)

I: What is the best way to facilitate the transfer of technologies related to climate change? (1&4&5)

I: What do you see as the future for CDM-like activities? (5)

I: What do you see the role of the private sector, both here in Thailand and internationally, in CDM-like solutions? (1)

I: How important is that role? Why? (1)

I: Are you familiar with the CU's ERI?

I: How did you hear of the ERI?

I: What is your impression of ERI?

I: What steps do you think the ERI can take to future address the problem of climate change?

6.3.2 Email Interview Questions

Hello,

My name is Joe O'Boyle, I met you at the resent workshop on Climate Change in Bangkok. My group and I had some follow up questions that we where hoping that you would have the time to answer.

We are student from Worcester Polytechnic Institute in Massachusetts, USA, currently studying at Chulalongkorn University's Energy Research Institute (ERI). We are conducting a current situation analysis of technology transfer related to climate change in Thailand for the ERI. In doing this we would like to gather the opinions of people currently involved in areas that may be relevant to technology transfer. To do this

we would like to interview you over email to gain insight into your opinions on these topics. We will insure confidentiality if you would feel more comfortable.

1. Please explain to us what your organization does and what are your main responsibilities?

2. What are your thoughts on the Clean Development Mechanism (CDM)?

3. What do you see as being necessary for successful CDM-like opportunities to take place?

4. What do you see as barriers to CDM-like opportunities? in Thailand?

5. What sector (Energy, transportation, agriculture, etc.) is best suited for CDM-like projects and why?

6. Which do you think is more feasible for CDM-like projects and why? efficient energy technologies or renewable energy technologies?

7. What is the best way to facilitate the transfer of technology related to climate change?

8. What do you see as the future for CDM-like activities?

9. What do you see the role of the private sector, both in Thailand and internationally, in CDM-like solutions? How important is that role?

10. What is your impression of the ERI? What can they do to best further the cause of climate change in Thailand and in Southeast Asia?

11. What is your primary source for information regarding CDM-like activities?

Thank you so much for your time!!

Kasemtas Dardarananda
Jarred Gallagher
Joseph O'Boyle
Jia Yu Zhao

6.4 Interview Transcriptions

6.4.1 UNDP Interview

Brief overview from an interview with Rene Andersen, a programme director of the United Nation Development Programme (UNDP):

During our interview at the United Nations Building, Rene asked that this interview not be recorded. Respecting his wishes, only notes were taken. From these, an overview of the conversation was developed and is shown below:

Throughout the interview the main point that Rene stressed was that fact that for larger scale projects, energy efficiency is more feasible and a bigger step in the fight against climate change.

Rene's prime choice for renewable energy was Biomass. He then went to point out that a new Biomass project was approved today. He feels very confident about this project and shows it by reiterating that Biomass is an immediate solution because of it being efficient and is less expensive and more feasible than alternative solutions, such as solar power due to the landmass it would need for sufficient power generation.

On issues that concern technology transfer, several questions were asked. The two that were of most relevance were if Rene felt that the public or private sector should be in the forefront of funding these projects, and if the Kyoto Protocol does not get ratified, what will happen to CDM in the future?

An interesting point came up when Rene answered the funding question. He said he believed that the private sector must be the driving force behind these projects, due to the fact that the private sector holds more money, thus can create larger scale projects. However, the public sector needs to provide a jumpstart to such projects. Rene went on

to explain that businesses are very conservative when it comes to new technologies. The public sector is needed to run smaller scale projects to show that these new technologies are indeed profitable. Rene brought up another interesting point, despite the fact the private sector does contribute the vast majority of the funding. The government can still maintain some control through taxing newer technologies. He gave an example saying that if a government does not want coal, it will tax it to prevent its use.

Rene felt that CDM would be around in some shape of form in the future. He elaborated on this by mentioning how CDM was a market mechanism and how businesses needed this to help reach their Kyoto Protocol deadlines. Also, the fact that the developing nations need a mechanism like this in order to gain newer and cleaner technologies can only show that CDM is here to stay in the future.

One final point that Rene brought up when questioned about CDM barriers and education, he noted that Thailand has been doing an above average job in educating the public in energy awareness, but there is always more that can be done with education.

6.4.2 US Embassy Interview

The following is the interview with an officer in the economic department of U.S foreign embassy in Thailand on 2-13-2001. The economic department represents the American interests in trade negotiation and multilateral negotiation. He felt that Thai government's does not really focus on reducing air pollution but trying to avoid oil crisis. Thailand has deposits of coal and lignite. Despite the fact that it has clean coal, it still imports them from Indonesia.

In his opinion, Thailand is a developed country and has fairly advanced technologies, which does not need technology transfer. However, if Thailand is

interested, technologies can be bought into the country. He also stated that U.S government couldn't and will not decide what technology that Thailand needs and transfer it into the country.

He stated the reason that U.S has not as active in setting up any AIJ projects or CDM pilot projects in Thailand is that the Americans are not as involved here as other Annex I nations like the Japanese. The Americans hold a much less proportion in the investment in the country as opposes to the Japanese who had been distributing as nearly 25% of the foreign investments here. However, there are projects in Latin America and Africa where U.S government focuses more on.

He feels that Thailand's energy sector should focus on natural gases, which have a better economic future of coal. Coal may be cheaper in a short run but definitely not in a long run.

In his opinion, Thailand still has a long way to go in having viable renewable energy plants, but the NGOs may have more interests in these projects rather than the government. He suggested if Thailand is interested in more effective solar power plant, northeastern of the country might be the place to build it. There is large amount of land and long time of sun explosion.

He again emphasized that Thailand is fairly developed and able to afford buying technologies from other countries.

He recommended Thailand to have a central coordinating organization for development projects (or CDM projects) who serves as a mediator between the outside investors and local businessmen.

He views the academic entities are the only chance to get rational answers to many of today's questions on climate change issues and the country's development because of their neutral standards. He is also familiar with Energy Research Institute of Chula University, which is one of the academic entities. He strongly recommended the public education of the global warming and energy usage.

He believes that once Thai economy improved, there won't be problem of buying technology from the technologically advanced countries. He thinks the energy efficiency system that EGAT suggested is a good idea in controlling energy usage, but the barriers in the plan are borderline problems among the neighboring countries and the political problems.

6.4.3 UNOCAL Interview

Interview with the representative from UNOCAL (13 Feb 2001)

1) Would you please explain briefly of what your organization does?

We focus on oil and natural gas, its exploration and production. We mainly look at the Thailand market, but we also look at power the neighboring countries, such as Laos, Cambodia, Vietnam, and Malaysia.

2) Can you give me your explanation on what you understand on global warming problem and what should be done?

No comment.

3) Would you not comment on the Clean Development Mechanism?

We believe you can achieve the same goal with different ways. The main issue is the amount of money you have and then how effective each one can deliver the results.

From my own personal practice and experience, improving the efficiency is one of the most effective ways. Along the way, you can develop the new technology, so you have to look at the macro approach on how to solve the global problem. There are many ideal things given by politics and academics but not much from the industrial practices. The economist can study all they want, but they need all sectors to come together in order to figure out what is the most effective way. Each sector should educate themselves more to understand the bigger picture. (He is showing a piece of paper that indicating "Natural Gas, most effective fuel" to interviewers. Let me explain to you, energy in this world comes from many different kinds. However, for solar energy, it is free but it does not mean it is cheap to harvest. Different countries use different kind of energy available to them, because they can optimize it. In Thailand, gas is difficult to transport, but there is a structure, it is more sufficient to use. You will have 36% as the finished electrical product, and 64% wasted into the atmosphere. If you want to improve in reduce GHG, the best thing to is look at those coal power plant and then build those with better options in global warming perspective, efficiency perspective, and economical perspective. In investment perspective, you can see coal in Thailand cost a lot more, but you only get 36% of it as energy.

Thailand's energy has more than 50% comes from natural gas. Thailand will be one of the most efficient energy generations in the world within 10 years, because of the large amount of natural gas deposits. I suggest use more gas instead of oil. There is no one single solution to the overall global warming problem.

4) Should the money sponsoring the CDM projects come from the private sector or the public sector?

I think use or get whatever is available, there is no one solution.

5) Are you familiar with ERI?

Not quite sure, however, even we are a private company, we still have our own research done on the issues.

6.4.4 Thai Government Interview

1) Would you please explain what your organization does?

It is the government agency that focuses on the environmental issues in Thailand.

2) Could you please explain your point of view of Kyoto Protocol? And what do you think of the technology transfer aspect of it? Are there any opinions?

Under the convention (UNFCCC), we have Article 4.5 that the Annex I (country) has to implement the technology transfer to the non-Annex I countries that are underdeveloped or small island countries. It is a must, to under the convention that these developed Annex I countries implementing these technology transfer process. But for CDM, it is only technology additionalogies. According to the Article 4.5, CDM is not the major mechanism for technology transfer, which is only the technology additional to the convention.

3) Of the CDM aspect of it, what do you see as necessary for the CDM opportunities to take place? You see as more important as respect to the environment or as more important to technology? What do you think are the criteria for CDM to take place?

I think COPs and the Kyoto Protocol, CDM must have the four additionalities. It is going to financial additionality, investment additionality, emission additionality, and also environmental additionality. So, it is already been exhibition.

4) So what do you think as the potential barriers to CDM opportunities?

Besides as the obvious factor that Kyoto Protocol may not get ratified, is there other potential barriers that can to be overcome or that should be dealt with? So, if CDM will get ratified, it can be a smooth process?

I am not sure about it. I don't know if the modalities could be adopted by the captions in the COP 6 part 2. That would be for implementing CDM, but for Thailand, I don't know and couldn't recall. All I can think right now is the transaction cost, you know, the option fee. If the transaction cost is so high that the investors are not willing to come and implement the projects. However, we have the projects that are national studies to study CDM in Thailand. They have 2 projects. Chulalongkorn University sponsors the first one. The second one we got financial support from Australia. Both projects are conducting CDM projects are going on now.

5) In your opinion, how do you think the energy sector should be directed?

I am not an energy people, you know, I don't know if you get the National Communication yet? I think you can study it from our National Communication, you will see energy sector has the big part in the opportunity for CDM in Thailand.

Is it because has most of the greenhouse gas emission?

Yes I think so.

Is that meaning that focusing CDM projects on energy sector will get the greatest (GHG) reduction?

Hopefully. If you really study our National Communication, you will find most of the GHG emissions are produced from the energy sector. (She repeated that to ensure the interviewers understands the fact.) So, the energy sector will be the big opportunity for CDM in the future, as well as the technology transfer.

6) So, what do you feel is the best way to have technology transfer related to the climate change? Do you think, to promote that projects should be lead by private sector as oppose to the public sector? Or, who do you think should be the forefront of these projects?

I think some kind of co-operations between the public and private sector, but as I said if you (referring to the Annex I nations) want to implement projects under the convention, the main force should come from the Annex I nations. It is up to the Annex I country to decide if it should lead by the public sector or the private sector.

So, is that mean that it is depending on the public sector and the private sector of the Annex I nations?

Yes.

How about Thailand? Do you think there should be any involvement of the private sector vs. the public sector?

(Paused in thinking)

It is not totally depends on the Annex I nations. In Thailand we have the projects that are very famous, for an example, the Demand Side Management led by EGAT. These projects must be enforced by the public sector, the government, but implemented by the private sector.

We also have projects under AIJ that concerning about the energy sector. They are lead by the private sector but under the supervision of the government agency.

Is the future CDM projects should be led by public sector?

No, it should be the private sector.

Why?

Because when you are talking about CDM projects, you are also talking about market. If you wanted to be in the market, so it should be led by the private sector. However, these projects should be under the supervision of the government agency.

7) What do you see as the future of the CDM-like activities?

We doubt about it. When we been to the COP, everybody doubts about what we will get through CDM. It will depend LULUCF calculations, some countries (unclear in the recorder, maybe USA) tried very hard to force the COP to allow the using of LULUCF to calculate the emission reduction. If COP allow these kinds of issues to happen, then CDM is nothing.

8) Do you have any recommendation for ERI related with climate change problem?

For the climate change issues in Thailand, we need a public relationship. I think ERI can help us in build up the relationship among industries in the energy industrial sector. We will ask them to help us to build up a good understanding concerning the GHG emission issues. It can be a information source. ERI has a representative in the National Climate Change Committee, which is DR. Dawan.

6.4.5 Yamaguchi Email Interview

Dear Mr. O'Boyle,

Yes, I remember we've met in Bangkok. Let me try to answer your questions. I don't mind not being anonymous, but please understand that the opinions are of myself, not of the company.

1. Please explain to us what your organization does and what are your main responsibilities?

We are a private sector consultancy firm(please see http://www.mri.co.jp)

I am a staff researcher on environment / energy issues, notably climate related ones.

2. What are your thoughts on the Clean Development Mechanism (CDM)?

That is a nebulous question... It is hard to answer that except to say that it is getting incredibly complex. If IPCC is to be believed (and I think it is), all of us, including the South, collectively have to dramatically cut down emissions within the next 50-100 years. However, in the next 20 years, hundreds of gigawatts of power plants would be built in the South.

It makes a lot of difference whether these are state-of-the-art or not, since what has been built is going to stay there for a long time. CDM should help enable massive capital transfer to ensure that what will be built in the South is the best available at the time of building. This is why early implementation is crucial.

Much of the current GHG emissions originate from the North. However, most of the incremental emissions would originate from the South. Since it is difficult to significantly reduce the emissions from the North in a short time without putting the economy in a mayhem, it is important to ensure the transfer of best available technology to the South to set its emissions trajectory as low as possible (it will have to increase nonetheless; sustainable development of the South should not be sacrificed). This buys time for the North to replace its existing sources to revolutionary ones within a reasonable timeframe. After that, I guess it is the South's turn to follow suit (I'd be dead by then...).

3. What do you see as being necessary for successful CDM-like opportunities to take place?

Simple, clear rules and transparent procedure. Simple should not mean lax.

4. What do you see as barriers to CDM-like opportunities? in Thailand?

Various impediments to market entry (subsidies, vested rights, red tape, etc.). Thailand has its own national priorities (e.g. natural gas is not for export, etc.) which would preclude certain sectors from entering into CDM market. I am not sure whether this counts as a barrier, since such priorities have to be respected.

Of course, the biggest impediment may be the deadlocked negotiation of the COP process.

5. What sector (Energy, transportation, agriculture, etc.) is best suited

for CDM-like projects and why?

Definitely energy, since CO2 is the most significant GHG, and reduction by energy-related projects can be accurately monitored. Transportation projects are hard to define (though important). Agriculture even harder. This would cause transaction problems in CDM (not in JI)

6. Which do you think is more feasible for CDM-like projects and why?

efficient energy technologies or renewable energy technologies?

It makes little difference as long as they are favoured by the host countries.

7. What is the best way to facilitate the transfer of technology related to

climate change?

Removal of the impediments cited in 4. Plus there are issues on intellectual property rights.

These have to be guaranteed. Host country has to be more proactive towards CDM.

Public finance of some form is necessary (via equity/debt service, risk coverage, etc.)

8. What do you see as the future for CDM-like activities?

Depends on whether there is a market for such activities. If there is no Kyoto Protocol, there could be the UK emissions trading market, Dutch programme for credit purchase, etc. which enables CDM-like activities.

9. What do you see the role of the private sector, both in Thailand and internationally, in CDM-like solutions? How important is that role?

It is hard to see the private sector not taking a central role in a free market economy, though public sector involvement is also indispensable.

10. What is your impression of the ERI? What can they do to best further the cause of climate change in Thailand and in Southeast Asia?

I wished that the opinion of ERI as a whole was more clear. Nevertheless, I appreciate their presence very much, since Southeast Asian countries do not make their presence felt at COPs very much.

11. What is your primary source for information regarding CDM-like activities?

JIQ, world bank PCF, Dutch ERU-PT, UNFCCC homepages

>Thank you so much for your time!!

Thank you too.

Best regards,

Ken

6.4.6 Black Email Interview

Joe,

see my anwsers below,

Thomas

1. Please explain to us what your organization does and what are your main responsibilities? WE ARE A RESEARCH CENTER DEDICATED TO THE APPLICATION OF ECONOMIC ANALYSES AND POLICIES FOR ENVIRONMENTAL PROTECTION IN THE DEVELOPING WORLD. WE DO APPLIED RESEARCH, CONSULTING, AND TRAINING OF ENV PROFESSIONALS IN THE USE OF ECON INSTRUMENTS.

2. What are your thoughts on the Clean Development Mechanism (CDM)?
SEE THE ATTAHCED STUDY ON COLOMBIAS CDM POTENTIAL, WHICH I DIRECTED WHILE I WAS CHIEF ECONOMIST AT THE MINISTRY OF ENVIRONMENT OF COLOMBIA.

3. What do you see as being necessary for successful CDM-like opportunities to take place? LOTS OF CAPACITY BUILDING IN THE RIGHT PLACES, AN INCUBATOR FUND TO DEVELOP FEASIBILITY STUDIES FOR CDM DEMONSTRATION PROJECTS, AND, MOST IMPORTANTLY, RATIFICATION OF THE KYOTO PROTOCOL BY THE USA.

4. What do you see as barriers to CDM-like opportunities? in Thailand?
- LACK OF RATIFICATION BY THE USA.
- LACK OF UNDERSTANDING LOCALLY OF THE CDM AND ITS OPPORTUNITIES.

- LACK OF AN EFFICIENT INSTITUTIONAL APPROVAL STRUCTURE.

BE CAREFUL WITH THE FORMATION OF NEW STATE INSTITUTIONS FOR CDM, THEY WILL BE NECESSARY BUT THEY MAY BE VERY INEFFICIENT, THEY MAY IMPOSE HIGH TRANSACTIONS COSTS, AND THEY MAY ENGAGE IN SERIOUS RENT SEEKING ACTIVITIES THAT WILL REDUCE THE ECONOMIC INCENTIVE TO THE PRIVATE SECTOR AND MAY DISTORT THE CDM. THE PRIVATE SECTOR MUST BE FULLY INFORMED AND FULLY ENGAGED IN THAILANDS NATIONAL STRATEGY STUDY FROM RIGHT NOW! OTHERWISE THE WELL INTENTIONED BUT UNINFORMED STATE ACTORS MAY MAKE LEGISLATION, REGULATIONS, AND FORM INSTITUIONS THAT ARE DETRIMIENTAL TO THE CDM BEFORE THE PRIVATE SECTOR FINDS OUT ABOUT THE CDM.

5. What sector (Energy, transportation, agriculture, etc.) is best suited for CDM-like projects and why? READ MY CDM STUDY ATTACHED.

6. Which do you think is more feasible for CDM-like projects and why? efficient energy technologies or renewable energy technologies?

DEPENDS ON THE COMPARATIVE ADVANTAGES OF EACH COUNTRY AND THE FINAL OUTCOMES OF THE INTERNATIONAL NEGOTIATIONS.

7. What is the best way to facilitate the transfer of technology related to climate change?

TARGETED CAPACITY BUILDING AND AN INCUBATOR FUND.

8. What do you see as the future for CDM-like activities?

DEPENDS ON THE OUTCOME OF THE INTERNATIONAL NEGOTIATIONS.

9. What do you see the role of the private sector, both in Thailand and internationally, in CDM-like solutions? How important is that role?

EXTREMELY IMPORTANT. THEY CONTROL THE MAJORITY OF THE DECISIONS ON ENERGY, INDUSTRY, TRANSPORT AND FARM PROJECS. THEY WILL DECIDE WHERE, WHEN AND HOW TO MAKE THE MAJORITY OF THE CDM DECISIONS.

10. What is your impression of the ERI? What can they do to best further the cause of climate change in Thailand and in Southeast Asia?

DONT KNOW WHAT THE ERI IS.

11. What is your primary source for information regarding CDM-like activities? THE UNFCC NEGOTIATIONS--I AM A LEAD NEGOTIATOR FOR COLOMBIA, AND THATS WHERE ALL THE INFORMATION DYNAMICS ARE.\

Thank you so much for your time!!

Kasemtas Dardarananda

Jarred Gallagher

Joseph O'Boyle

Jia Yu Zhao

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