

## Increasing the Value of the Carbon Credit Generated by Geothermal Power Projects Through Gold Standard Certification

Paul Butarbutar

South Pole Carbon Asset Management, Jl. Terusan Hang Lekir II No. 15 Jakarta 12220, Indonesia

p.butarbutar@southpolecarbon.com

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### ABSTRACT

Geothermal is one of the renewable energy sources that can be utilized to generate electricity. Generating electricity utilizing these geothermal sources can be claimed as reducing emission, thus generating Certified Emission Reduction (CER) in accordance with the Clean Development Mechanism (CDM) Rules of the Kyoto Protocol.

Several Geothermal Power Plants have been developed as CDM projects and are currently in various stages of CDM cycles. Some projects have been registered within the Executive Board (EB) of CDM, such as San Jacinto Tizate Geothermal Project in Nicaragua, Lihir Geothermal Power Projects in Papua New Guinea, and Darajat Unit III Geothermal Power Project in Indonesia. Some are in the validation stage, such as Kamojang Geothermal Project in Indonesia. All of these projects have been following the normal CDM cycle.

To increase the value of carbon credit generated by a geothermal power project, it can apply for an additional certification scheme, the Gold Standard Certification. This certification can increase the value, since more than 40 non-governmental organizations have endorsed it and many buyers request Gold Standard Credit. Having this additional certification will allow the project owner to request a premium price for the CER generated.

The paper will describe how CDM can increase feasibility of geothermal power projects by claiming CER. Also, the paper will describe how the Gold Standard Certification can enhance the value of the CER generated by the geothermal power projects.

### 1. INTRODUCTION

The Kyoto Protocol officially came into force in February 2005. There have been a lot of projects registered since then, as CDM projects. To date there are 1647 projects registered as CDM projects and almost 60% of these projects are in energy industries, including renewable energies.

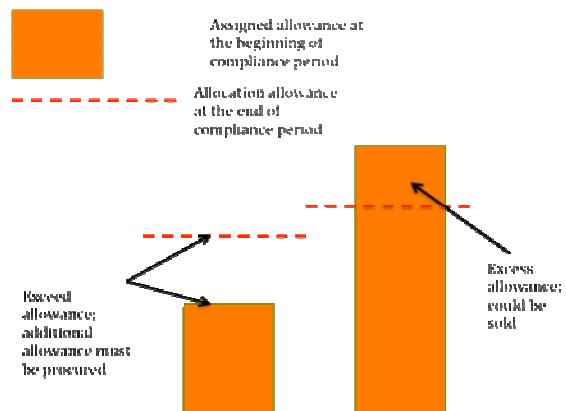
Geothermal power plants are among those renewable energies that have been registered as CDM projects. Lihir Geothermal Power Plant Project was among the first geothermal project registered as a CDM project. The others were San Jazinto Geothermal Power Plant, Drajad III Geothermal Power Plant, Lahendong Geothermal Power Plant, and others.

The additional revenue as a proceed from selling carbon credits from the geothermal power plant project has been able to enhance the feasibility of the geothermal power plant project, where a large amount of investments and high investment risks are to be managed.

### 2. INTRODUCTION TO CARBON MARKET, CAP AND TRADE SCHEME

#### 2.1 Carbon Market, Cap and Trade Scheme

Cap and trade scheme has become the preferred approach in the carbon market. In the cap and trade approach, every participant will be assigned an allowable emission to be emitted; means that the participant is allowed to emit greenhouse gas emission at the maximum of the allocated allowance. In the case where a company emits less emission during the period, the participant can sell the remaining allowance to other participants that need extra allowance due to the fact that their assigned allowance is not sufficient. In the case where the participants emit more than the assigned allowance and do not buy any allowance to comply at the end of the compliance period, the participants have to pay fine.



**Figure 1: Illustration of a cap and trade scheme**

#### 2.2 Global Carbon Market

In general there are 2 main carbon markets, namely compliance market and voluntary market. The compliance market covers the Kyoto Market, EU ETS, and domestic markets such as New Zealand, Australian, Japan and others, which are related to the mandatory implementation of a cap and trade regulation. On the other hand, the voluntary market covers the generation of verified emission reduction according to VCS standard or exchange for trading emission such as Chicago Carbon Exchange (CCX).

Carbon credits generated by CDM or JI projects can be sold to compliance markets. Normally participants buy the credit for compliance purposes. Therefore, these carbon credits that are very liquid can easily be sold to compliance buyers.

In contrary, carbon credits generated in accordance with a voluntary standard (VCS) can only be sold to a voluntary market; it is not suitable for compliance buyer. However, there are more and more companies willing to buy carbon credits from such projects for the image building or their

willingness to contribute to the mitigation of climate change.

### 2.3 Challenge of the Global Carbon Market

Compared to 2008 the current carbon credits price has fallen by more than 50%. One of the main reasons for this problem is the economic crisis. This has a high impact on the carbon aggregator or pooled buyers, which are lacking forward sale arrangement. This situation may result in situation where the projects will not proceed due to difficulties in getting loans and narrowing windows for getting carbon credits pre 2012.

On the other hand there is already some positive sign in development of the carbon credit's price. This is due to the fact that there is a high expectation that there will be a decision by end of this year or latest in 2010 about the inclusion of CDM-model in the post 2012 agreement. Also, the fact that new domestic market, such as New Zealand market, Japan Market or Australian Market would accept credits from CDM, and this will be extended to 2020 or beyond. There is also a sign of increase in the voluntary market.

## 3. CLEAN DEVELOPMENT MECHANISM

### 3.1 Objectives of the CDM

According to the article 12 of the Kyoto Protocol, CDM has the purpose:

- To assist the Non-Annex I parties to contribute to the objectives of the UNFCCC;
- To assist the Non-Annex I Countries to contribute to the sustainable development of the host country;
- To assist Annex I parties to meet their emission reduction obligations;

### 3.2 CDM Eligibility Criteria

In order to be eligible as a CDM project, the following criteria has to be fulfilled:

- CDM projects have to be implemented in Non-Annex I country and the host country must be a Party to the Kyoto Protocol;
- Participation in the CDM project has to be a voluntary participation;
- CDM projects have to contribute to sustainable development of the host country, which has to be confirmed by the host country in the form of issuance of Letter of Approval (LOA);
- CDM projects have to be able to provide real, measurable and long-term benefits related to the mitigation of the climate change;
- CDM projects have to show that the emission reduction would not occur without any incentives from the CDM;

### 3.3 CDM Project Cycle

The development of a CDM project will take a certain time in accordance with the following project cycle:

- Feasibility and due diligence: the first step in the development of CDM project is to assess the eligibility and feasibility of a project. This step is important to

check whether the project, according to methodology approved by the Executive Board of CDM, is eligible as a CDM project, and to check whether the amount of Certified Emission Reduction (CER) to be generated is economically feasible to cover the transaction cost of CDM;

- Project Design Document: if the project is eligible and feasible, then a project design document (PDD) will need to be developed. PDD will describe regarding the project, how it will reduce emission, how it will prove additionality, how it will monitor the emission reduction, and other related information. This PDD will become the basis for the implementation of the project;
- Stakeholder Consultation: in the CDM context the local community needs to be consulted. It has to be discussed what would be the impact of the project on them, especially on the economy, environment and social issues. If there is a concern of the local community on the project implementation, the project owner will have to discuss how to deal with that concern;
- Validation: a Designated Operational Entity (DOE), companies accredited by CDM EB, will conduct the validation. The purpose of the validation is to make sure that the development of the PDD is already in line with the methodology approved by CDM EB;
- Approval from Host Country: the approval from host country is a way to check whether the proposed CDM projects meet the sustainable development criteria of a host country;
- Project registration: once the validation is completed and an approval from the host country is received, the project will be submitted to CDM EB for registration.
- Project Implementation: once the project is registered then the project implementation can be started, this means, the measurement of the emission reduction can be started.

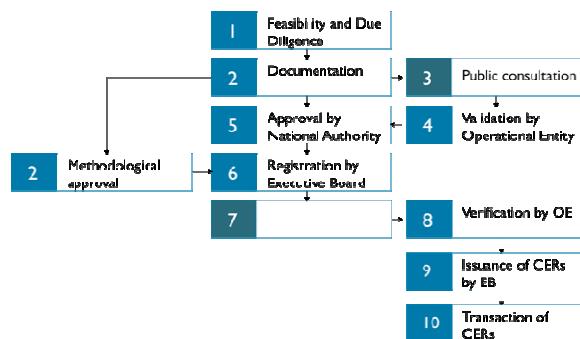


Figure 2: CDM project cycle

- Verification: after a certain period of project implementation or once the emission reduction has been accumulated, the project owner can decide to go for verification. This verification will have 2 main purposes, first, to check whether the project implementation is implemented in accordance with the PDD, and second, to check the accumulated emission reduction achieved by the project of that particular period;

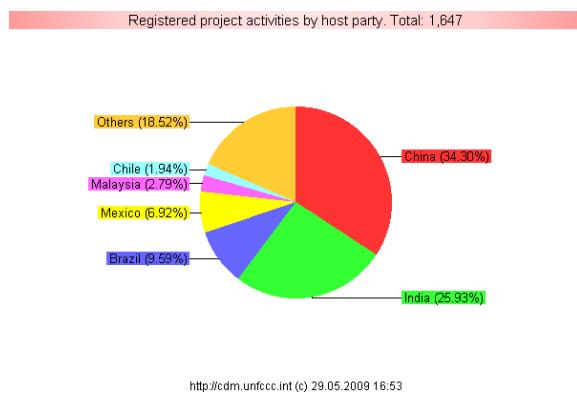
- Issuance of CER: based on the verification report submitted by DOE, the CDMEB will decide whether to approve the certification of the emission reduction. If yes, then EB will issue the Certified Emission Reduction (CER) achieved by the project for that period;
- Transaction of CERs: once issued then the CERs can be sold to the market.

### 3.4 CDM Statistics

The following statistics show the development of CDM projects since the Kyoto Protocol entered into force in 2005:

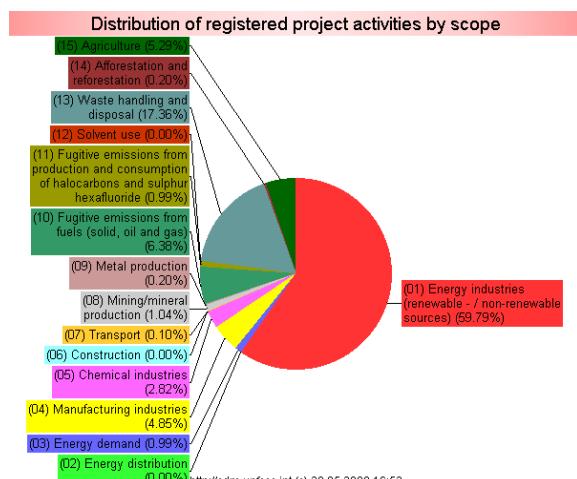
- Number of registered projects: 1647
- Number of CER issued: 287,819,365
- Expected CERs from registered project up to 2012: > 1,610,000

China and India dominate the registration of the projects, while China (128,239,098), India (66,118,457), South Korea (38,198,942) and Brazil (30,147,334) dominate the CER issuance.



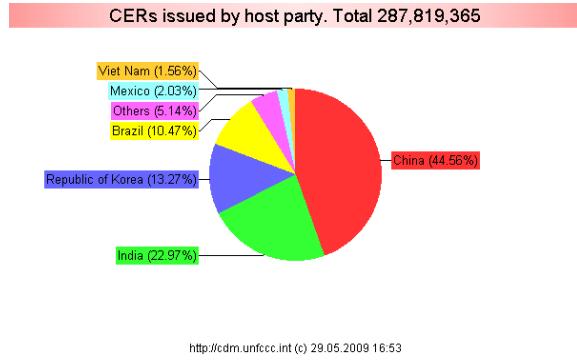
**Figure 3: Registered project by host countries.**

Source: UNFCCC



**Figure 4: Registered project by scope.**

Source: UNFCCC



**Figure 5: Issued CERs by host party**

Source: UNFCCC

## 4. CDM GOLD STANDARD

### 4.1 Gold Standard Foundation

The Gold Standard Foundation is a non-profit organization under Swiss law that operates a certification scheme for premium carbon credits. The Gold Standard logo is a trademarked brand that represents premium quality in the carbon market. It provides assurances to buyers of carbon credits bearing this label that planned emissions reductions are realistic, and that they will be generated in ways that contribute to sustainable development and provide local benefits. Because of these assurances, carbon credits that are sold with the Gold Standard label fetch a premium price.

Gold Standard credits (GS-CER and GS-VER) are offered for sale in compliance offset markets established by the Kyoto Protocol and in non-Kyoto voluntary offset markets.

The Gold Standard Foundation is owned by its NGO supporters, currently numbering over 60 NGO worldwide. These NGOs have formally endorsed Gold Standard objectives, methodologies and rules of engagement. They commit to promote sustainable development through carbon-offset markets that are characterized by transparency and equality of access for all market participants. To this end, developers of Gold Standard projects are required to use a bottom-up and integrated approach that puts particular emphasis on incorporating feedback from local stakeholder consultations. A main tool of the Gold Standard method is the Sustainable Development Matrix - a tool that project developers use to check that their projects are designed to make significant contributions to long-term sustainable development and thus qualify to display the Gold Standard logo.

### 4.2 Goal of the Gold Standard Certification

The primary goal of the Gold Standard certification scheme is to use markets for greenhouse gas reductions to bring about a rapid shift from dependence on fossil fuels to a sustainable energy economy, and pull carbon offset markets towards higher quality by regulating and monitoring the impact of emissions reduction projects on sustainable development.

Renewable energy and end-use efficient projects with sustainable development benefits are eligible to apply for registration with the Gold Standard.

### 4.3 Stages in Gold Standard Certification

The six stages leading to issuance of Gold Standard carbon credits are:

**I - Plan**

1. Get familiar with Gold Standard Method and assess project eligibility
2. Begin drafting Project Design Document (PDD) and Gold Standard Passport
3. Open an account in the Gold Standard Registry and Project Administration System

**II - Design**

4. Select baseline and monitoring methodologies
5. Assess additionality
6. Assess sustainability
7. Apply for a pre-feasibility assessment if required
8. Organize and report on local stakeholder consultation
9. Revise PDD and Gold Standard Passport
11. Obtain Gold Standard applicant status
12. First round of Gold Standard stakeholder review

**III - Validate**

13. Validation by DOE
14. Submit completed and validated PDD and Gold Standard Passport
15. Second round of Gold Standard stakeholder review

**IV - Register**

16. Submit registration documents and pay fee

**V - Verify**

17. Monitor and report on emissions reductions and sustainable development
18. Verification and certification by DOE

**VI - Certify**

19. Gold Standard review and certification

20. Gold Standard Foundation issuance of carbon credits and labels

21. Certification renewal

**4.4 The Impact of GS Certification on Carbon Prices**

Responsible carbon credit buyers put some pre-conditions on their decision to buy carbon credits from various broker or projects. Due to the fact that more and more buyers now show enhanced consciousness on climate change, their demand of the quality of carbon credits they buy also increases. Nowadays, more and more buyers ask specifically to buy carbon credit that can prove sustainable development specific issues, such as impact of the projects to environment, local economy and social.

Those buyers are in general willing to pay a price premium of about EUR 1 – 2 per CER/VER.

**5. GOLD STANDARD CERTIFICATION FOR GEOTHERMAL POWER PLANT**

The development of a geothermal power plant will fit very well in to a Gold Standard certification. It uses renewable sources to produce energy, it uses minimum amount of lands for the construction of wells, powerhouses and distribution network.

Case Study: A geothermal power plant in Indonesia with an installed capacity of 60 MW. The generated electricity and sent to grid will be about 473,040 MWh per year. Feed in tariff is USD 44.25 cents per MWh. Rate of tariff increase would be 1.5% per year. The CER potentials would be about 408,470 CERs per year. The CER would be contracted at EUR9.5 per CER so that the total income per year would be US\$26,939,134 from selling electricity and selling CERs. In the case where the project would have been registered as GS CDM, and with the assumption of premium of EUR1 per GS CER, the total revenue would increase to US\$27,504,865, or be increased by 2.1% of the total revenue due to the increase in CDM revenue at 10.5%.

**REFERENCES**

Clean Development Mechanism, [www.cdm.unfccc.int](http://www.cdm.unfccc.int)

Gold Standard Registry, <http://goldstandard.apx.com>