# Dutch CDM projects in the palm oil sector

## A research paper prepared for Greenpeace Netherlands

Profundo
economic research

# Dutch CDM projects in the palm oil sector

## A research paper prepared for Greenpeace Netherlands

**Final version: 30 November 2009**

**Jan Willem van Gelder**
**Petra Spaargaren**

**Profundo**
**Radarweg 60**
**1043 NT Amsterdam**
**The Netherlands**
**Tel: +31-20-8208320**
**E-mail: profundo@profundo.nl**
**Website: www.profundo.nl**

# Contents

**Summary** .......... **1**

**Introduction** .......... **2**

**List of abbreviations** .......... **3**

**Chapter 1 The Clean Development Mechanism** .......... **4**

**1.1 Introduction** .......... **4**

**1.2 Means and objectives of the CDM** .......... **4**

**1.3 General procedures and role of different parties** .......... **5**

1.3.1 Obtaining Certified Emission Reductions .......... 5

1.3.2 Primary CER market .......... 6

1.3.3 Secondary CER market .......... 6

**1.4 Certified Emission Reductions per host country** .......... **7**

**Chapter 2 International carbon markets** .......... **8**

**2.1 Introduction** .......... **8**

**2.2 European Union Emission Trading System** .......... **8**

**2.3 Pricing** .......... **8**

**Chapter 3 Involvement of the Netherlands in CDM projects** .......... **12**

**3.1 Introduction** .......... **12**

**3.2 Certified Emission Reductions issued by the Dutch government** .......... **12**

**3.3 AES AgriVerde** .......... **12**

**3.4 CDM projects in the palm oil sector approved by the Netherlands** .......... **13**

**3.5 Direct revenues generated by the projects** .......... **16**

**3.6 The role of the Dutch government** .......... **17**

**Chapter 4 Additionality** .......... **18**

**4.1 Introduction** .......... **18**

**4.2 Cost-benefit analysis** .......... **18**

**4.3 Small Renewable Energy Programme** .......... **21**

**4.4 Renewable Energy Directive of the EU** .......... **22**

**4.5 Additionality with respect to the Renewable Energy Directive** .......... **24**

**4.6 RSPO-certified palm oil** .......... **25**

**4.7 Additionality with respect to sustainable palm oil** .......... **26**

**4.8 Conclusion** .......... **27**

**Appendix 1 References** .......... **29**

# Summary

Developed under the United Nations Framework Convention on Climate Change (UNFCCC), the Clean Development Mechanism (CDM) aims to contribute to sustainable development in non-Annex I countries, to avoid climate change and to assist Annex I countries to comply with their emissions reduction commitments. CDM projects can earn Certified Emission Reduction credits (CERs), which can be traded or used by industrialized countries to meet their reduction targets under the Kyoto Protocol. The most important criterion for CDM projects to be approved is the concept of additionality. This concept implies that the planned reductions achieved by a project should not have occurred without the additional incentive provided by the CERs.

The state of the Netherlands, through the Ministry of VROM, has authorized the Bermuda-based company AES AgriVerde as a project proponent in 23 projects in the palm oil sector in Malaysia and Indonesia in the period of June 2008 until April 2009. The projects aim to capture methane - a very potent greenhouse gas - which is now emitted by the open-air effluent ponds at many oil palm mills. Together, these projects are expected to generate a reduction of 685,000 tonnes of $CO_2$ equivalent per annum. Over a seven year project period this reduction would generate an amount of 4.9 million CERs. When these CERs are sold at average market prices of € 7.50 in the primary market, they could raise a total amount of € 36.6 million (US$ 54.5 million).

The UNFCCC documents of the projects executed by AES AgriVerde include several statements that underline the additionality of the projects. These statements can be questioned. First of all, the captured methane can be used by the mill owners as an energy source, generating heat and electricity which can be used in the mill or sold to the power grid. For example the Small Renewable Energy Programme of the Malaysian government allows small power producers which utilize renewable energy sources (including POME) to sell their electricity to Tenaga Nasional Bhd., the partly government-owned manager and operator of Malaysia’s national power grid. A cost-benefit analysis shows that even in the absence of CERs, a methane recovery facility therefore pays itself back between 2 and 10 years, depending on the exact use of the methane (heat or electricity).

In addition, both the sustainability criteria set out in the Renewable Energy Directive of the European Union and the growing market for RSPO-certified palm oil favour the establishment of methane capture facilities at the palm oil mills of Indonesian and Malaysian producers. As for the RED, it is expected that the EU will demand an additional amount of 14 million tonnes of CPO in order to fulfil its energy needs. As the RED sets additional sustainability criteria, the market price for palm oil for biofuel use will probably rise above the ordinary palm oil market price when the RED is implemented in 2011. Establishing a methane capture facility will be a precondition for oil palm plantations to profit from this booming market and the expected price premium.

Furthermore, methane capture facilities will probably soon become a precondition for a palm oil producer to be certified as a sustainable producer by the RSPO. RSPO-certified palm oil already trades at a market premium and market uptake is increasing.

Therefore, it can be argued that palm oil producers will considerably benefit from establishing methane facilities at their palm oil mills, even in the absence of a compensation under the Clean Development Mechanism. The projects of AES Agriverde in the oil palm sectors of Malaysia and Indonesia which are approved by the Dutch government therefore do not meet the crucial additionality criterion of the CDM. As the investments by Annex I countries in these projects could contribute more effectively to curbing climate change when invested in other projects, these projects should not be registered as CDM projects.

# Introduction

The aim of this paper is to provide an overview of the Clean Development Mechanism projects executed in the palm oil sector in Malaysia and Indonesia which are approved by the Dutch government. Based on the research objective, the following research questions are formulated:

- How does the CDM work, what are the procedures and what are the roles of the different parties in the mechanism?
- How have the international markets for primary and secondary Certified Emission Reductions developed over the past five years: who are the buyers and who are the sellers, how have prices developed and which factors influence price developments?
- In which existing and proposed CDM projects in the palm oil sector is the Dutch government involved? What are the project dates, objectives, project status and companies involved?
- What do the additional revenues from electricity and/or heat generation, the revision of the Renewable Energy Directive of the European Union in June 2009 and the developing market for RSPO-certified palm oil mean for the additionality of the approved CDM projects in the palm oil sector?

To answer the four research questions formulated, information sources of the UNFCCC, the European Commission, the Dutch government and external parties on CDM projects were gathered and analyzed. Further information on the (projected) developments of (premium) prices and volumes on the European palm oil market will be researched using market reports from Oil World and other sources. Additionally, some interviews were held with experts on the palm oil market and CDM projects. Based on an analysis of all information sources, conclusions were drawn.

Chapter 1 gives an introduction to the Clean Development Mechanism, commenting on the means and objectives of the mechanism, the roles of different parties and the most important host countries for CDM projects. Chapter 2 explains how the international carbon markets have developed over the past years and how the pricing of different contracts has evolved. Chapter 3 comments on the involvement of the Dutch government in CDM projects in the palm oil sector in Malaysia and Indonesia and Chapter 4 discusses whether these projects satisfy the additionality criterion, which is a precondition for projects to qualify for CDM status.

A summary of the findings can be found on the first pages of this report.

## List of abbreviations

| | |
|---|---|
| CDM | Clean Development Mechanism |
| CDMEB | CDM Executive Board |
| CER | Certified Emission Reduction |
| CSPO | Certified Sustainable Palm Oil |
| DNA | Designated National Authority |
| ERPA | Emission Reduction Purchase Agreement |
| EU ETS | European Union Emission Trading System |
| EU | European Union |
| EUA | EU Allowances |
| FAO | Food and Agriculture Organization |
| gCO2eq/MJ | Grams of $CO_2$ equivalent per MJ of fuel |
| JI | Joint Implementation |
| LoA | Letter of Approval |
| MEC | Malaysia Energy Centre |
| POME | Palm Oil Mill Effluent |
| RED | Renewable Energy Directive |
| REDD | Reduced Emissions from Avoided Deforestation and Degradation |
| 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 |
| VROM | Dutch Ministry of Housing, Spatial Planning and the Environment |

# Chapter 1 The Clean Development Mechanism

## 1.1 Introduction

The Clean Development Mechanism (CDM) is a mechanism to reduce global greenhouse gas emissions, developed under the United Nations Framework Convention on Climate Change (UNFCCC). This is an international environmental treaty established at the United Nations Conference on Environment and Development (UNCED) in 1992 in Rio de Janeiro. This chapter will give an introduction to the Clean Development Mechanism, commenting on the means and objectives of the mechanism (paragraph 1.2), the general procedures and the roles of different parties involved (paragraph 1.3) and the most important host countries for registered projects (paragraph 1.4).

## 1.2 Means and objectives of the CDM

The Clean Development Mechanism (CDM) was one of the elements of the Kyoto Protocol, which deals with concrete steps to be taken to meet the UNFCCC objectives. Together with the Kyoto Protocol, the CDM entered into force in February 2005. The Kyoto Protocol sets emission reduction targets for the industrialized ("Annex I") countries which are signatories to the Protocol. The CDM allows these Annex I countries to achieve part of this goal by investing in emission reductions in developing ("non-Annex I") countries as an alternative to more expensive reductions in their home country. The official goals of the CDM, as defined in article 12 of the Kyoto Protocol, are the following:[1]

- To contribute to sustainable development in non-Annex I countries;
- To contribute to the ultimate objective of UNFCCC, avoiding dangerous climate change;
- To assist Annex I countries in complying with their emissions reduction commitments.

CDM projects can earn Certified Emission Reductions (CERs), which can be traded or used by industrialized countries to meet their reduction targets under the Kyoto Protocol. One CER represents a reduction of greenhouse gas emissions of one tonne $CO_2$ equivalent.[2]

The most important criterion for CDM projects to be approved is the concept of additionality. Additionality is defined in the Framework Convention on Climate Change as follows:[3]

> A CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.

The implies that the realized emission reductions would not have occurred, or would be smaller in size, without the additional incentive provided by the CERs. In order for a project to be considered additional, the sponsors must therefore be able to document that alternative scenarios to the proposed project are economically unattractive.

The CDM is supervised by the CDM Executive Board (CDMEB) and is under guidance of the United Nations Framework Convention on Climate Change (UNFCCC) in Bonn.[4]

One aspect heavily discussed during the past years is the exclusion of forest preservation in the Kyoto Protocol and the CDM. According to some recent studies, carbon emissions from deforestation and degradation account for about 20% of global anthropogenic emissions.[5] Greenhouse gases can be reduced in two ways: by decreasing the release of greenhouse gases and by capturing carbon dioxide and other greenhouse gases which have been released into of the atmosphere. The latter mechanism, in which forests and especially rainforests serve as carbon “sinks”, is not included in the Kyoto Protocol. When rainforests are logged and burned, the capacity to take up $CO_2$ from the atmosphere is lost and the carbon stored in the biomass and soil is released into the atmosphere. The proposal for Reduced Emissions from Avoided Deforestation and Degradation (REDD), which is part of a collaboration between Food and Agriculture Organization (FAO), United Nations Development Programme (UNDP) and United Nations Environment Programme (UNEP), would allow rain forest preservation to qualify for CDM status. REDD will be examined during the UNFCCC-conference in Copenhagen in December 2009.[6]

## 1.3 General procedures and role of different parties

### 1.3.1 Obtaining Certified Emission Reductions

When a CDM project is set up successfully, the CDM project owner can sell the resulting Certified Emission Reduction credits (CER) to a buyer. Sellers of CERs include project owners based in host countries, which are typically entities whose assets may be developed into CDM projects, like farms, chemical factories, steel plants and cement plants. If the CDM activity is related to the core activity of a project owner, the owner is often also the project developer. In addition, there is a growing market for environmental and technical consultants which advise on implementation, compile the required project documentation, and manage the bulk of the CDM process.[7]

Buyers of CERs include a range of parties, like public and private utilities, oil companies, investment banks, government programmes and institutional and private hedge funds. Companies and governments can comply with Kyoto rules by buying CERs.[8]

There are several ways for buyers to obtain CERs. One possibility is for buyers to approach sellers and form a direct relationship. Under this bilateral model, a project developer in a non-Annex I country develops the CDM project in partnership with the Annex I country. The goal for the Annex I country is to receive the CERs the project obtains, either via an Emissions Reduction Purchase Agreement (ERPA) or through some other form of payment. Under most ERPAs, credit purchases are committed in advance of issuance but not paid until the CERs are delivered.[9] The disadvantage of this bilateral approach is that it can be costly and time-consuming since many projects in many countries must be identified, and that the approach often requires good knowledge of local markets.[10]

Buyers may also invest in an aggregated fund whose task is to buy CERs. In this case the buyer has no direct link to an individual project, and will most likely have to pay management fees.[11] If the projects generate CERs, these are purchased on behalf of and distributed to the participants. Examples of these carbon funds are the World Bank’s Prototype Carbon Fund, the European Carbon Fund and KfW’s Carbon Fund.[12]

Governments often choose for another alternative: buying CERs through purchasing tenders. Governments issue these tenders for the purpose of buying CERs from project investors. [13] The Dutch government for example has its own tenders to obtain emission reduction credits - ERUPT and CERUPT - which are managed by Senter International (now SenterNovem) and funded by the Dutch government. The CERUPT programme focuses on financing CDM projects, and aims to purchase carbon credits through investments in projects in the area of renewable energy, energy efficiency, fuel switch and waste management in “non-Annex B countries”.[1] Both purchase programmes are closed since 1 January 2008, because the Dutch government has enough projects in its portfolio to comply with the Kyoto Protocol.[14]

### 1.3.2 Primary CER market

In the primary CER market, the transaction between the project developer and the investor takes place. In this market, the CER is transferred from the developing country to the international market. The contract to transfer ownership of a CER from seller to buyer is known as an Emissions Reduction Purchase Agreement (ERPA). ERPAs vary from case to case. The price agreed in most primary ERPAs is dependent on various risks associated with generating the CER and delivering it to the buyer. The risks are grouped as follows:[15]

- Performance risk (financial, technical, counterparty related)
- Registration and revision risk (project approval, baseline and methodology from the UN)
- Host country risk (general and carbon related)

Because a CER contract is long-term in nature, the financial position of both the seller and the buyer is important. CDM projects are generally executed in developing countries, for which a good credit rating might be difficult to obtain. The price negotiations often depend on how this issue is approached and managed. A good credit rating by a recognized agency is often beneficial, as it is perceived as an indication of the effectiveness of the seller in successfully executing project activities outside the CDM.[16]

### 1.3.3 Secondary CER market

In the secondary market, the further transaction after the primary transaction takes place: the onward sale of the CER until it is bought by the final consumer who will submit it to meet its target. The buyer of a secondary CER carries much less risk than the buyer of a primary CER because in the former case, the CER is either already in existence, or its delivery is guaranteed in some way with replacement or compensation for non-delivery written into the contract.[17] Secondary market CERs are often offered with a guarantee of delivery by a rated entity such as a bank or fund.[18]

In secondary markets, CERs are traded either in the spot market (for immediate delivery) or in the forward market. Transactions involving forward streams of CERs are referred to as forward contracts, where a signed agreement binds the buyer to pay the seller a pre-arranged amount upon delivery of the CERs at a future date. Primary market CERs are always forward contracts, since the CERs must yet be generated. Forward CERs are expected to be available in Phase I of the Kyoto Protocol (2008-2012).[19]

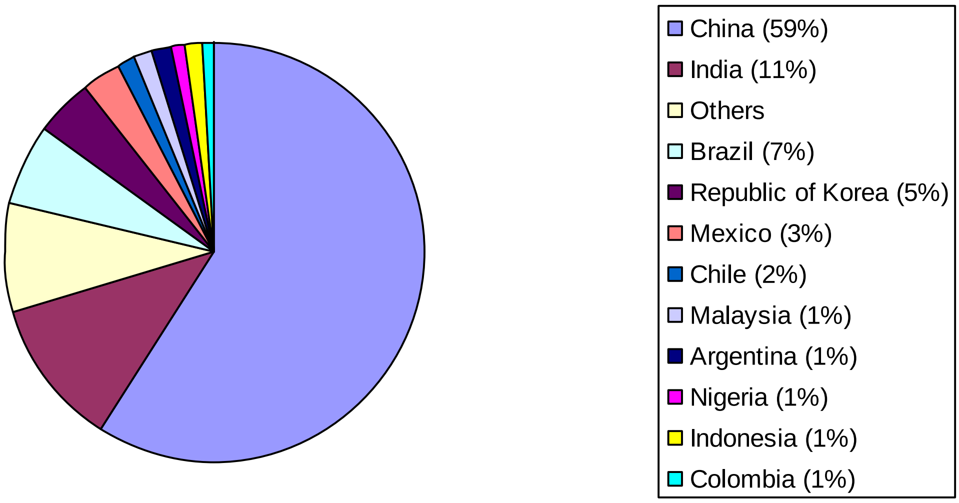
[1] The difference between the Annex I and Annex B countries is that Turkey and Belarus are not Annex B countries.

## 1.4 Certified Emission Reductions per host country

Figure 1 below shows the expected average annual amount of CERs resulting from registered CDM projects by host country. The total expected annual amount of CERs generated for all projects registered so far is 322.6 million. China is by far the largest host of CDM projects, with an average annual amount of 189.8 million CERs (59% of the total) and a total of 653 registered projects.[20] The average annual amount of CERs generated per CDM project in China is therefore 290,658.

Other important host countries are India (11% and 466 projects), Brazil (7% and 165 projects) and the Republic of Korea (5% and 34 projects). The two main palm oil producing countries in the world, Malaysia and Indonesia, host projects that generate 4,462,255 (1.4%) and 3,742,652 (1.1%) CERs per year respectively. The total amount of registered projects amounts to 66 in Malaysia and 33 in Indonesia.[21] Therefore, the average annual amount of CERs generated per project is 67,609 in Malaysia and 113,414 in Indonesia.

**Figure 1. Expected average annual CERs from registered projects by host country**




Source: UNFCCC

# Chapter 2 International carbon markets

## 2.1 Introduction

This chapter starts with a brief introduction to the European Union Emission Trading System (paragraph 2.2), because this system plays an important role in the light of the EU's climate policy and its compliance with the Kyoto Protocol. Paragraph 2.3 comments on the development of the international markets and prices for both EU Allowances and Certified Emission Reductions.

## 2.2 European Union Emission Trading System

The European Union Emission Trading System (EU ETS) is the largest multinational emissions trading scheme in the world and an important part of EU's climate policy. Under the EU ETS, large companies within the EU must monitor and report their $CO_2$ emissions. These companies must return an amount of EU Emission Allowances (EUAs) to the government which is equivalent to their $CO_2$ emissions in that year. The EU ETS currently covers more than 10,000 installations with a net heat excess of 20 MW in the energy and industrial sectors which are collectively responsible 50% EU's emissions of $CO_2$ and 30% of its total greenhouse gas emissions. In order to neutralise irregularities in $CO_2$ emission levels that might occur because of extreme weather events, EUAs are given out for a sequence of several years ("trading period") at once.[22]

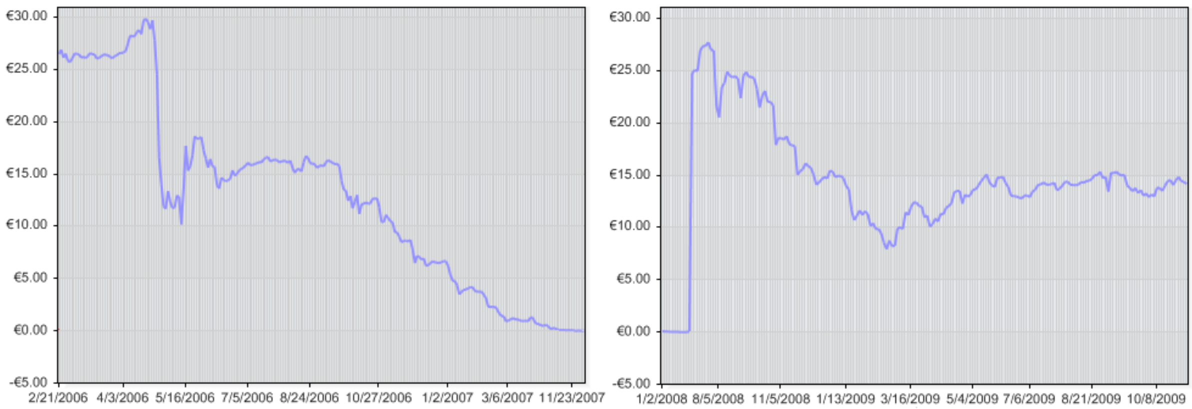
The first trading period, called the "learning phase", lasted from January 2005 until December 2007. At the end of this period the first phase EU allowances became invalid. The second trading period, called the "Kyoto commitment period" lasts from January 2008 until December 2012.[23] Currently, the installations get the allowances for free from the EU member states' governments.[24] Besides receiving this initial allocation on a plant-by-plant basis, an operator may purchase EUAs from other parties, like traders, the government or installations. In addition, as explained in paragraph 1.3, companies can use CERs to satisfy their emission reductions under the EU ETS.

## 2.3 Pricing

In the primary CER market, the buyer takes on a large part of the risk, because the project must yet be executed. As for secondary market CERs, a large part of the risk is taken by the rated entity, so secondary market CERs often command a higher price than those bought directly from a project.[25] Therefore, secondary CERs are traded at a premium compared to primary CERs. In the primary market, the overall range of forward CER prices in ERPAs lies between € 5 and € 10. [26] The actual price depends on the risks outlined before. The lower end of the range mostly represents deals where the buyer is taking all the risks of non-delivery from projects in the early stages of development.

Important for the pricing of the primary and secondary CERs is the price of EU Allowances, which were discussed in paragraph 2.2. For many buyers, the value of CERs is benchmarked to the EUA price and therefore volatility in EUA prices is reflected in the CER market. Figure 2 demonstrates the EUA spot prices in first trading period (learning phase) from January 2005 until December 2007 and the spot prices in the second trading period (Kyoto commitment period) from January 2008 until recently. The left graph shows that the EUAs started trading at the beginning of 2006, and when the end of the first trading period approached, EUA spot prices dropped sharply to almost zero. The second period experienced a large decrease in prices from May 2008 until February 2009, but started to rise again afterwards, fluctuating around € 15.

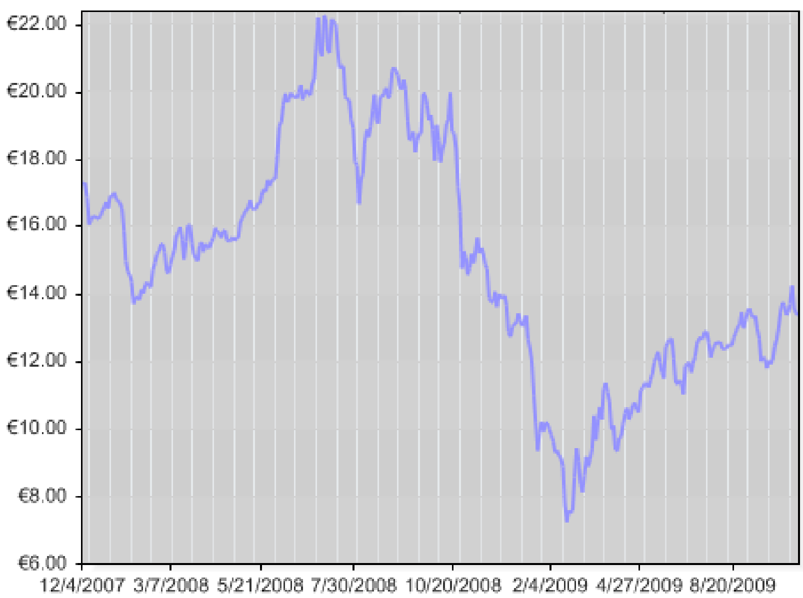
**Figure 2. EUA Spot prices, first trading period (left) and second trading period (right)**




Source: Cantor CO2e Charting (www.cantorco2e.com/myCantorCO2e/Charts), Viewed in November 2009.

Figure 3 demonstrates the fluctuations of the secondary CER spot prices in the period of December 2007 until October 2009. The figure shows that in July 2008, the secondary CER price reached a peak of € 22.0, after which it faced a sharp decline. Lower industrial production and power demand had cut requirements for emissions allowances and credits. The price kept falling until it equalled € 7 in April 2009. After that, the price started to rise again, reaching € 13.95 on 29 October 2009.

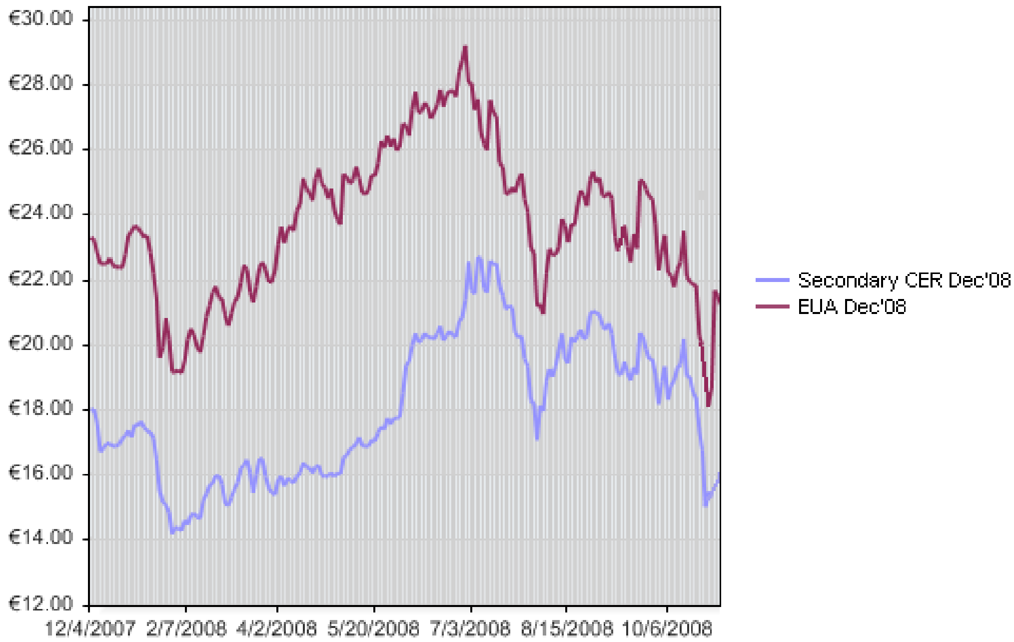
**Figure 3. Secondary CER spot prices, December 2007 until October 2009**




Source: Cantor CO2e Charting (www.cantorco2e.com/myCantorCO2e/Charts), Viewed in November 2009.

In March 2009, the primary CER price was said to be around € 6.50 - 8.50.[27] In October 2009, primary CER prices for delivery up to the end of 2012 were in the range of € 8 -11.[28] Figure 4 and Figure 5 show the price differential between the secondary CER forward contract and EUA forward contract with delivery dates of December 2008 and December 2009 respectively. The forward price of EUAs is higher than the price of secondary CERs, so the EUAs are traded at a premium. This is for a large part due to limits of usability of secondary CERs.[29] For the December 2008 delivery dates, the differential equalled around € 7 in mid-2008, but at the end of 2008, the gap narrowed to around € 2.

**Figure 4. The EUA '08 versus the secondary CER '08**

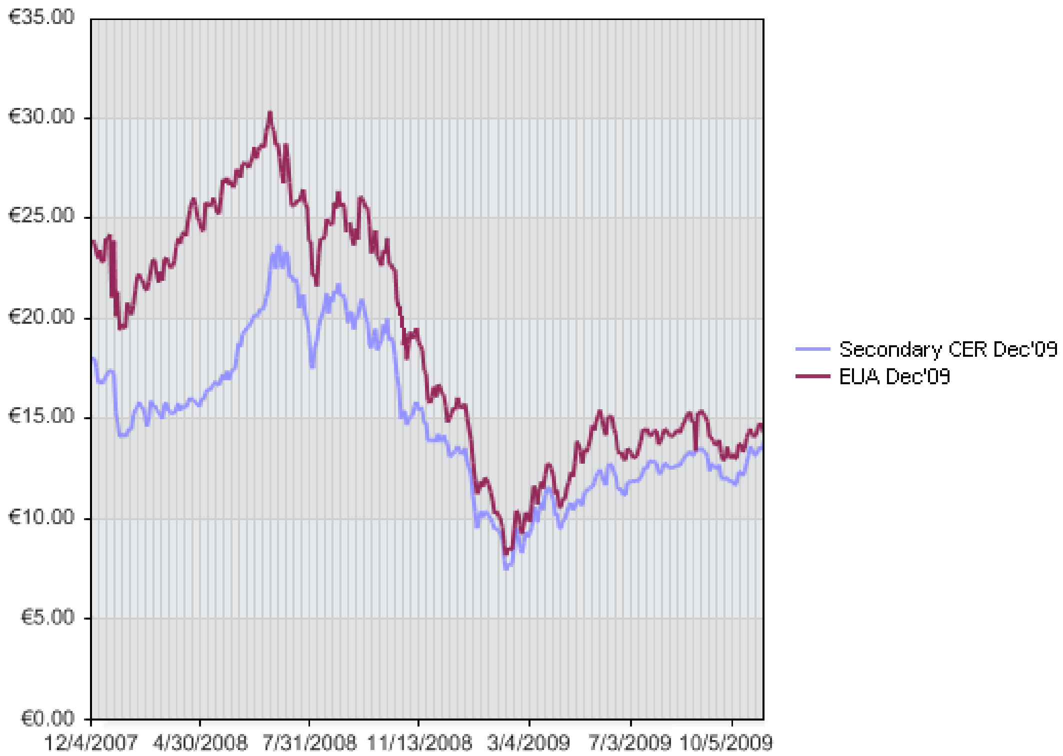



Source: Cantor CO2e Charting (www.cantorco2e.com/myCantorCO2e/Charts), Viewed in November 2009.

For the December 2009 delivery dates (see below), the differential is smaller than that of the December 2008 futures. While at the beginning of 2008, the difference amounted to around € 5, it narrowed and at the end of 2008, the difference almost disappeared. In 2009, the gap widened a bit, but still did not exceed €2.

Figure 4 and Figure 5 show that volatility in EUA prices is very much reflected in the CER market, which is not surprising since the value of CERs is benchmarked to the EUA price.

**Figure 5. The EUA '09 versus the secondary CER '09**




Source: Cantor CO2e Charting (www.cantorco2e.com/myCantorCO2e/Charts), Viewed in November 2009.

Finally, it is important to note that an important factor in determining minimum CER prices is the policy of the Chinese government. The Chinese government set a minimum CER price of € 6 that it imposes on all Chinese CDM projects. In March 2008, the government increased this price to € 8.[30] Because, as demonstrated in Chapter 1, 58% of all registered projects are executed in China, this minimum price has a huge impact on minimum international CER prices. This policy probably explains why the CER and EUA prices get closer when the EUA price falls, as illustrated in Figure 5.

# Chapter 3 Involvement of the Netherlands in CDM projects

## 3.1 Introduction

This chapter will discuss the involvement of the Dutch government in existing and proposed CDM projects in the palm oil sector. Paragraph 3.2 explains the procedure by which the Dutch government issues Certified Emission Reductions. Paragraph 3.3 gives details about the company which is developing CDM projects in the Malaysian and Indonesian palm oil sectors which are approved by the Dutch government. Paragraph 3.4 lists all projects, commenting on the amount of reductions the projects generate. Paragraph 3.5 gives the total amount of revenues which can be earned from the achieved reductions and paragraph 3.6 discusses the role of the Dutch government.

## 3.2 Certified Emission Reductions issued by the Dutch government

The Netherlands signed the Kyoto Protocol on 31 May 2002. The Dutch Ministry of Housing, Spatial Planning and the Environment (VROM) is responsible for purchasing CERs from CDM projects. A special CDM division was established within the ministry as part of the Directorate for International Affairs in April 2001. As public money is involved and procurement rules are applicable, the Ministry is not entitled to buy CERs at random from the market. Co-operation is therefore sought with several types of intermediate implementing organisations. The Ministry of VROM intends to purchase CERs through the following five tracks:[31]

- Multilateral international financial institutions (like the World Bank)
- Senter International (now SenterNovem), a Dutch agency acting on behalf of several Dutch Ministries
- Private financial institutions
- Bilateral purchase-agreements with Host Countries
- Participation in carbon funds

According to the UNFCCC, the Netherlands has participated in 250 registered CDM projects since the establishment of the mechanism, representing 11% of the total amount.[32]

## 3.3 AES AgriVerde

In the period of June 2008 until April 2009 the state of the Netherlands, through the Ministry of VROM, participated in several CDM projects in the palm oil sectors of Malaysia and Indonesia. For these projects, VROM had authorized the Bermuda-based company AES AgriVerde as a project proponent. [33]

AES AgriVerde was formed in May 2006 as a joint venture between New York listed infrastructure company AES Corporation and London listed bio-digester constructor and operator AgCert International. AES Corporation is one of the largest independent power producers in the world, developing electricity plants on all continents. The joint venture was part of the alternative energy group that AES Corporation established as a vehicle to invest US$ 1 billion in the renewable energy sector between 2006 and 2009. AES Corporation acquired a majority interest in the joint venture and planned to invest around US$ 325 million in the new company between 2006 and 2011. In addition, AES Corporation acquired a 9% equity interest in AgCert.[34] Later, all shares of AgCert were acquired by AES Corporation.[35]

AES AgriVerde's headquarters are based in Bermuda with an office in Melbourne, Florida.[36] The company engages in the production and sale of greenhouse gas emission reductions generated from livestock farms and palm oil mills. Bio-digesters are used in waste management systems to capture methane (a potent greenhouse gas), which generates a renewable source of electricity.[37] In 2006, the company announced that it aimed to create an annual production volume of 20 million tonnes of greenhouse gas emission reductions by 2012.[38] The company's initial target was to build 270 project sites in Asia. However, according to some inside sources, it has only built ten.[39]

AES Agriverde has developed 23 CDM projects in the field of methane capture at palm oil mills in Indonesia and Malaysia, which are all approved by the Netherlands. These projects are described in the following paragraph.

## 3.4 CDM projects in the palm oil sector approved by the Netherlands

Table 1 summarizes the "methane recovery in wastewater treatment" projects registered at the UNFCCC which were executed by AES AgriVerde and approved by the Dutch government. The procedure of such projects is as follows: methane emissions from wastewater treatment are reduced by closing the current open tank in the mill and installing a methane collection system to capture the methane (biogas) from the Palm Oil Mill Effluent (POME). The biogas can be used in a boiler to produce steam for direct application (heat as energy source) and the surplus can be used for electricity generation (using a steam turbine) for the present plant's own consumption and also the newly integrated ones.

**Table 1 Registered CDM projects approved by the Netherlands**

| Date of registration | Location | Site | Group | Reductions /year* | Reductions /total* |
|---|---|---|---|---|---|
| 17 June 2008 | Perak, Malaysia | Foong Lee Sawiminyak | - | 57,094 | 399,655 |
| 3 December 2008 | Sumatera Utara, Indonesia | PT Perkebunan Milano (Pinang Awan) | Wilmar Group | 33,390 | 233,73 |
| 16 January 2009 | Sumatera Utara, Indonesia | PT Victorindo Alam Lestari | Permata Hijau Group | 39,218 | 274,526 |
| ***Average*** | | | | ***43,234*** | ***302,636*** |
| ***Total*** | | | | ***129,702*** | ***907,908*** |

* Estimated emission reductions in metric tonnes of $CO_2$ equivalent per annum (as stated by the project participants)

Source: Website UNFCCC, Project Search (cdm.unfccc.int), Viewed in November 2009.

Together, the projects listed in Table 1 will produce emission reductions of 129,702 tonnes of $CO_2$ equivalent per annum. The projects, which have crediting periods of seven years, will produce 907,908 emission reductions over the total period. The project executed by Foong Lee Sawiminyak is the largest in scale, with estimated reductions of 399,655 tonnes of $CO_2$ equivalent. Figure 6 shows the Foong Lee Mill flare and the process of methane collection. The other projects are executed by subsidiaries of the Singaporean Wilmar Group and the Indonesian Permata Hijau Group.

**Figure 6. Foong Lee Mill - Flare (left) and methane collection (right)**

Source: Newsletter Roundtable on Sustainable Palm Oil, Issue # 11, April/June 2007.

Apart from these three projects which received final approval by the CDM Executive Board, the Netherlands has also approved 20 similar projects of AES Agriverde in Indonesia and Malaysia which are not yet approved by the CDM Executive Board. Table 2 and Table 3 list the projects in Indonesia and Malaysia respectively. In the CDM procedure, these projects at present have a status of 'Minor Corrections'. The UNFCCC website indicates that in this case, either one of the parties involved or at least three members of the CDM Executive Board requested a review of the CDM activity.[40] It is expected that these projects will be officially registered in the near future.

Table 2 shows that together, the projects in Indonesia would produce 203,664 emission reductions in metric tonnes of $CO_2$ equivalent per annum and 1,425,640 emission reductions over the total project period of 7 years. AES AgriVerde executes some the projects in cooperation with subsidiaries of large Malaysian business groups, like the Belgian Sipef Group and the Indonesian Bakrie Group, which own two projects, and the Malaysian Kuala Lumpur Kepong Group and the Indonesian Permata Hijau Group, which own one project.

**Table 2 Indonesian CDM projects approved by the Netherlands but not yet registered**

| Date of approval by the Netherlands | Location | Site | Group | Reductions /year* | Reductions /total* |
|---|---|---|---|---|---|
| 28 July 2008 | Sumatera Utara | PT Tolan Tiga | Sipef Group | 31,881 | 223,166 |
| 19 December 2008 | Sumatera Utara | PT Permata Hijau Sawit | Permata Hijau Group | 38,602 | 270,213 |
| 19 December 2008 | Sumatera Utara | PT Sago Nauli | - | 19,901 | 139,305 |
| Approved by Netherlands on 19 December 2008 | Sumatera Utara | PT Tolan Tiga | Sipef Group | 10,276 | 71,929 |
| Approved by Netherlands on 29 April 2009 | Aceh | PT Sisirau | Risjadson Group | 16,726 | 117,081 |

| Date of approval by the Netherlands | Location | Site | Group | Reductions /year* | Reductions /total* |
|---|---|---|---|---|---|
| Approved by Netherlands on 29 April 2009 | West Sumatera | PT Bakrie Sumatera | Bakrie Group | 22,133 | 154,933 |
| Approved by Netherlands on 29 April 2009 | Jambi | PT Sumbertama Nusapertiwi | Bakrie Group | 15,989 | 111,921 |
| Approved by Netherlands on 29 April 2009 | Riau | PT Adei Plantation and Industry (Nilo) and PT Adei Plantation and Industry (Mandau ) | Kuala Lumpur Kepong Group | 48,156 | 337,092 |
| ***Average*** | | | | ***25,458*** | ***178,205*** |
| ***Total*** | | | | ***203,664*** | ***1,425,640*** |

* Estimated emission reductions in metric tonnes of $CO_2$ equivalent per annum (as stated by the project participants).

Source: Website UNFCCC, Project Search (cdm.unfccc.int), Viewed in November 2009.

Table 3 lists the projects executed in Malaysia. Together, these projects would produce 351,383 emission reductions in metric tonnes of $CO_2$ equivalent per annum and 2.55 million emission reductions over the total project period of 7 years. AES AgriVerde executes some the projects in cooperation with subsidiaries of large Malaysian business groups, like the Pertubuhan Peladang Negeri Johor (PPNJ) Group, the Felda Group and the Prosper Group.

**Table 3 Malaysian CDM projects approved by the Netherlands but not yet registered**

| Date of approval by the Netherlands | Location | Site | Group | Reductions /year* | Reductions /total* |
|---|---|---|---|---|---|
| 28 July 2008 | Pahang | Kilang Kelapa Sawit Jerantut | - | 35,348 | 247,434 |
| 28 July 2008 | Kedah | Kilang Kelapa Sawit Arah Kawasan | - | 44,382 | 310,676 |
| 27 November 2008 | Sabah | Keningau Palm Oil Mill | - | 19,760 | 138,320 |
| 27 November 2008 | Kedah | Setiakawan KKS | - | 45,533 | 318,729 |
| 27 November 2008 | Johor | Kilang Kelapa Sawit Bukit Bujang | Pertubuhan Peladang Negeri Johor (PPNJ) | 17,717 | 124,020 |
| 27 November 2008 | Johor | KKS PPNJ Kahang | Pertubuhan Peladang Negeri Johor (PPNJ) | 21,822 | 152,756 |
| 27 November 2008 | Kedah | RH Plantation | Rimbunan Hijau Group (RH Group) | 20,230 | 141,613 |
| 27 November 2008 | Pahang | Rompin POM | Prosper Group | 35,818 | 250,729 |
| 27 November 2008 | Pahang | Kilang Kosfarm | Prosper Group | 26,893 | 188,249 |

| Date of approval by the Netherlands | Location | Site | Group | Reductions /year* | Reductions /total* |
|---|---|---|---|---|---|
| 29 April 2009 | Pahang | Wujud Wawasan | Prosper Group | 22,214 | 155,495 |
| 29 April 2009 | Pahang and Negeri Sembilan | Kilang Kelapa Sawit Serting and Kilang Sawit Jengka | Felda Palm Industries | 30,756 | 307,563 |
| 29 April 2009 | Pahang | Endau POM | Prosper Group | 30,910 | 216,373 |
| ***Average*** | | | | ***29,282*** | ***212,663*** |
| ***Total*** | | | | ***351,383*** | ***2,551,957*** |

* Estimated emission reductions in metric tonnes of $CO_2$ equivalent per annum (as stated by the project participants).
**Status: Minor corrections

Source: Website UNFCCC, Project Search (cdm.unfccc.int), Viewed in November 2009.

The total annual amount of $CO_2$ reductions of the registered projects (Table 1) and the projects waiting for final registration (Table 2 and Table 3) amounts to 684,749 metric tonnes of $CO_2$ equivalent per annum. The overall reduction amount is 4.89 million metric tonnes of $CO_2$ equivalent.

The expected annual CERs generated by the projects which are registered (Table 1) represent 1.9% of the total expected annual amount of CERs in Indonesia and 1.3% of the total amount in Malaysia. When all projects of Table 2 and Table 3 will be registered in the future, the expected annual CERs of all projects executed by AES AgriVerde will increase to 7.0% of the total expected annual amount in Indonesia and to 8.5% in Malaysia.

## 3.5 Direct revenues generated by the projects

The projects summarized in Table 1 until Table 3 are generating CERs - or will do so in the near future - which can be sold. According to AES AgriVerde, the revenue from the CER sales is shared between AES Agriverde and the owners of the palm oil mills involved. The revenues can be used by the mill owners to invest in other value added systems such as composting or power generation.[41]

In some UNFCCC project documents, AES AgriVerde states that the company will pay a “license fee” to the palm mill owners, equal to 10-27% of the revenues from all environmental benefits associated with the avoidance, mitigation or sequestration of greenhouse gases by the project, including but not limited to the CERs. Other environmental benefits can include improved water quality and reduced odour. For example in the documents of the projects at the Tolan Tiga and Permata Hijau Sawit mills in Indonesia, AES AgriVerde demonstrates the potential licence fees for the mill owners with an example where the owners will receive the revenues of 21% of the CERs generated.[42]

The project at the Tolan Tiga mill is expected to generate 31,881 CERs per annum. When these CERs are sold at average market prices of € 7.50 in the primary market, as stated in paragraph 2.3, the project will raise an amount of € 239,108 (US$ 357,083) per year. Based on a 21% revenue for the mill owner, AES AgriVerde will receive € 188,895 (US$ 282,167) and Tolan Tiga € 50,213 (US$ 75,007) per annum. For Permata Hijau Sawit the respective amount would be € 60,798 (US$ 90,819) per annum. The UNFCCC project documents show that in the case of Rompin Pom in Malaysia, AES proposed to pay a license fee of 27% to the mill owner, which would result in revenues of € 72,531 (US$ 108,346) for the mill owner.[43]

The projects summarized in Table 1 until Table 3 could produce a total amount of 4.9 million CERs. When these CERs are sold at average market prices of € 7.50, they could raise a total amount of € 36.6 million (US$ 54.5 million).

Next to the revenues from CERs, the projects will also generate other revenue streams. The captured methane can be used for heat and electricity generation. This leads to cost savings for the mill operators, which also could sell excess electricity to the national grid. Minor revenue streams result from the usage of the residue from the POME tank as fertiliser: costs savings and increased yields.

AES AgriVerde explains in the UNFCCC documents that any revenues or cost savings by electricity or heat generation will remain with the mill operator. AES AgriVerde will provide no funding to the mill operator for the option to use biogas for renewable energy nor will the company receive any revenue or benefit from any renewable energy activity.[44]

## 3.6 The role of the Dutch government

Each country involved in the CDM has a Designated National Authority (DNA) responsible for granting approval to local projects which have fulfilled national criteria for sustainable development and with a good chance of succeeding at eventual registration.[45] Government agency SenterNovem is the Dutch DNA. On behalf of the Dutch government, SenterNovem has reviewed the applications and has extended a Letter of Approval (LoA) for the projects executed by AES AgriVerde in the palm oil sectors of Indonesia and Malaysia. The approval of the Dutch government (as well as of a government of a non-Annex I country, in this case Malaysia or Indonesia) is required to make the trade of CERs between companies possible. According to sources at SenterNovem, when projects apply for a LoA with the Dutch government, SenterNovem does not extensively review the contents of the application. It is relatively easy for companies to obtain a LoA.[46]

The Dutch government has no intention to buy the CERs generated by the projects in which it authorized AES AgriVerde. The government already has sufficient projects in its portfolio to meet its Kyoto reduction targets.[47]

Next to the Netherlands, the only government which was found to be participating in similar palm oil projects in Malaysia and Indonesia is Denmark, which has approved one methane recovery project in Malaysia, executed by United Plantations Berhad (a company which is partially Danish-owned). Unlike the Dutch government, the Danish government will itself buy the CERs generated from this project.[48]

# Chapter 4 Additionality

## 4.1 Introduction

This chapter considers the additionality of the methane recovery CDM projects which are executed in Malaysia and Indonesia by AES Agriverde and approved by the Dutch government. Paragraph 4.2 presents a cost-benefit analysis of the establishment of a methane recovery facility at a palm oil mill and discusses the additionality from this perspective. Paragraph 4.3 discusses the Small Renewable Energy Program launched by the Malaysian government. Paragraph 4.4 sets out the guidelines of the Renewable Energy Directive of the European Union and paragraph 4.5 discusses the additionality of the CDM projects with respect to this directive. After that, paragraph 4.6 discusses the requirements for certification by the Roundtable on Sustainable Palm Oil and paragraph 4.7 discusses the additionality of the projects in the light of the RSPO certification criteria. Paragraph 4.8 draws conclusions.

## 4.2 Cost-benefit analysis

In 2004 the Malaysian research company SIRIM Environment and Bioprocess Technology Centre has made a cost-benefit analysis of heat and electricity generation from methane capture at a palm oil mill, which is summarized in Table 4. These estimates are based on an average-sized mill in Malaysia with a capacity of 45 tonnes FFB per hour, for 350 operating hours per month, or an annual crop throughput of 189,000 tonnes FFB.[49] The projects summarized in paragraph 3.4 vary in scale, but are on average comparable to the SIRIM assumptions. For example PT Permata Hijau has an annual crop throughput of 466,366 tonnes. The smaller projects, like PT Sago Nauli, have a capacity lower than assumed by SIRIM: 108,573 tonnes FFB per year.[50]

When methane is captured at the palm oil mill, the gas can be used for the generation of either thermal or electric energy, or both. The range of costs and benefits for both kind of facilities depend on the reaction temperature, which can vary between 40°C and 55°C.[51] The heat and electricity generated can be used as energy sources for the palm oil mill, reducing its energy costs. The electricity can also be sold to the national grid, supplying power to adjacent villages.

According to the SIRIM study, when palm oil companies use the biogas for thermal energy (heat) generation, the capital cost of establishing a facility is around US$ 600,000. The establishment of an anaerobic reactor system accounts for about half of total capital costs. The annual operation and maintenance costs amount to around US$ 95,000. The total annual operating revenue of a methane capture facility for the use of heat generation lies around US$ 400,000, with most revenue coming from biogas utilisation. The cost-benefit analysis shows that an annual return on investment of 30% to 50%, or payback period of 1.5 to 2.5 years, is possible in resource recovery systems utilising methane for heat generation.[52]

When palm oil companies use biogas for electricity generation, the capital cost of establishing a facility is higher than in the case of heat generation, amounting to around US$ 1.4 million. This is because in this facility, additional gas-engine generators must be established. The maintenance costs are also higher than in the heat generation installation. Because the costs are higher and the annual revenue is comparable to the facility for heat generation, the annual return on investment is significantly lower, ranging between 2% and 6%. The payback period is between 7 and 9.5 years. [53]

**Table 4 Cost-benefit analysis of a methane capture facility at a standard palm oil mill**

| | ***Electricity*** | | ***Heat*** | |
|---|---|---|---|---|
| All amounts in US$ ‘000 | Min | Max | Min | Max |
| A. Capital cost | 1,229.0 | 1,541.8 | 609.0 | 591.8 |
| Anaerobic reactor system | 349.0 | 257.1 | 349.0 | 257.1 |
| Biogas storage system | 138.4 | 213.0 | 138.4 | 213.0 |
| Land application system | 121.7 | 121.7 | 121.7 | 121.7 |
| Gas-engine generators | 620.0 | 950.0 | - | - |
| B. Annual capital charges* | 106.2 | 133.2 | 52.6 | 51.1 |
| C. Annual operating & maintenance cost | 187.2 | 224.6 | 96.0 | 94.3 |
| Anaerobic treatment | 23.4 | 20.7 | 23.4 | 20.7 |
| Biogas handling | 14.4 | 16.3 | 14.1 | 16.3 |
| Land application | 17.8 | 17.8 | 17.8 | 17.8 |
| Electricity generation | 50.0 | 66.5 | - | - |
| Equipment depreciation | 81.9 | 102.8 | 40.6 | 39.5 |
| D. Annual operating revenue | 315.2 | 455.9 | 335.9 | 488.4 |
| Biogas utilisation | 262.3 | 403.0 | 283.0 | 435.5 |
| Fertiliser saving | 34.5 | 34.5 | 34.5 | 34.5 |
| Increased FFB yield | 18.4 | 18.4 | 18.4 | 18.4 |
| E. Annual cost-benefit (D-C-B) | 21.8 | 98.2 | 187.3 | 343.0 |
| Annual return on investment (E/A) | 1.8 | 6.4 | 30.8 | 58.0 |
| Payback period (A/(D-C)) | 9.6 | 6.7 | 2.5 | 1.5 |

*Figures are based on a lifetime of 11.57 years.

Source: A Technical and Economic Analysis of Heat and Power Generation from Biomethanation of Palm Oil Mill Effluent. B. Yeoh, SIRIM, Electricity Supply Industry in Transition: Issues and Prospect for Asia, 14-16 January 2004.

These cost estimates can be compared to the cost calculations supplied by AES AgriVerde to the UNFCCC. Table 5 shows the costs stated by AES AgriVerde for the three projects which have been registered (see Table 1). The development costs and equipment costs will be incurred once, while operating costs and other costs will be incurred every year. For the facility at PT Victorindo, the costs are the highest, amounting to more than US$ 2 million in total. The annual operation and other costs range between US$ 80 and US$ 200, which is comparable to Table 4. The capital costs are lower than indicated in Table 4, ranging between US$ 400 and US$ 700. This is probably because AES AgriVerde did not include the costs of establishing a gas-engine generator or other equipment directed to the generation of heat or electricity. In the case of PT Victorindo, AES did include an expense for Renewable Energy Equipment - probably a gas-fired generator.[54]

**Table 5    Costs as stated by AES AgriVerde (US$)**

| | PT Victorindo** | PT Milano | Foong Lee |
|---|---|---|---|
| Development Costs (year 0) | 24.6 | 24.6 | 340.4 |
| Equipment costs (year 0) | 660.7 | 384.0 | 81.2 |
| Operation costs/year | 73.1 | 72.8 | 57.8 |
| Other costs/year* | 131.8 | 10.0 | 90.6 |
| ***Total costs (7-year period)*** | ***2,119.6*** | ***988.0*** | ***1,459.9*** |

*Overhead allocation from international operations and project allocation overhead.
**Includes costs for a renewable energy facility. When excluded, equipment costs are 510.3.

Source: Website UNFCCC, Project Search (cdm.unfccc.int), Viewed in November 2009.

The mill owners which participate in the projects executed by AES AgriVerde can flare the methane captured, but they can also burn it to generate heat or electricity. In the latter case they need to install electricity generators.

AES states that it is an option for facility owners to add electricity generators. The company argues that it will not claim credits for this electricity generation. At the Victorindo mill, AES had included costs for Renewable Energy Equipment in the equipment costs (around US$ 150,000), but later removed this expense. [55] In the documents of some for the projects yet to be registered, AES states that in case the mill is interested in the possibility to use a portion of the recovered methane for electricity generation, AES AgriVerde would also provide the necessary equipments to guarantee the successful realization of generating electricity.[56]

The cost-benefit analysis provided in this paragraph can be amended by taking into account the CER revenues generated from the projects. The SIRIM study is based on an average-sized palm oil plantation in Malaysia, and it is assumed that the projects executed by AES AgriVerde are comparable to this size. The average annual amount of CERs generated by the projects listed in paragraph 3.4 is 29,772, which (at prices of € 7.50, as stated in paragraph 2.3) will result in an estimated average annual revenue of US$ 332,400. Table 6 shows part of Table 4 with the additional information of CER revenue. When the projects will, in addition to the revenues of electricity or heat generation, earn extra revenue from CERs, the annual cost-benefit increases tremendously for both kind of installations. The annual return on investment increases from around 4% to around 27% for electricity generation and from around 44% to around 100% for heat generation. Payback times also fall, to 2.7 years for electricity and less than a year for heat generation.

**Table 6    Cost-benefit analysis of a methane capture facility at a palm oil mill including CER revenues**

| | ***Electricity*** | | ***Heat*** | |
|---|---|---|---|---|
| All amounts in US$ ‘000 | Min | Max | Min | Max |
| Annual cost-benefit | 21.8 | 98.2 | 187.3 | 343.0 |
| Annual cost-benefit with CERs | 354.2 | 430.6 | 519.7 | 675.4 |
| Annual return on investment | 1.8 | 6.4 | 30.8 | 58.0 |
| Annual return on investment with CERs | 28.8 | 27.9 | 85 | 114 |
| Payback period | 9.6 | 6.7 | 2.5 | 1.5 |
| Payback period with CERs | 2.7 | 2.7 | 0.9 | 0.7 |

The calculations in Table 4 make clear that even in the absence of the CER revenue, it is attractive for the project developers (AES Agriverde and the palm oil companies) to establish a methane capture facility at the site of the palm oil mill. Payback times without CERs range between 2 and 10 years. This positive result is achieved because the captured methane can be used for heat or electricity generation, thereby saving energy costs for the mill operator. The excess electricity can also be sold to the national grid (for example through the Small Renewable Energy Programme, see paragraph 4.3).

In its project proposals, AES AgriVerde does not take this considerable cost saving into account. For example in the Foong Lee report, AES states that "The decision to utilize some of the biogas for electricity generation was not a financial incentive but rather a result of discussions with the Indonesian DNA. Thus, potential revenues from electricity generation did not play a role in the investment decision, at which time the only revenues were considered to come from carbon credits as a result of biogas capture and combustion."[57]

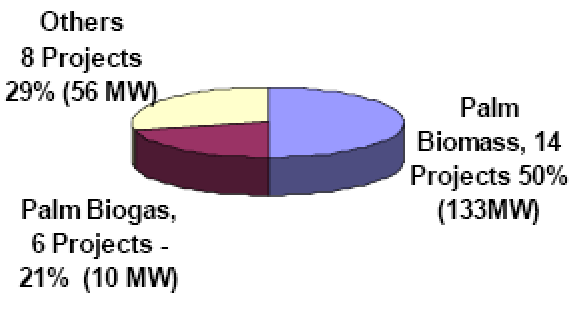
When the revenues from CERs are included in the cost-benefit analysis, payback times decrease tremendously, in some cases to less than one year. This makes the projects very profitable for the project developers.

## 4.3 Small Renewable Energy Programme

In 2001, in a step towards encouraging the use of renewable energy in power generation, the Malaysian government launched the Small Renewable Energy Power (SREP) programme. The objective of this programme was to encourage the private sector to undertake small power generation projects using renewable resources including biomass, biogas, municipal waste, solar, mini-hydro, and wind energy. Under the program, small power producers which utilize renewable energy sources are allowed to sell their electricity to Tenaga Nasional Bhd. (TNB), the partly government-owned manager and operator of Malaysia's national power grid, with maximum power export limited to 10MW.[58] In order to co-ordinate the implementation of the SREP projects, a Special Committee on Renewable Energy (SCORE) was set up under the Ministry of Energy, Water and Communications (now known as the Ministry of Energy, Green Technology and Water), with the Energy Commission acting as the Secretariat to the SREP Programme.[59]

As Figure 7 shows, 14 palm biomass projects (using Empty Fruit Bunches as a fuel source) have been approved by the SREP as at 2009 with a total capacity of 133 MW. In addition, 6 projects for palm biogas (using POME as a fuel source) have been approved.

**Figure 7. SREP Approved Projects, 2009**




Source: Next generation biofuels: Malaysian experience. S. Ahmad and C. May. International Conference on Green Industry in Asia, Manila, Philippines, 9-11 September 2009.

SCORE maintains several guidelines to promote the development of small renewable energy power plants. One of these guidelines is that a minimum of 30% equity in a renewable energy power plant project must be held by Malaysian shareholders. A foreign agency or company is allowed to participate in SREP project with maximum participation equity of 30%.[60]

Felda Palm Industries, one of the companies identified in Table 3, is executing both palm biogas and a palm biomass projects, which will be implemented under the SREP. In December 2008, TNB signed a shareholders agreement with Felda Palm Industries and Japan's Electric Power Development to jointly develop a 10 MW Biomass Power Project in Pahang, using Empty Fruit Bunches as a fuel source.[61] Also Felda's biogas plant in Negeri Sembilan (see Table 3), which uses POME as an energy source, received SCORE approval.[62] In the cost benefit analysis of this biogas project, Felda Palm Industries included a revenue of RM 735,000 (US$ 217,070) per year for the sale of electricity to TNB at RM 0.21 per year, as agreed in the Renewable Energy Power Purchase Agreement (REPPA).[63] So in addition to the CERs that Felda Palm Industries will earn as a result of the project executed by AES AgriVerde, the mill owner also makes use of the SREP and can earn money selling the electricity.

## 4.4 Renewable Energy Directive of the EU

After several years of negotiation and improvement, the European Union published the Renewable Energy Directive (RED) in June 2009 in the Official Journal of the European Union. The RED sets out a common framework for the promotion of energy from renewable sources. In the directive, mandatory targets are established for the share of energy from renewable sources in the total consumption of energy, and for the share of energy from renewable sources in transport.[64] All member states must comply to the standards set out in the directive.

For the share of renewable energy in total energy consumption, countries must follow national targets in which at least 20% of gross final consumption in 2020 will be derived from renewable sources. As for transport, all member states must make sure that in 2020, the share of final consumption of energy from renewable sources in all forms of transport equals 10%. Each Member State has to submit a report to the Commission on progress in the promotion and use of energy from renewable sources by the end of 2011, and every two years thereafter.[65]

In order to reach these targets, member states must promote and encourage energy efficiency and energy saving. Each member state has to adopt a national renewable energy action plan, which sets out the country's national targets for the share of energy from renewable sources consumed in transport, electricity and heating and cooling in 2020. In this policy, countries must take into account the effects of other policy measures related to energy efficiency and take adequate measures to achieve the overall targets. These measures include cooperation between local, regional and national authorities, planned statistical transfers or joint projects, national policies to develop existing biomass resources and the mobilisation of new biomass resources for different uses.[66]

The RED also sets sustainability criteria for biofuels. The sustainability scheme consists of mandatory criteria for economic operators as well as monitoring and reporting requirements. The criteria are as follows:[67]

- Biofuels have to result in at least a 35% greenhouse gas saving compared to traditional fuels. In 2017, this proportion increases to 50% for existing installations and to 60% for new installations

- Areas that contain high carbon stock should not be converted for biofuels
- Areas with high biodiversity should not be used for biofuels production

Only energy from biofuels and bioliquids that satisfy the sustainability criteria shall be taken into account for the following purposes:[68]

- Measuring compliance with the requirements of the RED concerning national targets;
- Measuring compliance with renewable energy obligations;
- Eligibility for financial support for the consumption of biofuels and bioliquids.

In effect, this implies that biofuel projects which do not meet the sustainability criteria can not receive any financial or regulatory support. As long as fossil fuels are more expensive than biofuels, this means that such biofuels will not be able to find a market.

To calculate the greenhouse gas saving to be achieved by various biofuels, the RED contains a table (see Table 7) with typical and default values of greenhouse gas emission saving for all biofuel feedstock. Palm oil-based biodiesel without a specified process is located at the bottom of the table, resulting in a typical 36% greenhouse gas emission saving as compared to traditional fuels. The default value for palm oil biofuel is only 19%, meaning that if producers cannot provide their own figures based on scientific measurements and calculations, a default value for palm oil-based biodiesel of 19% will be assumed. As this is below the mandatory 35% greenhouse gas saving required for biofuels, biofuel producers in the EU would not be allowed to use this feedstock to achieve their emission reductions.[69]

**Table 7 Typical values for biofuels if produced with no net carbon emissions from land-use change[2]**

| ***Biofuel production pathway*** | Greenhouse gas emission saving (%) | Default percentage (%) |
|---|---:|---:|
| Waste vegetable or animal oil biodiesel | 88 | 83 |
| Sugar cane ethanol | 71 | 71 |
| Wheat ethanol (straw as process fuel in CHP plant) | 69 | 69 |
| Hydrotreated vegetable oil from palm oil (process with methane capture at oil mill) | 68 | 65 |
| Palm oil biodiesel (process with methane capture at oil mill) | 62 | 56 |
| Sugar beet ethanol | 61 | 52 |
| Sunflower biodiesel | 58 | 51 |
| Wheat ethanol (natural gas as process fuel in CHP plant) | 53 | 47 |
| Rape seed biodiesel | 45 | 38 |
| Soybean biodiesel | 40 | 31 |
| Hydrotreated vegetable oil from palm oil (process not specified) | 40 | 26 |
| Palm oil biodiesel (process not specified) | 36 | 19 |
| Wheat ethanol (process fuel not specified) | 32 | 16 |

Source: Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC. Official Journal of the European Union, 5 June 2009.

[2] This table is does not display all the feedstock, but is a shorter version of the table in the RED.

For palm oil biodiesel which is processed with methane capture at the palm oil mill, the emission saving is much higher, estimated at 62% as compared to traditional fuels and a default value of 56%. So while biofuel based on ordinary palm oil for which no direct emission reduction figures can be provided can not be sold in the EU because of the RED, biofuel based on palm oil produced with methane capture can.

## 4.5 Additionality with respect to the Renewable Energy Directive

In the season 2007/2008, the EU imported just over 5 million tonnes of palm oil, of which 2.04 million (40.8%) originated from Malaysia and 2.23 million (44.6%) originated from Indonesia.

Table 8 shows that Malaysia's production of palm oil amounted to 17.7 million tonnes in 2008/2009. Of this production, 15.0 million tonnes (or 85%) was exported. The EU is an important export market for Malaysia, with an average proportion of around 15% in the period 2004-2008. Other important export markets are India and China.[70]

**Table 8 Malaysia statistics palm oil**

| Malaysia | Total export Malaysia (1000T) | Total production Malaysia (1000T) | Export to EU (1000T) | Export to EU (% total export) |
|---|---|---|---|---|
| 2004/2005 | 13,584.9 | 15,195.0 | 1,735 | 13 |
| 2005/2006 | 13,718.4 | 15,486.2 | 1,969 | 14 |
| 2006/2007 | 13,767.8 | 15,293.6 | 2,278 | 17 |
| 2007/2008 | 15,041.0 | 17,567.4 | 2,042 | 14 |
| 2008/2009 | 15,900.0 | 17,760.0 | - | - |

Source: Oil World 2007 until 2009.

Indonesia's production of palm oil amounted to 20.3 million tonnes in 2008/2009, and 15.9 million tonnes were exported. Exports to the EU accounted for around for an average of 17% in the period 2004-2008. Other important export markets are China, the United States and Pakistan.[71]

**Table 9 Indonesia statistics palm oil**

| Indonesia | Total export Indonesia (1000T) | Total production Indonesia (1000T) | Export to EU (1000T) | Export to EU (% total export) |
|---|---|---|---|---|
| 2003/2004 | 8,706.2 | 11,970.0 | - | - |
| 2004/2005 | 9,861.9 | 13,560.0 | 2,083 | 21 |
| 2005/2006 | 11,589.9 | 15,520.0 | 1,953 | 17 |
| 2006/2007 | 12,465.0 | 16,730.0 | 1,704 | 14 |
| 2007/2008 | 14,100.0 | 18,880.0 | 2,259 | 16 |
| 2008/2009 | 15,870.0 | 20,250.0 | - | - |

Source: Oil World 2007 until 2009.

According to a Oil World, 800,000 tonnes of palm oil were used for energy generation in the EU in the year 2008. This amount consisted of 370,000 tonnes for electricity and heat generation and 450,000 tonnes for biodiesel production. Oil World said that it would be possible that 1.0 to 1.1 million tonnes of palm oil will be used for energy in the EU in the year 2009. The consultancy said that the EU is likely to use 550,000 tonnes of palm oil for biodiesel in 2009, the balance for electricity and heat generation, mostly in small power plants in Germany.[72]

Based on these Oil World data it is assumed that the EU will import an 1,050,000 tonnes of palm oil for biofuel production in 2009, of which it is estimated that 428,400 tonnes will originate from Malaysia and 468,300 tonnes will originate from Indonesia.[3]

In the future, this amount will probably increase because the EU member states must meet the targets specified under the RED, which will lead to an increased demand for biofuels, including those generated from the palm oil feedstock. Modelling by the UK Department for Transport estimates that by 2020, 45% of Europe's biodiesel could come from Malaysian and Indonesian palm oil, equalling additional demand for palm oil of approximately 14 billion litres (12.8 million tonnes) per year.[73] This would increase Europe’s demand for palm oil imports with more than 250% above the present 5 million tons per year.

In order to be able to profit from this considerable growth of the EU market, palm oil producers must establish a methane capture process at their palm oil mills. Moreover, as the RED sets additional sustainability criteria, the market price for palm oil for biofuel use will probably rise above the normal palm oil market price when the RED is implemented in 2011. Establishing a methane capture facility will be a precondition for oil palm plantations to profit from this price premium.

## 4.6 RSPO-certified palm oil

In response to the urgent and pressing global call for palm oil produced in a sustainable way, the Roundtable on Sustainable Palm Oil (RSPO) was formed in 2004 with the objective of promoting the growth and use of sustainable oil palm products through credible global standards and engagement of stakeholders. The RSPO is a global multi-stakeholder initiative in which different players from the palm oil supply chain are participating. These stakeholders include plantation companies, manufacturers, merchandisers and retailers of palm oil or related products, industry associations, civil organizations and financial institutions.[74]

Palm oil producers can be awarded a Certification for Sustainable Palm Oil (CSPO) production, in accordance with the standards of the RSPO. The RSPO certification is a voluntary system aimed at promoting sustainable palm oil development, taking into account economic, environmental and social aspects of palm oil production. The principle objective of RSPO is “to promote the growth and use of sustainable palm oil through co-operation within the supply chain and open dialogue between its stakeholders.”[75]

Among the principles that should be considered for obtaining a RSPO certification for sustainable palm oil is the fifth principle which is called “Environmental responsibility and conservation of natural resources and biodiversity”.[76] This principle contains criteria with regard to waste, resource use, and climate. Table 10 summarizes these criteria.

[3] These numbers are based on an average of EU imports originating from Malaysia of 40.8% and an average of EU imports originating from Indonesia of 44.6%, as specified in paragraph **Error! Reference source not found.**.

**Table 10 Criteria of the fifth RSPO principle**

| Criterion | |
|---|---|
| 5.1 | Aspects of plantation and mill management, including replanting, that have environmental impacts are identified, and plans to mitigate the negative impacts and promote the positive ones are made, implemented and monitored, to demonstrate continuous improvement |
| 5.2 | The status of rare, threatened or endangered species and high conservation value habitats, if any, that exist in the plantation or that could be affected by plantation or mill management, shall be identified and their conservation taken into account in management plans and operations |
| 5.3 | Waste is reduced, recycled, re-used and disposed of in an environmentally and socially responsible manner |
| 5.4 | Efficiency of energy use and use of renewable energy is maximised |
| 5.5 | Use of fire for waste disposal and for preparing land for replanting is avoided except in specific situations, as identified in the ASEAN guidelines or other regional best practice. |
| 5.6 | Plans to reduce pollution and emissions, including greenhouse gases, are developed, implemented and monitored |

Source: RSPO Principles and Criteria for Sustainable Palm Oil Production. RSPO, October 2007.

Especially the criterions 5.3, 5.4 and 5.6 are relevant for producers which consider to use processes with methane capture at the palm oil mill. For example criterion 5.4 contains the following information: “Growers and mills should assess the direct energy use of their operations, including fuel and electricity, and energy efficiency of their operations. This should include estimation of fuel use by contractors, including all transport and machinery operations. The feasibility of collecting and using biogas should be studied if possible.”[77]

In April 2009, Vengeta Rao, the secretary-general of the RSPO, said that while the roundtable's principles and criteria set out the need to reduce greenhouse gas emissions, it does not get into specifics such as quantification or methane capture. The RSPO has set up a working group to look into the criteria for greenhouse gas savings in the palm oil industry, and revisions to the criteria that incorporate greenhouse gas emission savings.[78] In November 2009, it was announced that oil palm planters at first rejected the proposal by the RSPO to adopt the greenhouse gas criteria into its existing principles and criteria.[79] However, after the 7th annual meeting in November 2009 a representative of the RSPO said that the board reached a compromise on making the greenhouse gas emissions rule voluntary. Companies are encouraged to apply greenhouse gas saving measures already, while a new working group will try to find a more acceptable conclusion at the eighth RSPO meeting in Jogjakarta in 2010.[80]

## 4.7 Additionality with respect to sustainable palm oil

Certified Sustainable Palm Oil (CSPO) has been available since November 2008. The RSPO announced that by late October 2009, plantations in Malaysia, Indonesia and Papua New Guinea had produced more than 1.1 million tonnes of CSPO since they were officially certified.[81] More than 250,000 tonnes of certified sustainable palm oil have been purchased since its availability, according to the RSPO. In September and October alone, more than 100,000 tonnes of palm oil or corresponding certificates were acquired by companies globally.[82] The rise in sales of sustainable palm oil is a result of an increasing number of companies which have formulated goals to fully switch to sustainable palm oil within a certain time frame (mostly 2015), as all RSPO members are required to do.[83]

CSPO producers can sell sustainable palm oil at a premium through various RSPO channels. The price of palm oil from sustainable certified plantations is around US$ 50 a tonne higher than the price for ordinary palm oil. When CSPO started to become available, it could be sold at price premiums of US$ 70-75 per tonne over standard palm oil. But with increasing quantities offered worldwide for export and with demand still subdued, the price premium of certificates for SPO declined to US$ 22-27 in May 2009. There is the risk that the premium for certified SPO continues to decline in the next 1-2 years (with additional quantities becoming available) to or below US$ 20 per tonne. However, Oil World expects a pick up in the premium (in the medium term), due to increasing consumption from the food and the bio-energy industries, partly also linked to new government regulations and/or requirements.[84]

In September and October 2009, market uptake was about 50%, meaning that certified producers were able to sell around 50% of their sustainable oil at a premium price. This percentage rose from 22% in the whole period that CSPO was available.[85] In the future, when more companies shift to CSPO, this amount could increase even further.
At this moment methane recovery at palm oil mills is not yet an official criterion for palm oil to be qualified as CSPO, but the RSPO is already encouraging its members to invest in such facilities and it seems likely that in the near future such a facility will become a precondition for certification. The increasingly attractive market for sustainable palm oil therefore makes it more attractive to install such a facility.

## 4.8 Conclusion

As explained in the previous chapter, when the CERs generated from the AES AgriVerde projects are sold at average market prices of € 7.50 in the primary market, they could raise a total amount of € 36.6 million (US$ 54.5 million). The UNFCCC documents of the projects executed by AES AgriVerde include additionality statements like (in the case of the projects in Malaysia): "The Malaysian palm oil industry views the installation of waste treatment systems as a means to satisfy statutory effluent discharge requirements, not a potential revenue source" and "Mill owners or project developers have no reason to alter the existing wastewater treatment practice without the existence of CDM."

These statements can be questioned. First of all, the cost-benefit analysis presented in this chapter shows that even in the absence of CERs, a methane recovery facility pays itself back between 2 and 10 years, depending on the exact use of the biogas (heat or electricity). In addition, both the sustainability criteria set out in the Renewable Energy Directive of the European Union and the growing market for sustainable palm oil favour the establishment of methane capture facilities at the palm oil mills of Indonesian and Malaysian producers.

As for the RED, it is expected that the EU will demand an additional amount of 14 million tonnes of CPO in order to fulfil its energy needs. As the RED sets additional sustainability criteria, the market price for palm oil for biofuel use will probably rise above the ordinary palm oil market price when the RED is implemented in 2011. Establishing a methane capture facility will be a precondition for oil palm plantations to profit from this booming market and the expected price premium. In addition, methane capture facilities probably will soon become a precondition for a palm oil producer to be certified as a sustainable producer by the RSPO. RSPO-certified palm oil already trades at a market premium and market uptake is increasing.

Therefore, it can be argued that palm oil producers will considerably benefit from establishing methane capture facilities at their palm oil mills, even in the absence of a compensation under the Clean Development Mechanism. The projects of AES Agriverde in the oil palm sectors of Malaysia and Indonesia which are approved by the Dutch government therefore do not meet the crucial additionality criterion of the CDM. As the investments by Annex I countries in these projects could contribute more effectively to curbing climate change when invested in other projects, these projects should not be registered as CDM projects.

# Appendix 1 References


1 Kyoto Protocol to the United Nations Framework Convention on Climate Change. Website UNFCCC, Kyoto Protocol (unfccc.int), Viewed in November 2009.

2 Framework Convention on Climate Change. United Nations UNFCCC, 30 March 2006.

3 Framework Convention on Climate Change. 3/CMP.1, Annex, paragraph 43. United Nations UNFCCC, 30 March 2006.

4 Website UNFCCC (cdm.unfccc.int), Viewed in November 2009.

5 Bali delegates agree to support forests-for-climate (REDD) plan. MongaBay, 17 December 2007.

6 Website UNDP, UN-REDD Programme Fund (www.undp.org), Viewed in November 2009.

7 Website TFS Green Energy Broker (www.tfsgreen.com), Viewed in November 2009.

8 Banks See Green in Carbon Projects. L. Abboud, The Wall Street Journal Online, 18 December 2007.

9 The Clean Development Mechanism: A user's guide. Chapter 7: The Carbon Offset Marketplace. UNDP/BDP Energy and Environment Group, 2003.

10 Website TFS Green Energy Broker (www.tfsgreen.com), Viewed in November 2009.

11 Website TFS Green Energy Broker (www.tfsgreen.com), Viewed in November 2009.

12 Arbitrage opportunities between EU Emission Allowances and Certified Emission Reductions. A. de Wolff, University of Groningen, September 2006.

13 Arbitrage opportunities between EU Emission Allowances and Certified Emission Reductions. A. de Wolff, University of Groningen, September 2006.

14 Website SenterNovem (www.senternovem.nl), Viewed in November 2009; Information supplied by SenterNovem, November 2009..

15 Issues in the international carbon market, 2008-2012 and beyond. Point Carbon Advisory Services, October 2007.

16 Website TFS Green Energy Broker (www.tfsgreen.com), Viewed in November 2009.

17 Issues in the international carbon market, 2008-2012 and beyond. Point Carbon Advisory Services, October 2007.

18 Website TFS Green Energy Broker (www.tfsgreen.com), Viewed in November 2009.

19 Website TFS Green Energy Broker (www.tfsgreen.com), Viewed in November 2009.

20 Website UNFCCC, CDM Statistics (cdm.unfccc.int), Viewed in November 2009.

21 Website UNFCCC, CDM Statistics (cdm.unfccc.int), Viewed in November 2009.

22 Early days of EU Emissions Trading System and the response of Government and Business. J. Duggan, Defra, 29 September 2008.

23 The Origin, Evolution and Consequences of the EU Emissions Trading System. J. Skjærseth and J. Wettestad, Global Environmental Politics, May 2009.

24 Early days of EU Emissions Trading System and the response of Government and Business. J. Duggan, Defra, 29 September 2008.

25 Website TFS Green Energy Broker (www.tfsgreen.com), Viewed in November 2009.

26 CERs lose out to EUAs in recovery. Carbon Positive, 29 April 2009.

27 CER prices back above €10. Carbon Positive, 2 April 2009.

28 CER prices reach 2009 highpoint. Carbon Positive, 30 October 2009.

29 Carbon Markets Workshop: Powerpoint presentation by C. Bougen. Ministry for the Environment and Emissions Trading Group, 4 April 2008.

30 Falling EUA & CER Prices – and the questions we should be asking. Think Carbon, 4 February 2009.

31 Website VROM, policy CDM (www.vrom.nl), Viewed in November 2009.

32 Website UNFCCC, CDM Statistics (cdm.unfccc.int), Viewed in November 2009.

33 Website UNFCCC, Project Search (cdm.unfccc.int), Viewed in November 2009.

34 News release, AES Corporation and AgCert: AES and AgCert International create new joint venture.to reduce greenhouse gas emissions, 21 May 2006.

35 Website AgCert (www.agcert.com), Viewed in November 2009.

36 AES holds off on AgriVerde sale after hunt for buyers comes out cold. Mergermarket, 18 September 2009.

37 AES holds off on AgriVerde sale after hunt for buyers comes out cold. Mergermarket, 18 September 2009.

38 News release, AES Corporation and AgCert: AES and AgCert International create new joint venture.to reduce greenhouse gas emissions, 21 May 2006.

39 AES holds off on AgriVerde sale after hunt for buyers comes out cold. Mergermarket, 18 September 2009.

40 Website UNFCCC, Corrections Requested (cdm.unfccc.int), Viewed in November 2009.

41 Newsletter Roundtable on Sustainable Palm Oil, Issue # 11, April/June 2007.

42 Letter from AES AgriVerde to Tolan Tiga, 1 March 2007. Website UNFCCC (cdm.unfccc.int), Viewed in November 2009.; Letter from AES AgriVerde to Permata Hijau Group, 11 May 2007. Website UNFCCC (cdm.unfccc.int), Viewed in November 2009.

43 Letter from AES AgriVerde to the Prosper Group of Companies, 28 December 2007. Website UNFCCC (cdm.unfccc.int), Viewed in November 2009.

44 Website UNFCCC, Project Search (cdm.unfccc.int), Viewed in November 2009.

45 Website TFS Green Energy Broker (www.tfsgreen.com), Viewed in November 2009.

46 Written and oral conversations with several SenterNovem employees, November 2009.

47 Written and oral conversations with several SenterNovem employees, November 2009.

48 Website UNFCCC, Project Search (cdm.unfccc.int), Viewed in November 2009.

49 A Technical and Economic Analysis of Heat and Power Generation from Biomethanation of Palm Oil Mill Effluent. B. Yeoh, SIRIM, Electricity Supply Industry in Transition: Issues and Prospect for Asia, 14-16 January 2004.

50 Website UNFCCC, Project Search (cdm.unfccc.int), Viewed in November 2009.

51 A Technical and Economic Analysis of Heat and Power Generation from Biomethanation of Palm Oil Mill Effluent. B. Yeoh, SIRIM, Electricity Supply Industry in Transition: Issues and Prospect for Asia, 14-16 January 2004.

52 A Technical and Economic Analysis of Heat and Power Generation from Biomethanation of Palm Oil Mill Effluent. B. Yeoh, SIRIM, Electricity Supply Industry in Transition: Issues and Prospect for Asia, 14-16 January 2004.

53 A Technical and Economic Analysis of Heat and Power Generation from Biomethanation of Palm Oil Mill Effluent. B. Yeoh, SIRIM, Electricity Supply Industry in Transition: Issues and Prospect for Asia, 14-16 January 2004.

54 Website UNFCCC, Project Search (cdm.unfccc.int), Viewed in November 2009.

55 Website UNFCCC, Project Search (cdm.unfccc.int), Viewed in November 2009.

56 Website UNFCCC, Project Search (cdm.unfccc.int), Viewed in November 2009.

57 Website UNFCCC, Project Search (cdm.unfccc.int), Viewed in November 2009.

58 Next generation biofuels: Malaysian experience. S. Ahmad and C. May. International Conference on Green Industry in Asia, Manila, Philippines, 9-11 September 2009.

59 Small Renewable Energy Power Programme (SREP). Website Suruhanjaya Tenaga (www.st.gov.my), Viewed in November 2009.

60 Small Renewable Energy Power Programme (SREP). Website Suruhanjaya Tenaga (www.st.gov.my), Viewed in November 2009.

61 Tenaga Nasional Bhd, Felda Palm Industries Sdn Bhd and Electric Power Development Co. Ltd. Signs Shareholders Agreement. Investing BusinessWeek, 1 December 2008.

62 FELDA Palm Iidustries Sdn Bhd - Biogas Project: Generating Electricity from Waste Palm Oil Mill Effluent (POME). Website Pusat Tenaga Malaysia (www.ptm.org.my/biogen/biogas.aspx), Viewed in November 2009.

63 FELDA Palm Iidustries Sdn Bhd - Biogas Project: Generating Electricity from Waste Palm Oil Mill Effluent (POME). Website Pusat Tenaga Malaysia (www.ptm.org.my/biogen/biogas.aspx), Viewed in November 2009.

64 Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC. Official Journal of the European Union, 5 June 2009.

65 Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC. Official Journal of the European Union, 5 June 2009.

66 Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC. Official Journal of the European Union, 5 June 2009.

67 Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC. Official Journal of the European Union, 5 June 2009.

68 Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC. Official Journal of the European Union, 5 June 2009.

69 NGOs unhappy with revised palm oil criteria. ENDS Report, 30 September 2009.

70 Oil World Annual 2009. ISTA Mielke GmbH, May 2009.

71 Oil World Annual 2009. ISTA Mielke GmbH, May 2009.

72 EU to import more palm oil for biofuels-Oil World. Reuters, Hamburg, 24 March 2009.

73 Friends of the Earth: Roundtable on Sustainable Palm Oil rejects greenhouse gas emissions standards. M2 PressWIRE, 4 November 2009.; Website Biofuelsb2b, conversion factors (www.biofuelsb2b.com), Viewed in November 2009.

74 Website RSPO (www.rspo.org), Viewed in November 2009.

75 Website RSPO (www.rspo.org), Viewed in November 2009.

76 RSPO Principles and Criteria for Sustainable Palm Oil Production. RSPO, October 2007.

77 RSPO Principles and Criteria for Sustainable Palm Oil Production. RSPO, October 2007.

78 Corporate: Palm biodiesel at a crossroads. The Edge Malaysia, 6 April 2009.

79 Malaysian Newspaper Highlights. 6 November 2009.

80 Malaysian, Indonesian palm growers withdraw objection to GHG criteria. New Straits Times (Malaysia), 5 November 2009.

81 Certified Sustainable Palm Oil Trade Exceeds 250,000 MT. Environmental Leader, 2 November 2009.

82 Certified Sustainable Palm Oil Trade Exceeds 250,000 MT. Environmental Leader, 2 November 2009.

83 Certified Sustainable Palm Oil Trade Exceeds 250,000 MT. Environmental Leader, 2 November 2009.

84 Written information supplied by Siegfried Falk, co-founder of Oil World, 10 November 2009.

85 Certified Sustainable Palm Oil Trade Exceeds 250,000 MT. Environmental Leader, 2 November 2009.