



THE EMERGING CER MARKET AND GEOTHERMAL ENERGY POTENTIAL

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ABSTRACT

CER is the abbreviation of Certified Emission Reduction. It will become new service business, which only could be produced in developing countries (Non-Annex 1) in cooperation with developed countries (Annex 1). It was created under Clean Development Mechanism (CDM), as stipulated in Article 12 Kyoto Protocol, United Nations Framework Convention on Climate Change (UNFCCC).

The market should be commenced in January 2000, in order to stabilize the level of Greenhouse gas emission at 5% below 1990's level in 2010. The Annex 1 has committed to reduce the GHG emission at differentiated target (Japan 6%, USA 7% and EU 8%). These countries need help from Non-Annex 1, because the cost to reduce it, is much different between the two groups.

The market is there, but the regulations are still pending. The last COP 6.a. was failed to reach agreement, particularly between USA and EU. It will resume in June/July 2001. For the benefit of all countries in the world, it is expected the COP 6.b. could reach promising agreement between all parties involved.

The geothermal energy is the most favorable for Indonesia to participate actively in the global effort to reduce CO₂ and selling the CER produced by the CDM project at the market price commencing 2008 to the Annex 1. At the same time Indonesia may reach sustainable development.

Geothermal energy in Indonesia has the potential capacity up to 20.000 MW. And its emission rate only 115 grams per KWh. If we compare to the coal-fired power plant it is only approximately 10%. If the acceptable baseline in power generation sector for Indonesia is the coal-fired, Indonesia will get plenty of CER from geothermal sector. (23-02-01)

INTRODUCTION

In 1999, the German government through its technical cooperation body (GTZ) has taken the initiative to award a grant to the Indonesia government to establish a National Strategy Study (NSS) team in 1999, which is to write a **Indonesia National Strategy Study – Clean Development Mechanism (CDM)** as one of 20 potential developing countries (Non-Annex 1) in a programme coordinated by the World Bank.

Prior to this establishment, Indonesia has approved 6 pilot phase projects under Activities Implemented Jointly (AIJ) scheme. One of these AIJ's project had been completed last year, and is to be handed over from the investor (E-7 consortium of energy utilities) to the Indonesian government on March 2001. It is the **Solar Home System (SHS)** located in Nusa Tenggara Timur.

As potential CDM host-country both in energy and forestry (LULUCF), Indonesia has to develop national policies and institutions, and also to identify a portfolio of CDM projects in line with its **national sustainable development planning**.

The study had been started in February 2000 and is expected to be completed in March 2001. The NSS' team is consisting of the Steering Committee (national and international members) and Working Group of 7 national experts. The national working group is assisted by the international consultants provided by the donor country (Germany) and the World Bank.

OBJECTIVES OF THE INDONESIA NATIONAL STRATEGY STUDY (NSS) PROGRAM

The NSS program is designed to be the host-country driven. For Indonesia, the Terms of Reference (TOR) are based on the following objective :

“Provide a tool by which Indonesia’s government can formulate a sound negotiating position vis-à-vis controversial issues related to the CDM and the implementation of the Kyoto Protocol.”

This tool could be acquired only by in-depth study and detailed analysis addressing the following questions :

1. Size CDM potential in Indonesia ?
2. What is the size of the CER's market and also its expected price in the future
3. What are the benefits for Indonesia as host-country, both its industries and people ?
4. What institutions and policies have to be established ?
5. Listing the CDM portfolio projects, which may be offered to the investors.
6. Future Action Plan for the CDM implementation.

BACKGROUND ON THE UNFCCC, THE KYOTO PROTOCOL AND FLEXIBILITY MECHANISMS

“Flexibility Mechanisms The atmosphere does not care where you put carbon into the atmosphere, it does not care if it comes out of North America or

China. So, if the cost of carbon abatement is US\$ 20 in China, US\$ 200 in America, it is much more cost-effective to reduce emissions in China than in America."

Dr. Robert Watson, Chairman of IPCC (December 20,2000

The UNFCCC was inaugurated in Rio de Janeiro in June 1992. The key article in this UNFCCC regulation is Article 4.2, which commits the Annex 1 countries (industrialized) to adopt policies to mitigate global climate change by reducing GHG emissions and enhancing sinks, and communicate their policies and measures with respect to a short-term goal of returning emissions to 1990 levels by 2000. The long-term goal is stabilization of GHG concentrations in the atmosphere. UNFCCC is facilitating to reach this goal by organizing a Conference of Parties (COP) every year commencing 1995.

In COP 1, held in Berlin (March-April 1995) the participating countries or **Parties**, agreed to implement a pilot phase for JI (Joint Implementation), i.e. industrialized countries invest in GHG reduction projects in other countries. The result of this program has been reviewed by end of 1999. This pilot phase scheme is called **Activities Implemented Jointly (AIJ)**. About 150 projects have been approved of which about 60 are undertaken in many developing countries, including Indonesia, Costa Rica etc. Annex 1 countries can not credit the **emission reduction** achieved by the host-countries under AIJ scheme.

In COP 2, held in Geneva (July 1996), no significant decision happened. However, several workshops on AIJ and Sound Environmental Technology were organized by UNFCCC in the same year, i.e. Osaka-Japan, Jakarta-Indonesia etc.

Further in COP 3, held in **Kyoto** (December 1997) the **Parties** agreed on the concept of **Kyoto Protocol**, which provides for **credit** against emission reduction, for projects be implemented in host-countries (EIT and Non-Annex 1).

In this context, the protocol adopted the three flexibility mechanisms, which are afterward called as **Kyoto Mechanisms**, in lieu of the original name **Flexibility Mechanisms** as hereunder :

1. Joint Implementation (JI), as stipulated in Article 6.
2. **Clean Development Mechanism (CDM)**, as stipulated in Article 12.
3. Emission Trading (ET), as stipulated in Article 17.

Under Article 3 of the Kyoto Protocol, the overall commitment is to reduce GHG emissions by about **5%** below 1990's levels during the period 2008 – 2012. It is a substantial step, since many Annex 1 countries already exceed their 1990's GHG emission levels. Some countries such as the United States would need to reduce its GHG emission by as much as **40%** below the projected "business-as-usual" (BAU) emission levels.

Further, the Kyoto Protocol provides in each mechanism, different type of unit, or currency, to denote the emissions or emission reduction exchanged, as follows :

1. Article 6 provides for the transfer of " emission reduction units (ERUs) resulting from projects", This project is only valid between Annex 1 countries and only during the commitment period **2008 – 2012**.
2. Article 12 provides for the exchange of "certified emission reductions (CERs), resulting from the projects". This project is only valid between Annex 1 countries and Non-Annex 1

countries under CDM but already from 2000. This mechanism has dual purpose, for Annex 1 countries to achieve **cost-effectiveness** and on the other side (Non-Annex 1 countries) to support **sustainable development planning**.

3. Article 17 provides for the exchange of "Assigned Amount Units (AAUs). It is only valid between Annex 1 countries. The activity is called **Emission Trading**. The Non-Annex 1 countries will not allowed to participate under this scheme.

In COP 4, held in Buenos Aires (November 1998) the **Parties** agreed a work plan addressing the key technical, methodological and institutional issues which related to all three Kyoto mechanisms. This work plan is named : **Buenos Aires Plan Action (BAPA)**.

In COP 5, held in Bonn (October 1999), no significant decision happened. The review of the AIJ pilot phase has shown that it has given experience to the Non-Annex 1 and Annex 1 countries as well. In this respect it has served as "CDM embryo", before entering into the CDM in 2000. The decision was taken to continue the AIJ pilot phase.

In COP 6, held in The Hague (November 2000), the negotiations collapsed largely because of differences between the United States and the 15-nation European Union, i.e. United States tried to push the inclusion of sinks in CDM. This conference failed to reach agreement and will resume only in June/July 2001 in Germany due to the request of the newly installed Republican Party's government of the USA to postpone the second-part of COP 6 to have more time to prepare for climate talks.

1.1. Findings from the Indonesia National Strategy Study (NSS)

Until February 2001, the Indonesia NSS Program has been running for one year. The main findings which have been collected and analyzed by the national team includes the projection of the emission trends up to 2020, the estimation of the potential market for Certified Emission Reduction (CER) and the investment opportunities under CDM, and the analysis of the emission reduction measures.

In addition, based on the respondents replies on the questionnaires sent by the Ministry of State for Environment in December 2000, the Indonesian government learns more about the opinion of the stakeholders on the following matters :

- A. Sustainable Development Indicators
- B. Sector Priority
- C. Ranking of Project Type
- D. Institution Establishment

The complete result of this CDM survey can be examined in Appendix

1.2. Identification of CDM potential and marginal abatement cost

Indonesia has the potential to become a major **Certified Emission Reduction** supplier, besides China, India, South Korea, Malaysia, Brazil, Mexico and other hundred small countries.

Annual emission inventories have been presented in the **First National Communication of the Republic of Indonesia for**

1990 – 1994. It could be examined that the global warming potential of **CO₂** , **CH₄** and **N₂O** as GHG emissions in Indonesia were growing at the rate **1.6%** per year in the last decades before the economic crisis. CO₂ accounts for almost **70%** and the remaining **30%** is consisting of the other two gases.

The main sources of **carbon dioxide (CO₂)** are energy sector (fuel combustion) and forest sector. Total emission of energy sector increased between 1990-1994 from **128 up to 170 million tons**. Its average growth rate was **5%** per year. **Methane (CH₄)** is released mainly from **agriculture sector**. The second source is **energy sector**, such as exploration and exploitation in coal mining, land preparation, energy combustion and waste management. Energy combustion contributed from **0.32 up to 0.36 million tons** or at the growth rate **2.3%** per year (1990 - 1994). The residential sector is the most significant emitter of methane gas (**> 97%**), and is increasing by **2.3%** per year(**99% from biomass fuel**). Then from the **industrial processes** (carbon black and methanol plants), which emitted **46,000 tons** in 1990 down to **40,000tons** in 1995. The last source is **forestry sector**, its emission decreased due to the rate of forest conversion was decreasing during the same period. Conversely, emission from waste materials were increasing by **2%** per year, which was relevant to the growth rate of urban population. **Nitrous Oxide (N₂O)** emission is mainly produced by agricultural activity, while contribution from energy, industrial processes and forestry was very limited. The highest N₂O emission contribution of agricultural soils caused by application of nitrogenous fertilizers (synthetic nitrogenous fertilizers, animal manure and crop residue).Biomass burning caused by forest fired or conversion and also the agriculture activity may also considered as its sources. The quantity of emission is not only depend on the rate consumption but also the value of emission factor of biomass.

The sources of GHG emission may be listed : 1. Energy industry, 2. Industrial processes, 3. Transportation, 4. Residential and Commercial, 5. LULUCF and 6. Agriculture. The first 4 sectors contributed **30 - 60%**, LULUCF **20 - 50%** and agriculture **15 – 25% from 1990 – 1994**. The high variability of the forestry sector emissions is noteworthy (see **Figure-1**)

The economic projection is based on available data from Central Bureau of Statistic, the GDP growth in 1997 was only **4.6%**. It is less than the previous year growths due to economic crisis happened in mid 1997. It became worse in 1998, GDP decreased sharply and reach minus **13.2%**, and this situation will stay until 2000. In 2002 the GDP growth is expected to bounce back, but most probably to reach **3%** only. It is predicted that the GDP rates will reach **4%** and **5% in 2003 and 2004** respectively. However, in 2010 the real GDP will drop, since Indonesia will no more be an oil exporting country. **GHG emission projection** will depend on the accelerated economic development. The growth rate of GHG emissions (CO₂, CH₄ and N₂O) is anticipated at about **2%** per year in the next two decades. In this prediction CO₂ will account for **75%** and the remaining **25%** is taken by CH₄ and N₂O. The activities in energy industry, industry, transport and residential and commercial will be the major contributor to the GHG emissions. These four sectors will contribute approximately **55 - 77%** and the balance **11 - 33%** will be the forestry sector contribution during the period **1995 - 2020**. The GHG emissions from industrial processes based on production of 21 industrial groups

are presented as the output of macro economic model and IPCC - 1996 guideline. The total emission in **2020** is projected to double compare to 1995 emission. It will happen caused by the population and economic growth, which in turn will increase the fossil fuels consumption. As agriculture based country, CH₄ emission from the agriculture sector will become dominant in the next 30 years. The CH₄ emission was calculated from the projected livestock population and the average emission of each per year. Livestock population is estimated based on the projection of meat demand and the average meat productivity from 1990 - 2020. The growth rate of average livestock productivity was estimated **0.3%** per year. Information on N₂O projection is only from energy and industrial processes sectors. The energy sector is growing from 9,000 tons in 1995 to reach 11,000 tons in 2020. Industrial processes only contribute 40 tons within the projection period.

The options for mitigating climate change :

As described previously that the main GHG emission sources are fossil fuels at different stages of activities: **energy production, energy transformation** and also the **energy combustion** at the end-users' plant sites. The **priority** and **method** to reduce GHG emission will be described in the following matrix :

Energy Industry, Industry, Transportation, Residential & Commercial Sectors

ENERGY INDUSTRY Mitigation option

A. Oil & Gas	<ul style="list-style-type: none"> * Minimizing gas flaring * Improving efficiency in distribution system * Improving energy management * Energetic utilization of flared gas
B. Coal Upgrading	<ul style="list-style-type: none"> * Increasing coal preparation plant capacity * Coal quality upgrading * Improving process management
C. Coal Bed Methane	<ul style="list-style-type: none"> * Utilization of de-gasified methane * Enhanced coal bed methane recovery
D. Power Plant	<ul style="list-style-type: none"> * Improving the thermal efficiency (IGCC, PFBC etc.) * Substitution by renewable energy * Biomass for direct combustion * Fuel switching

TRANSPORTATION Mitigation Option

E. Mass transport and	<ul style="list-style-type: none"> * Application turbo-charger for diesel & gasoline
Natural gas Vehicle (NGV)	<ul style="list-style-type: none"> *Fuel switching from oil to ethanol, CNG and LPG * Adopting new technology: electric and fuel cell * Mass transportation system

INDUSTRY	Mitigation options
F. Pulp & Paper	<ul style="list-style-type: none"> * Adopting new technology * Installing economizer or pre-heater for boilers * Waste management for energy generation * Capturing waste-heat from pulp & paper mills * Installing continuous pulp digester unit
G. Textile	<ul style="list-style-type: none"> * Fuel switching for captive power plant * Adopting co-generation technology
H. Cement	<ul style="list-style-type: none"> * Improving thermal efficiency (wet kiln to dry kiln) * Improving efficiency (dry kiln to pre-calciner) * Modification product specifications
I. Tapioca Starch	<ul style="list-style-type: none"> * Capturing biogas from methane reactor * Waste management for energy generation
J. Sugar	<ul style="list-style-type: none"> * Improving boiler design and utilizing bagasse * Adopting co-generation technology
K. Palm oil	<ul style="list-style-type: none"> * Improving waste management * Adopting digester technology * Improving boiler technology

RESIDENTIAL & COMMERCIAL	Mitigation options
L. Lighting, Cooking & : Other Appliances	<ul style="list-style-type: none"> * Replacing light bulb to fluorescent lamps (CFL) * Replacing 60 watts bulb to 15 watts CFL. * Replacing conventional by electronic ballast * Installing Solar Home System (SHS) * Installing solar water heater at hotels and commercial/office building. * Installing on & off automatic control for street lighting and using CFL. * Fuel switching for cooking * Improving stove efficiency * Improving refrigerator and air conditioner system and efficiency. * Introducing advanced air conditioner technology * Provision of high efficient lighting system

Marginal abatement Cost Curves (MaC Curves) for a set of technologies could be calculated by dividing the different of total cost with different of total CO₂ emission of two successive reductions. Total cost and the total CO₂ emission of energy system at different technologies are estimated based on the result of the MARKAL Model. In every case, some technologies are forced to be chosen to dominate the future Indonesia energy system depending on the case selected. As the method analysis of MARKAL Model is least cost, analyzing the marginal cost of the application of CO₂ reduction technologies

can be conducted by defining the capacity of each the efficient technology and compare to the base case capacity mix.

The selected mitigation options will be compared to the base case: In this section, additional capacity of CO₂ reduction technologies also have included the considerations of distance between supply and demand locations, number of demand, and the industrial economic growth rate.

The following mitigation options have been modeled:

- **Cogeneration technology**
- **Advanced electric motor technology**
- **Solar thermal technology**
- **Compact fluorescent lamp (CFL) technology**
- **Improved refrigerator**
- **Hitech refrigerator technology**
- **New mini hydro power plant**
- **New hydro power plant**
- **New gas combined cycle power plant**
- **Advanced compact fluorescent lamp (ACFL) technology**
- **Compact refrigerator technology**
- **Compact panel refrigerator technology**
- **New biomass power plant technology**
- **New gas turbine power plant technology**
- **Binary geothermal technology (base case)**
- **Binary geothermal technology (increase 0.3 GW in third)**
- **New coal power plant 600 MW technology**
- **New coal power plant 400 MW technology**
- **Standard Fluorescent Lamp (SFL) technology**

Analysis of Possible Mitigation Cases are performed by several model runs and to isolate each individual mitigation option and the related impact on system cost. Some technologies, such as cogeneration, new motor electric, solar thermal, compact fluorescent lamp, improve refrigerator and hitech refrigerator do not increase total system cost, but will decrease it whereas the others will increase it

Application of high efficient technology and substitution of fossil fuels by renewable energy will avoid or reduce CO₂ emission. However, this technology requires more investment.

The technical ranking priority of technological options for reducing CO₂ emission from energy sector in Indonesia excluding transportation sector is based on three considerations. Firstly, the ranking is made based on the maximum CO₂ reduction with the minimum additional cost. Then, secondly, the availability of CO₂ reduction potential. While the third, the accessibility of application for CO₂ reduction technologies. Other technologies that have not been modeled (e.g. reduction of gas flaring), political considerations and stakeholder interests will be taken into account at a later stage.

Based on the amount of CO₂ emission release and total of marginal abatement cost, cogeneration could be ranked as **the top one**. The cogeneration marginal economic gain is **US\$ 64.6** per ton of CO₂, i.e. a reduction of total system cost. Motor electric could be ranked as the **Second** which marginal economic gain is **US\$ 11.4** per ton of CO₂. Further, the last rank of the option, from 17 until 20 are new HSD gas turbine, new coal power plant (400 and 600 MW) and SFL. Those

technologies have marginal abatement costs more than **US\$ 50,-** per ton of CO₂ release respectively.

Transportation Case :

The base case of transportation sector is different from the other sectors. In this sector the efficiency of technologies assumed will increase, but at low rate or almost constant along period. The mitigation options are improvement efficiency technology and Mass Rapid Transport (switching transport mode). Due to the absent of detail data on energy saving in Mass Rapid Transport, this option could not be analysis. The mitigation options by improving efficiency may be listed as follows :

Truck and bus using gasoline fuel; Truck and bus using diesel fuel; Passenger car using gasoline fuel; Passenger car using diesel fuel; and Increasing number of passenger using natural gas.

The first rank of option in the transportation sector is improving efficiency of truck and bus using gasoline. The marginal abatement cost of this technology is **US\$ 9.8** per ton CO₂ reduced, then the second rank is improving efficiency of truck and bus using diesel (**US\$ 5.3** per ton CO₂ reduced). Improving efficiency gasoline and diesel passenger cars are ranked the third and fourth respectively. The marginal abatement cost of improving gasoline is **US\$ 2.1** per ton CO₂ reduced, and for diesel passenger car is **US\$ 8.8** per ton CO₂ reduced. Last rank CNG, its marginal abatement cost is **US\$ 7.5** per ton CO₂ reduced.

Marginal Abatement Cost of Cases in Transportation Sector Appropriate with priority of minimum additional cost per Ton CO₂ Reduced

Ranking of the project type according to priority

The GHG mitigation option rank base on the marginal abatement cost as discussed before could not be implemented directly. Base on that marginal abatement cost of the energy sector and transportation rank then consider another priorities i.e.: urgency of air pollution, technology development level and their potential, the implementation for reducing CO₂ emission priority rank shown as follows :

Project Type Ranking Based on Technological Option of CO₂ Reduction

Project Type	Priority
Cogeneration	5
Fuel switching, oil to natural gas	5
Small hydropower	5
Geothermal Energy	5
New, highly efficient gas-fired power stations	4
Replacement of inefficient electric motor in industry	4
Biomass energy	4
Use of gas as transport	4
Replacement of incandescent light bulbs with compact fluorescent lamps	4
Improvement in fuel efficiency of cars	4
New, highly efficient coal-fired power stations	3
Provision of public transport (Mass Rapid Rail Transit)	3
Large hydropower	3
Solar thermal energy (small-scale)	2
Photovoltaic	2

Note: scale from 1 to 5

1= very low

5= very high

1.2. Assessment of CER international demand

Indonesia's NSS assessed the potential market of **Certified Emission Reduction (CER)** which will be available commencing **2008**, in case the host-country will prepare to implement CDM projects in early stage. The industries recognize that CER is a new product. The CER trading is possible before 2008, unless the Indian negotiation position prevails.. In the early stage the primary market will emerge, but it is limited to the investors who will prepare to invest in the selected CDM portfolio projects. It may be energy efficiency or renewable energy projects as described in the last part of this summary.

However, during the time the host-country will have the opportunity to explore the size of the secondary market. This market potential will be much influenced by at least the following variables : **total demand of fungible products, Annex 1 parties GHG emission growth, the supplementarity measure and also most important one is the “hot-air”** coming from EIT countries (Economic in Transition).

In Appendix 6 (long-format report), for **2010** the total demand of Annex 1 parties is estimated to reach : **515.5 – 620.6 Mtons Carbon or 1,890 – 2,275 Mtons CO₂ equivalent**.

On one hand the early stage of CDM project implementation will raise the **competitive-advantage** for the host-country, but on the other hand, if too many CER could be produced, first it will depress the market price from 2008 and another disadvantage for global, the Annex 1 parties will be lazy to do their home-work. It is the reason why the **supplementarity measure** has to be decided as early as possible by the next COP. The matter will become worse, if only Annex 1 parties is eligible to participate in the Emission Trading as stipulated in Article 17 of Kyoto Protocol.

From the marketing point of view, it seems the host-country has to wait, even though the study and preparation of the CDM implementation could be start immediately after the NSS study completed. The real commencement of CDM projects should be postpone until the next COP firmly decide both **supplementarity** and **fungibility principles**. Further, the Non-Annex 1 parties is also eager to watch the **ratification of the Kyoto Protocol** by at least **55%** of the country members which emitted **55%** of the total GHG emission to date.

The size of the international market will have significant impact on the future CER market price. If the market is small, and conversely the supply is large the price will be low. If it will happen, the **financial benefit** for the host-country and its industries as well will be unattractive.

The source of emission credit will come from two main suppliers : **Non-Annex 1 parties** and **EIT**. Based on the expert study the market share between these two groups is anticipated **77%** and **23%**. Non-Annex 1 parties has the capability to produce CER from the **energy and industries sectors** (Algas and Uep studies) in total **1,467 – 1,907 Mtons CO₂ equivalent** in 2010. Two giant countries **China** and **India** will be the biggest suppliers and followed by Indonesia

South Korea, Malaysia, Brazil and Mexico. The last three countries might become significant suppliers in the future, if **LULUCF** is inclusion in the CDM.

The **market price** is still unclear. The Algas and UneP studies estimated the Marginal Abatement Cost (MaC) approximately **US\$ 25,-** per ton CO₂. The Stappa (USA) reported that the current contract between the sisters companies of the British Petroleum (BP) Amoco, Arco, Castrol's group commencing December 1998 is **US\$ 17,-** per ton CO₂. It is not an open market. The latest development of this BP's transaction indicated quantity increase significantly, and consequently the transaction price down to **US\$ 10,-** per ton CO₂.

This deteriorated price has not been influenced by the "**hot-air**" yet. If "hot-air" is freely to enter the secondary market commencing 2008, it may drop the market price below **US\$ 10,-** per ton CO₂. The "hot-air" will become threat to the CER supplier, i.e. **Indonesia**.

Last question which will be crucial for Indonesia is : **How much the potential CER market share for Indonesia in 2010 ?**

It is understood that the total share for 130 countries only **28%**. Assuming that Indonesia may reach **15%**, it means the capacity to produce CER will be in the range **95 - 115 Mtons CO₂** in 2010. If the CDM projects could be commenced in 2004, the average production is **13.5 - 16.5 Mtons** annually.

Indonesia's CER market share in 2010 approximately :
95 - 115 Mton CO₂

1.3. Benefits for Indonesia as CDM host-country

In the previous parts (1.1. and 1.2) it has been described the Indonesia's potential to produce Certified Emission Reduction (CER) and the emission credit market which will develop commencing 2008. However, Indonesia NSS has to examine carefully the **advantage** and **disadvantage**, if Indonesia will decide to participate actively in CDM. People recognise that the **ultimate goal** of UNFCCC is to stabilize the GHG emission in the atmosphere. On the one hand, the CDM shall support Non-Annex 1 host parties to achieve **sustainable development**. On the other side the Annex 1 parties will gain the financial benefit, through the **cost-effective** principle coincidentally to meet their obligation to reduce the level of GHG emission. For this reason, the Non-Annex 1 parties intend to obtain the equal share of the **financial surplus generated by implementing CDM projects**. (**Josef Janssen**). It is the one which Indonesia would think as the direct benefit. In addition, there are secondary benefits, as listed hereunder : 1. Improvement of human resources, 2. Technology and know-how transfer, 3. Energy saving and 4. Improvement of local environment.

Indonesia government has issued the latest **GBHN** for period **1999 – 2004**, as guidance of the economic development, which its formulation could be elaborated briefly as follows : 1. **Resource allocation** will be based on market mechanism, 2. **Sustainable development** is a must, 3. The priority of economic development will focus to **small** and **medium enterprise (SME)**, 4. Government will only develop the

infrastructure, i.e. energy and electricity generation, transportation and water supply, and 5. Government will support the adaptation of environmentally sound technology.

To guarantee that CDM will be useful for Indonesia, from the planning until the implementation stage, every CDM project has to adhere the **national priorities** as stipulated in the **GBHN (1999 – 2004)**. The eligible CDM projects in Indonesia have at least to meet the following **Sustainable Development Indicators** as listed below :

1. No adverse environmental impact,
2. Environmentally sound transfer of technology
3. Stakeholder participation
4. Socio-economic consideration
5. Local economic benefits
6. Capacity building improvement
7. Equitable distribution of benefits
8. The market openness of CER to Annex 1,
9. Community development program
10. Respect of "ulayat" right on land
11. Net job creation (employment increase)
12. Use of implementable technology
13. No net long-term increase in external debt burden and
14. Increase foreign currency reserves

Each CDM project has to obtain prior approval from the host-country government, before it can be implemented. Like other direct investment projects, the feasibility study must be undertaken before host-country government approval issued. If the project is eligible, because it is in line with the national priorities, it must be **screened** to pass through at least the following 3 parameters : **1. Environmental Aspect, 2. Economic Aspect and 3. Social Aspect**.

1. Environmental Aspect :

As the goal of CDM is to support achieving sustainable development in the host-country, therefore the first screen is the contribution of the CDM project to the environmental improvement. The proper selection of technology, technically and ecologically is very important. There are several group of CDM projects that can be operated, as listed below : 1. Energy conservation, 2. Renewable energy, 3. Fuel switching 4. Biomass energy, 5. Waste management, 6. Agriculture, 7. GHG direct capture and 8. Carbon sink (forestry). The result of CDM survey, which total respondents **52** on type of GHG reduction and removal can be examined in the Appendix.

2. Economic Aspect :

The feasibility of the CDM project will depend on the **economic benefit** including the financial return after income from CER sales included. Indicators such as Net Present Value (NPV), Internal Rate of Return (IRR) or Benefit Cost Ratio (B/C) are still needed for assessment of the CDM project viability. The analysis between the backward and forward linkages of CDM project is also important to assess effects on the sector.

3. Social Aspect :

The sustainability of every CDM project depends on how much local people will get the benefit from it. Many quarrels are appearing currently between the industries and local community caused by unequal benefit sharing. The community never get the benefit from the project. In contrary, they feel that the existing projects nearby their home have led to **disadvantages**. In addition, they feel that their rights have been ignored, or even been taken

away. A CDM project be feasible socially, if it has capability to improve local community welfare and increasing social cohesion.

Due to the implementation of Regional Autonomy Law (UU No. 22/1999) commencing January 1, 2001, Indonesia NSS also analyses the **strengthening of human capacity** which leads to an improvement of bargaining positions compared to Annex I countries, both at the National Level and Regional Level (Province and Region). The following factors must be paid more attention, particularly that related to the implementation of CDM projects in the regions.

A. National Level :

1. To provide information of potential GHG reductions by sector, 2. Clearness of domestic regulations on CDM, 3. Establishment of inter-department institution to manage CDM and 4. Strengthening domestic auditing institution for verifying , certifying and monitoring the CDM project.

B. Regional Level (Province and Region)

1. Information on type and location of potential DM projects, 2. Clear regional regulations on CDM, 3. Strengthening local institutions for controlling and evaluation of projects 4. Improvement infrastructure.

Further, at the industrial level, strengthening the bargaining positions is also important, at least the attention has to paid to the following subjects : 1. Strong and good corporate governance, 2. Clear long-term planning, 3. Well performances before the CDM project is planned, 4. Capability to identify which CDM project have the potential to produce CER, 5. Capability to assess the value of benefit and cost of the CDM project.

Stakeholder Opinion on Sustainable Development Indicators

	Criterion	Total Score	Rank
A..	No adverse environmental impact		
C.	Environmentally sound transfer of technology		
E.	Stakeholder participation		
K.	Socio-economic consideration		
L.	Local economic benefits		
M.	Capacity building improvement		
B.	Equitable distribution of benefits		
N.	The market openness of CER to Annex 1		
H.	Community Development Program		
I.	Respect of "ulayat" right on land		
D.	Net job creation (employment increase)		
J.	Use of implementable technology		
G.	No net long-term increase in external debt burden		
F.	Increase foreign currency reserves		

Survey in December 2000.

1.4 Institutions and Policies

Political and Policy Framework

The prospect of CDM implementation in Indonesia heavily depends upon the current regime in the government as well as the continuous changes towards a more democratic society. In 1999, Government announced important laws: Law number 22 on Local Governance and Law number 25 on Balancing of Finance between the Central Government and the Provinces. This new policy is an acknowledgement of decentralization and the vertical power distribution principle as its form for governance. Now, the central government has formally agreed to share its power with the regions. Autonomy mainly embraces political power and decentralization administrative power.

Transferring duties and functions of the central government to the regions starting January 2001 is an important issue of governing through decentralization. This includes authority of the regions to administer national resources in their region and seek loans from domestic and international sources. How this will happen in detail, however, is still unknown.

The provision of broader authority to Local governments will give them more leverage to manage and utilize central and local budgets based on Local needs without interference from the central government. This also means the authority to utilize potential resources in the region, development of initiatives, set priorities and make decisions for the benefit of the region, and reach an appropriate balance of finance between the central and Local governments based on just and objective criteria.

These political changes have to be considered in the CDM implementation. The basis of the newborn politics is still developing to its form, which no one knows the final form, which may or may not be favourable to CDM. However, CDM has to find the political ground which is sound in the always changing political environment. It is very much likely that some regions will implement policies favourable to CDM whereas other regions may have difficulties to become attractive CDM hosts. The differentiation may be related to the level of education and training of local bureaucrats and to the amount of natural resources available in the respective region. At this point, it is not clear which provinces would turn out to be favourable to CDM. Local and central government authorities are currently negotiating the scheme for local foreign direct investment (FDI) and local authority to manage project loans since it would affect national picture of total loans and its ability to repay. If one sees on the wealth of local natural resources and the availability of human resources, some provinces may qualify as areas for CDM to develop.

As a CDM host country, Indonesia must consider the CDM host to fulfill its potential for both emission reduction and sustainable development goals, it is vital that CDM be fostered that allow the greatest possible breadth of projects to be fully financed by investor countries. With currently high political heat in the country, this situation is not conducive for unilateral CDM and investment. Moreover, local capacity for investment is also considerably low. Therefore, it means that CDM in Indonesia should be treated by project financing techniques to ensure its success and by political and security stability.

It is recommended that the government develop more specific CDM policies and regulations for relevant sectors, i.e. commercial, industry, transportation, and power generation. The policies should cover sustainable development plan, scheme for investment, sustainable natural resource management, institutional coordination, and public participation.

CDM Institutional Arrangement

For private-sector project-based finance to flourish in the CDM process, there is an immediate need for capacity building among the potential participants, particularly in the host countries. There is danger that without such capacity building, the CDM could simply replicate forms of development capitalism that are often considered exploitative by observers in many developing countries.

CDM National Board needs to be formed to facilitate CDM policy formulation & its implementation. The CDM National Board should consist of representatives from government (central & local levels) originating from sectors relevant to CDM, professional & industrial associations, experts from universities & research institutions, NGOs, financial institutions, environmental forums/networks, and chamber of commerce. The Board members should presumably have experiences with respect to public and environmental policies, financial and portfolio management, project assessment, contractual management, finance, and marketing of financial products. The main tasks of CDM National Boards as follows:

1. To develop national & local policies to facilitate CDM implementation in Indonesia which has linkages to Indonesia commitment on international agreement and protocol as stipulated under Kyoto Protocol.
2. To provide advice, direction, and support for the operation of Secretariat
3. To facilitate and assist in networking (international & national in scope) for the success of CDM implementation

The State Ministry for Environment or through National Committee on Climate Change can nominate membership for CDM National Board. The nomination and selection should follow general principles based on professionalism and needs for the Board to function properly. Interest to accommodate more certain institutions should be avoided to prevent disharmony in the Board. The membership may be divided into 2 categories, i.e. permanent members and temporary members ad hoc). Permanent members are representative from institutions such as sectoral departments/Ministries. These can be members from central government: State Ministry of Environment, Ministry of Industry and Trade, BKPM/Investment Board, BAPEDAL, Ministry of Mines and Mineral Resources, Ministry of Forestry, Ministry of Agriculture, Ministry of Transportation, and Ministry of Finance. The non-government agencies serving as permanent members are national NGOs and environmental networks, chamber of commerce, universities, and financial institutions. The nomination of temporary members / ad hoc should be based on the project reviewed. Sectoral and technical considerations should be enforced in the selection of temporary membership. Temporary members may be nominated from the industrial associations, selective NGOs and experts from universities depending on the need of the CDM project under review. The role of State Ministry for Environment and National Committee on Climate Change should be central since their expertise and representation are acknowledged in the international climate change fora.

Similar memberships should be applied for accommodating local CDM projects. The investment Board/BKPM and other sectoral divisions within local government should be accommodated as members. Such local form of CDM Board should also be made possible to facilitate regional or local CDM implementation. In general, members of CDM Board should serve for no more than 4 years to keep the organization flexible for necessary organizational changes.

1.5 Project Pipeline

Selection of CDM Projects

In general, Indonesia views that controversial issues surrounding CDM need to be resolved before the Protocol comes into force. As such, to make the mechanism workable, the accountability and transparency of the mechanism should be guaranteed through proper auditing systems. It also emphasizes on the importance of domestic actions taken by Annex I Parties before implementing the CDM in developing countries. With regard to national CDM projects, Indonesia considers that host country should be given priority to determine projects and entitled for assistance.

The suggestion to take into account the country's decentralization plan, which soon will come into force, is pronounced in many occasions. Under regional autonomy, appropriate consideration should be given to the sharing of power, financial obligations, as well as human resource between governments at higher level and lower level.

The Directorate General of Electricity and Energy Development (DGEED), the institution responsible for drafting energy policy in Indonesia, has embarked upon CDM issue and in particular views the needs to evaluate thoroughly the long-term and short-term benefits of the CDM implementation, give priority to the National Capacity Building and Technology Transfer, encourage its implementation through a pilot phase, give priority to technologies that are proven, commercial, and easy to comprehend by local skills.

Opportunities in the energy sector are open in the areas of renewable energy, energy efficient technology, clean technology, and clean production technology; while in the transport sector the followings are encouraged: development of lead-free gasoline, utilization of LPG and CNG, and mass rapid transport system.

In the electricity sector, the main priority for the State Electricity Company (PLN) at current condition, as suggested in its short-term planning, is to restore its financial viability and seek ways to financing postponed projects. In Java and Bali, the country's densely populated islands, demands continue to rise despite the crisis, whilst in the outer islands blackouts and brownouts occur more frequently as the old generators are in desperate need for replacement. Many PLN's projects in energy efficiency and generator replacements have been put in halt due to lack of funding.

Due to flexible interpretation of 'sustainable development' and 'benefit for the host country', international agreement on the *basic* project criteria should be pursued. While national (and international) criteria to determine priority projects have not been established, general criteria should be introduced to prepare project host and investors with plausible requirements for eligible CDM projects.

CDM Project criteria should be set by taking into account the following key aspects, based on:

- the most current UNFCCC documentations on CDM project criteria,
- lessons learned from implementation of AIJ projects in Indonesia, and
- general procedures for project development in Indonesia.

It is proposed that CDM Project criteria be set by taking into account key aspects as follows: legal aspect, sustainable development,

environmental and social aspect, policy and institution aspect, and economic and financial aspect (details available in the long-format report). It is important to note that the list serves only as an indicative guideline, not restrictive, and will be adjusted to internationally agreed CDM eligibility criteria.

At this stage, and in general, AIJ projects could be expected to fill such requirements, given that these projects were started with an explicit target to reduce greenhouse gases emission; thus, adjustments towards CDM requirements would be much easier. In addition, the economic study of the projects may also have anticipated the accounting of abatement cost, legal status (ownership issue) of the project, and eligible period emission reductions.

CDM Project Cycle

Project development for Indonesia CDM projects can be divided into three stages, i.e.:

1. Phase I: Initial Assessment
2. Phase II: Qualification
3. Phase III: Project Execution

Phase I is a preliminary assessment comprising a) Project Identification; b) Project Basic Design; and c) Project Appraisal by National CDM authority. In the Qualification stage, Project Feasibility Study, Project Financing, and EIA, are carried out. The results should be submitted as one bundle of document for validation and approval. Following the approval, projects will be registered with the UNFCCC Secretariat, and may proceed to the Project Execution stage where process of gaining CER will actually be taking place. This stage will consist of consecutive steps as follows: Construction and Operation, Emission reduction monitoring, Emission reduction verification and certification, and Issuance of CER.

In this scheme, a National CDM body is introduced and it will function to act as a focal point of the national CDM program; approve nominated CDM projects at national level, provide library of information and database on CDM related activities that are accessible for public use, and liaise between the country and the UNFCCC Secretariat.

Specific Modalities

Baseline and additionality

In order to achieve environmental integrity and to ensure real, measurable, long-term environmental benefits are achieved, baseline methodology and measurability and verifiability of CO₂ reductions are of prime importance. Specific guidance for these issues is requisite and need to be agreed at international level to ensure consistency of the CERs quality produced worldwide, as well as to assure that the objectives of the Convention and the Protocol will be met.

Currently there are three kinds of additionality that are mostly discussed, against which a CDM project shall be measured: environmental, financial, and investment additionality. Any decision made on additionality should not discourage opportunities of clean projects that could not be implemented without the CDM scheme. Rules for additionality should be set in such a way that it is not too complex thus incurring high administration cost and inviting less investments, but not too weak thus exposing higher risk for system corruption and

undermining criteria of sustainable development, although it may invite more investments.

The baseline study should contain the following items: Definition of system boundary, Type of baseline and baseline methodology used, Additionality, Project lifetime, Compliance with national environmental standards and related regulations, Abatement cost, and Leakage discussion.

Methods for Determining Baseline

Four baselining methods that could be possibly applied in Indonesia are discussed in the long-form report:

- 1 Sectoral Baseline (Model Simulation);
- 2 Multi-project Baseline;
- 3 Project Specific; and
- 4 Simplified Baseline for Small Projects.

Abatement cost and economic analysis

The estimate of abatement cost normally is estimated as the difference between the costs of baseline case and the project.

Project proponents will need to undertake the economic analysis using methods that best suits the project objectives, taking into account all cost components such as capital and investment, operation and maintenance, transaction cost, and other costs. Additional costs may incur as a result from complex baseline determination, negotiation of CER sharing, adaptation fund, sustainability requirements, and risks. Ancillary benefits may also be listed: quality improvement of surrounding environment, reduced pollution, better social condition, jobs creation, and many others; and wherever quantifiable, these benefits can be included in the estimation of total benefits accrued from the project.

Credit Sharing

The distribution of CERs and financial revenues generated from a CDM activity will be carried out in accordance with negotiated agreement prior to project inception. It is important to stress here that all project participants ideally should have equal knowledge and capacity to ensure contractual equity and avoid a situation of exploitation (e.g. risking country's future development in return of short term financial gains) concerned by most host countries.

Marketing and promotion

To create positive and sound market climate for CDM projects, market barriers that may hinder the implementation of CDM should be identified. In order to overcome these barriers, policies, incentives, and regulations conducive to the market of carbon projects must be established. This section particularly reviews potential market barriers of CDM projects and discusses possible strategic actions to deal with them by cost minimization and appropriate promotional activities.

Capacity Building

Capacity building is imperative in the implementation of a CDM project, particularly to address the limited capacity with respect to the transfer of knowledge and technology for climate change mitigation in the developing countries. Furthermore, as a new mechanism CDM entails procedures and modalities that should be learned, clearly understood, and can be executed by all Parties involved in it. While participation in CDM is voluntary, the capacity

of CDM stakeholders to embark on activities in the CDM is presumably limited (in particular, negotiation skills); therefore, human and institutional capacity building should be an integrated part of the CDM establishment itself.

Potential CDM projects

While CDM criteria have not been fully developed, this section attempts to nominate projects that could be candidate for CDM projects with the purpose of preparing the Indonesian government with a list of possible, realistic projects when the CDM comes into force. The following table presents potential CDM projects in Indonesia.(as attached list).

2.0. Recommendation on negotiating position

Indonesia as one of parties from Non-Annex 1 Parties should have a firm position on these issues for achieving the dual objectives of the UNFCCC by implementing CDM :

2.1. Sustainable development

2.2. GHG emission reduction

The following points should become the sound negotiating position for Indonesia

- A. The need of CDM pilot initial phase in Indonesia
- B. Ceiling on the Kyoto Protocol
- C. International structure design of CDM
- D. Adaptation cost and administration tax of CDM projects and economics implication
- E. Baseline determination
- F. Risks, problem and opportunities of CDM forestry project

- **Candidate for CDM Projects***