SOURCING PALM OIL FROM SUSTAINABLE SOURCES

Commissioned by: Essent

Samenvatting

Aanleiding

Biomassa is één van de bronnen van vernieuwbare energie die ingezet kan worden om de duurzaamheid van de energievoorziening te verhogen. Eén vorm van biomassa is palmolie. Essent heeft in het verleden palmolie (derivaten) ingekocht voor haar centrales en wil, alvorens hiermee verder te gaan, garanties voor de duurzaamheid van deze energiebron. Essent heeft daartoe aan een commissie van experts gevraagd haar te adviseren of het mogelijk is een systeem op te zetten waarbij de duurzaamheid van de inzet van palmolie is gegarandeerd. In dit rapport doet de commissie verslag van haar bevindingen.

Criteria voor duurzame palmolie productie

Er bestaan reeds verschillende sets van criteria voor de duurzaamheid van palmolie, o.a. van de *Roundtable on Sustainable Palm Oil* (RSPO) en de – meer in het algemeen voor biomassa geldende - criteria van de zogenaamde Commissie Cramer. De commissie van experts beveelt aan om zo veel mogelijk aan te sluiten bij de criteria van de RSPO, welke in grote mate dekking geven van de Cramer criteria en internationaal het best geaccepteerd zullen worden. De RSPO stelt eisen aan de milieukwaliteiten en de sociale omstandigheden van de palmolie productie. Onder andere wordt het vernietigen van bos met *High Conservation Values* (HCV) verboden.

De commissie meent dat voor de opwekking van duurzame energie bovenop RSPO aanvullende eisen nodig zijn om te garanderen dat de inzet van palmolie tot een terugdringing van broeikasgasemissies leidt:

- geen palmolie van plantages op veengronden;
- in geval van ontbossing voor zover geoorloofd binnen de kaders van RSPO, dient men te laten zien dat er een netto reductie van de broeikasgasemissie optreedt.

Voor deze additionele eisen wordt verwezen naar de bestaande Cramer criteria die hiervoor gedefinieerd zijn.

Verdringingseffecten

Essent zou zich tevens moeten inspannen om te voorkomen dat de groei van de vraag naar palmolie elders leidt tot schade, bijvoorbeeld de vernietiging van bos met High Conservation Values (HCV). De commissie stelt voor dat Essent zich inzet voor de verhoging van palmolieproductie zonder dat hiervoor ontbossing nodig is (bijvoorbeeld door verhoging van de productiviteit of gebruikmaking van braakliggend land) en daarnaast vermijdt om zaken te doen met bedrijven die zich aantoonbaar schuldig maken aan ernstige aantasting

van de duurzaamheid, zoals het kappen van bos met HCV en het openleggen van land zonder de rechten van lokale gemeenschappen te respecteren.

Verificatie van duurzaamheidscriteria op de plantage

Om te controleren of de door Essent ingekochte palmolie inderdaad aan de duurzaamheidcriteria voldoet is een zorgvuldig proces van verificatie nodig. De eisen die aan dit proces worden gesteld (bijvoorbeeld de kwaliteitseisen die aan de controleurs worden gesteld en de wijze van raadpleging van belanghebbenden) zijn merendeels al (in concept) beschreven door de RSPO. De commissie stelt voor deze te gebruiken, en bij de interpretatie waar nodig gebruik te maken van de meer gedetailleerde richtlijnen van de Forest Stewardship Council (FSC).

Commissie van Toezicht

Uiteindelijk zal de gehele certificering van palmolie plaatsvinden door internationaal erkende organen, zoals de RSPO. De commissie is van mening dat Essent hierop moet aansluiten zodra deze operationeel zijn. Voor een overgangsfase dient Essent een onafhankelijke Commissie van Toezicht in te stellen die toeziet op de kwaliteit van de verificatie van de door Essent ingekochte palmolie en hiervoor ook de middelen ter beschikking heeft.

Chain of custody

Bijzondere aandacht is nodig om te garanderen dat er een duidelijke relatie is tussen de duurzaam geproduceerde palmolie en de door Essent in elektriciteitscentrales verstookte palmolie (de zogenaamde *chain of custody*). Hiervoor zijn verschillende systemen denkbaar, waaronder fysieke scheiding, een massabalanssysteem en een *book-and-claim* systeem (certificatenhandel). De commissie heeft geen strikte voorkeur voor één van deze systemen. Voor elk systeem zal moeten gelden dat voor elke ton duurzame palmolie die door Essent wordt geclaimd, een ton duurzaam geproduceerde palmolie aan de markt is toegevoegd. Tevens mag elke hoeveelheid duurzaam geproduceerde palmolie slechts één maal als zodanig worden geclaimd. De commissie meent dat een massabalanssysteem op korte termijn het best werkbaar is.

Stapsgewijze implementatie

Er is nu sprake van een overgangsfase en de hoeveelheid duurzame palmolie op de markt is nog beperkt. De commissie stelt voor dat Essent in 2008 minimaal 20% geverifieerd duurzame palmolie inkoopt en dit percentage jaarlijks met minimaal 20% ophoogt tot 100% in 2012. Een belangrijke overweging hiervoor is dat duurzame productie van palmolie gedreven wordt door een vraag naar dergelijke duurzaam geproduceerde palmolie. De commissie acht het daarom van belang dat Essent een voortrekkersrol vervult door deze vraag te creëren: het uitsluiten van Essent van de palmoliemarkt acht de commissie niet in het belang van de ontwikkeling naar duurzame palmolie productie.

Content

1 Introduction

1.1 Assignment

Our world is confronted with increasing concerns about global warming and security of energy supply. Renewable energy is promoted as one of the solutions to these challenges. One source of renewable energy is palm oil (derivatives). Crude palm oil and its derivatives[1] can be used to produce biodiesel as well as to produce electricity and heat. Essent, a Dutch electricity producer, has co-fired palm oil for the generation of electricity from renewable sources. However, there has been an increasing concern about the sustainability of palm oil production. It is feared that the large-scale consumption of palm oil by the energy sector may have negative effects, e.g. on the environment in producing countries. In a reaction to this concern Essent suspended its sourcing of palm oil and asked a commission of experts, see Annex A, to advise her on the possibilities of sourcing palm oil from verified sustainable sources. This report is the result of the Commission's work and documents the advice of the Commission to Essent.

The assignment to the Commission is to determine whether it is possible to implement a certification system for palm oil products in the short term that enables sourcing of palm oil from verified sustainable sources.

- For the sustainability criteria maximum use is made of existing standards or initiatives: Roundtable on Sustainable Palm Oil (RSPO) and the Dutch Cramer Criteria for sustainable biomass in the Netherlands (discussed in Chapter 2.1).
- The assignment is limited to palm oil and does not consider other renewable energy sources such as alternative oil crops.

The questions to be addressed by the Commission are:

1. *Verification*: how can Essent set up and control a credible verification system in the short term to determine whether plantations meet the RSPO/Cramer criteria?
2. *Chain of custody*: how can Essent set up a credible chain of custody system in the short term that enables sourcing of palm oil that meets the RSPO/Cramer criteria? The Commission will consider different mechanisms for the chain of custody.

The above two questions to the Commission build upon the sustainability criteria of RSPO and Cramer and assume these criteria provide a useful norm for sustainable palm oil production. If, during the assignment, Cramer and RSPO prove insufficient for critical sustainability issues, the Commission will also address the following question:

[1] This report will use the term 'palm oil' to indicate both crude palm oil and its derivatives.

3. Are there significant sustainability risks related to sourcing palm oil that are (insufficiently) addressed through company certification systems? If so, what additional action can Essent undertake to effectively diminish these risks?

1.2 Readers' note

The remainder of this Chapter will give a general introduction to the palm oil industry. Next, Chapter 2 analyses existing sustainability criteria for palm oil production and includes the Commission's advice on which set of (existing) sustainability criteria form a credible norm for sustainable palm oil. Special attention will be given to important issues such as displacement effects and greenhouse gas emissions. Having defined the norm for sustainable palm oil in Chapter 2, Chapter 3 includes a discussion and the Commission's recommendations on the credible verification of the sustainability criteria as well as the chain of custody. Chapter 4 sets out targets for Essent with respect to the sourcing of palm oil from sustainable sources. Together, Chapters 2, 3 and 4 form the Commission's advice on how Essent can credibly source sustainable palm oil.

1.3 Palm oil, facts and figures

This section gives a brief overview of key facts and figures concerning palm oil.

The palm oil production process

Palm oil is produced from the fruits of the oil palm, which grow in bunches. Harvesting of oil palm fresh fruit bunches (FFB) starts 24-30 months after planting. Harvesting is done manually using a chisel on young palms and a sickle mounted on a stick in older oil palms due to their height. After roughly 25 years oil palm trees become too high to be harvested and are removed and replaced by new plantings (Teoh 2002).

Figure 1-1 Oil palm FFB harvesting (Teoh 2002).

After harvesting the FFB are transported to the palm oil mill where the oil is extracted from the fruits' mesocarp, see Figure 1-2. It is important that the FFB are processed as soon as possible after harvesting to prevent the build up of Free Fatty Acids which negatively affects the quality of the Crude Palm Oil. The milling process produces Crude Palm Oil as the main product as well as smaller quantities of palm kernels. Palm kernels are normally processed in a different plant where the palm kernel is crushed to produce Palm Kernel Oil and Palm Kernel Meal. Palm Kernel Oil is currently not used for energy purposes and will not be considered in this report.

Figure 1-2 Fresh Fruit Bunch and cross section of fruitlet (Teoh 2002).

The Crude Palm Oil can be used without further processing for co-firing in gas-fired power plants. For the main uses of palm oil (food and cosmetics), the Crude Palm Oil is processed into Refined Bleached and Deodorised Palm Oil, which may be processed further into several fractions (e.g. palm olein and palm stearin). A by-product from the refinery process is Palm Fatty Acid Distillate (PFAD). Palm Fatty Acid Distillate can also be used for co-firing. Other users of Palm Fatty Acid Distillate include the soap industry, feed industry and oleochemical industry.

Main consuming industries

Palm oil is mostly used in the food industry as cooking oil and as an ingredient in a wide range of food products ranging from margarine to ice cream and cookies. Other uses of palm oil are in non-food products such as soaps and cosmetics. More recently palm oil has been recognised as a renewable alternative to fossil oil by the energy sector. Today, palm oil consumption by the energy sector is still very small compared to the food industry.

Production figures

With a forecasted production of 37 million tonnes of oil for 2006/2007, palm oil recently took over soy oil as the main vegetable oil from a global production perspective. Soy oil production is currently only slightly lower than palm oil production while production quantities of rapeseed oil, the next largest vegetable oil, are less than half that of palm oil. Together, palm oil, rapeseed oil and soy oil make up 75% of total oil production of the main nine vegetable oils, see Figure 1-3.

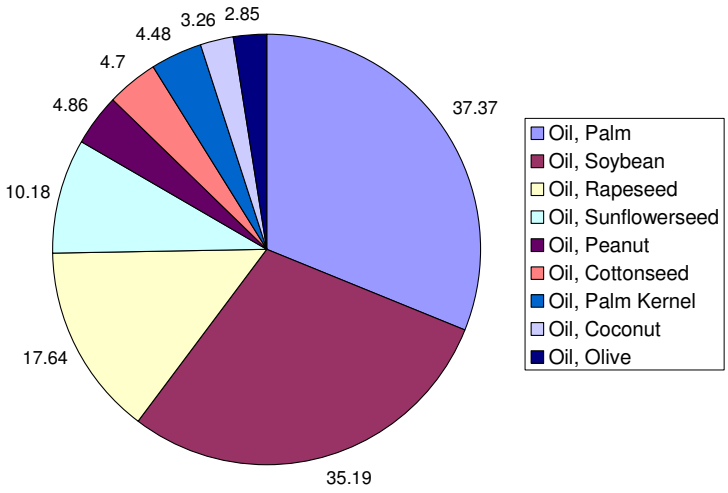

Figure 1-3 Global annual production forecast of main vegetable oils for 2006/2007 in million tonnes. (Source: USDA 2007a)

Looking at growth rates it can be concluded that palm oil growth rates significantly outpace those of soy oil and rapeseed oil. Since 2000, global palm oil production has grown with an average of 7% per year. Growth is strongest in Indonesia with 11% per year since 2000. For the future it is expected that especially Indonesia will continue to show strong growth figures. The main palm oil producing countries are summarized in Figure 1-4. Malaysia and Indonesia dominate global palm oil production and together produce 85% of global production. Total harvested area is close to 10 million hectares. Because of the high oil yields of oil palm, see below, oil palm plantations currently produce 35% of global vegetable oil production on less than 5% of the global area harvested for oil crops (Oil World 2007)

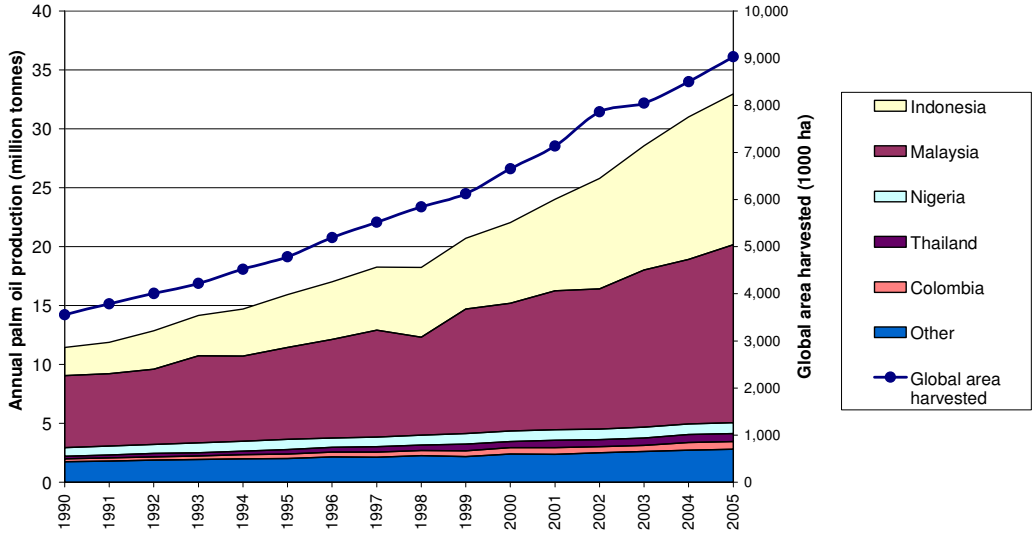

Figure 1-4 Main palm oil producing countries. Surfaces indicate annual production per country. The single line shows the growth in area harvested on a global scale. (Source: FAO 2007)

Main palm oil importing countries

The main importing countries are China, India and the European Union, see Figure 1-5.

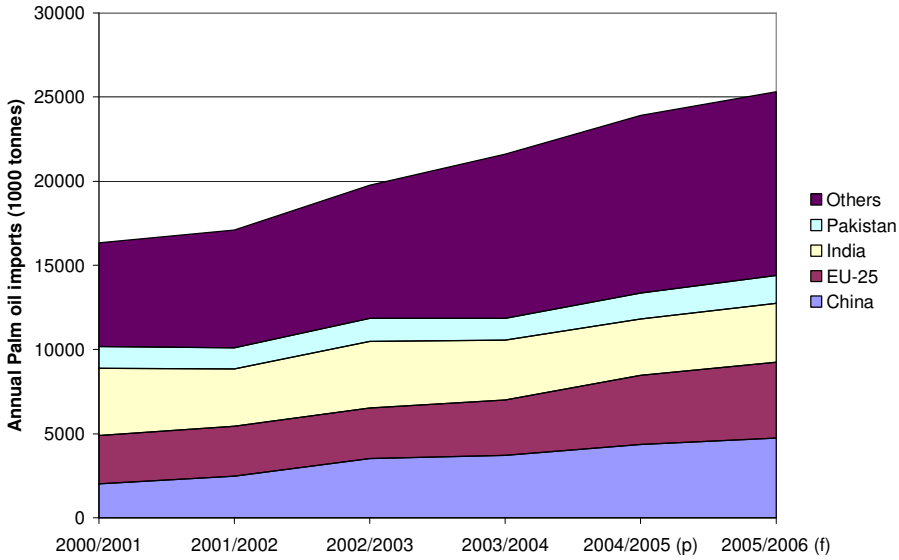

Figure 1-5 Main palm oil importing countries (USDA 2007)

Price information

Palm oil is the cheapest vegetable oil available on the world market. Prices fluctuated mainly between 400 and 600 US$/tonne (c.i.f. Rott) in the last three years, see Figure 1-6.

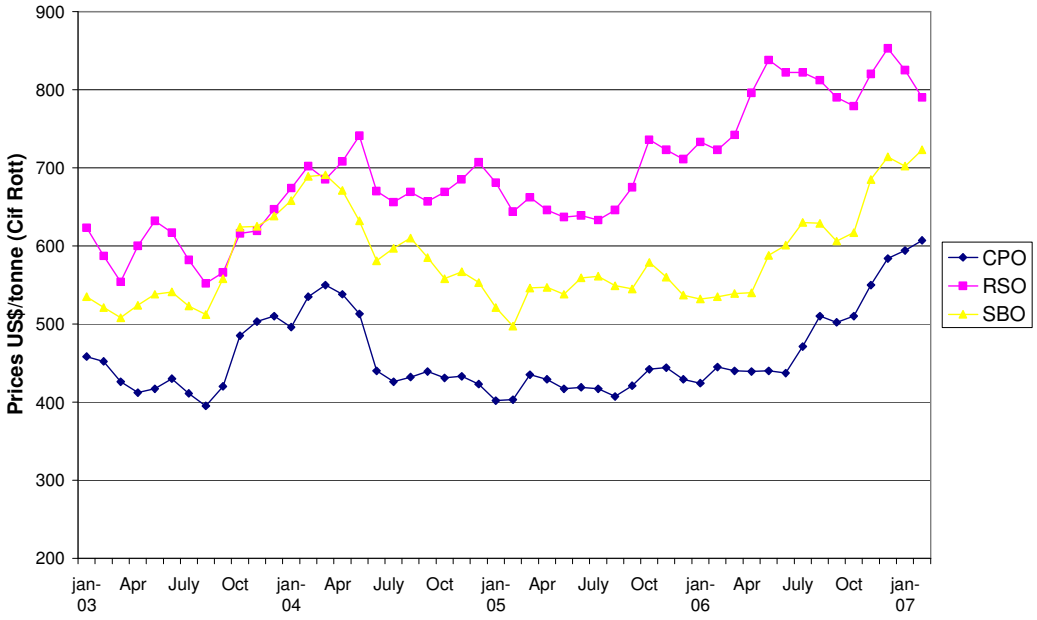

Figure 1-6 Prices of three main vegetable oils in Europe: Crude Palm Oil (CPO), Rape Seed Oil (RSO) and Soy Bean Oil (SBO).

Yields

Oil palm has a very high oil yield. At an average of almost 3.5 tonnes Crude Palm Oil per hectare per year, average yields are almost six times higher than average rapeseed oil yields and almost ten times higher than soy oil yields. Even when taking into account meal[2] yields, the oil palm still outperforms its main alternatives soy and rapeseed, see Figure 1-7.

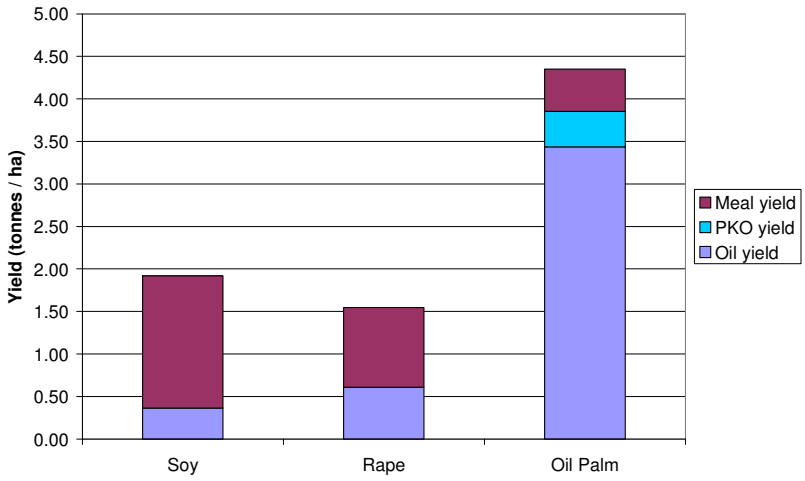

Figure 1-7 Global average yields of different vegetable oil crops in tonnes per ha (Dehue 2006 referring to USDA and FAO).

[2] Meal is what is left after crushing the beans or seeds for their oil content. Meal is typically used as animal feed.

2 Criteria for sustainable palm oil production

This chapter looks at the criteria for sustainable palm oil. Both the criteria of the Roundtable on Sustainable Palm Oil (RSPO) and the criteria of the Dutch Cramer Commission will be analysed. It will be shown that these sets of criteria show a large overlap and that the RSPO is likely to have higher credibility and acceptance with producers.

While the Commission clearly does not intend to reinvent criteria for sustainable palm oil, several sustainability issues have been discussed in greater detail because of their importance. For each of these issues the Commission considered additional requirements where RSPO was judged to provide insufficient protection.

2.1 RSPO and Cramer criteria

The RSPO criteria

In 2001, WWF commissioned to explore the possibilities for a Roundtable on Sustainable Palm Oil. The result was an informal co-operation among vegetable oil company Aarhus United UK Ltd, Golden Hope Plantations Berhad, retail chain Migros, Malaysian Palm Oil Association, Sainsbury's and Unilever together with WWF in 2002. In 2004, the "Roundtable on Sustainable Palm Oil (RSPO)" was formally established under the Swiss Civil Code with a governance structure that ensures fair representation of all stakeholders throughout the entire supply chain.

The RSPO developed a set of Principles and Criteria for sustainable palm oil production, which were first published in October 2005, see Annex C. These criteria are currently being applied for a pilot implementation period of two years from the date of adoption. Various issues will still have to be tackled, such as verification of the principles and criteria, the role of smallholders, chain of custody and national interpretations. The RSPO is therefore not yet an operational standard and no RSPO certified palm oil is on the market today.

It is estimated that the current membership of the RSPO covers roughly 40% of world palm oil production. More information on the RSPO including its criteria can be found on http://www.rspo.org.

The Cramer criteria

In order to guarantee the use of sustainable biomass for energy in The Netherlands the interdepartmental program Energy Transition in The Netherlands installed the 'Commission

on Sustainable Production of Biomass' led by Prof. Dr. J. Cramer. The task of the Cramer Commission was to develop a set of criteria for sustainable biomass production and processing. The Cramer Commission worked with a wide group of stakeholders with representatives from industry, NGO and academia. A large difference with RSPO is that the Cramer Commission included little representation from producing countries.

The first results of the Cramer Commission were published in July 2006 and the final results are expected by April/May 2007. The final results will take the form of an advice to the interdepartmental program Energy Transition and it will be up to the relevant ministries to translate the Cramer Commissions' advice into concrete policy measures. We used the draft version of February 2007 (Cramer, 2007).

Cramer criteria versus RSPO criteria

The Cramer criteria revolve around six sustainability themes while the RSPO criteria are categorised in eight sustainability principles. Both cover environmental, social and economic issues. A detailed comparison between the Cramer criteria and RSPO criteria is included in Annex B. A high level comparison is shown in Figure 2-1 below.

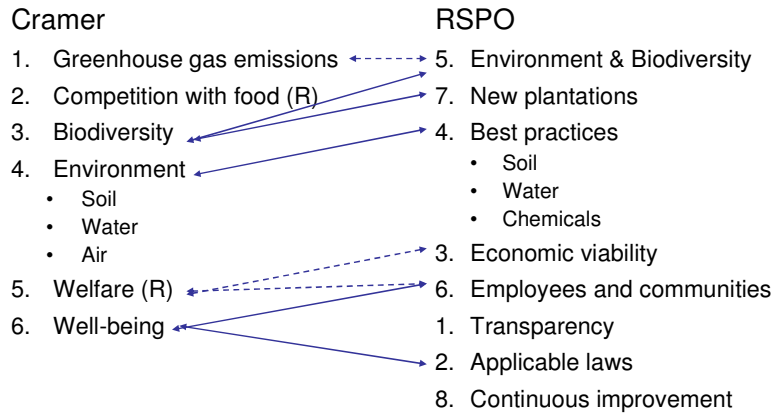

Figure 2-1 Comparison between the six themes covered by the Cramer criteria and the eight principles of the RSPO. The Cramer numbers coincide with theme numbers in the February draft publication of the Cramer Commission. The RSPO numbers coincide with the principle numbers. They have been put in a different order for transparency reasons. A solid line indicates a strong overlap while a dotted line indicates a partial overlap. (R) means that on the relevant theme only reporting is required and no minimum standards are set.

The following observations can be made on the comparison of Cramer and RSPO criteria:

1. The two sets of criteria show a large overlap. Most notably on:
    a. Biodiversity
    b. Air quality
    c. Soil quality
    d. Water quality and consumption

e. Labour conditions and land rights (well-being)
f. Compliance with national law

2. Several differences exist where the Cramer criteria require 'reporting':
    a. Cramer requires reporting on 'competition with food' while RSPO has no such requirement. Due to the sensitivity of competition with food, this issue will be addressed in more depth below.
    b. The same goes for local economic welfare. RSPO does include a criterion on contribution to local sustainable development.
3. The main difference is on greenhouse gas (GHG) emissions:
    a. Cramer has a criterion on a minimum GHG reduction of biomass compared to its fossil alternative. RSPO, not being primarily geared towards the energy sector, has no such requirement.
    b. Cramer has criteria on above and below ground carbon stock conservation. RSPO does have a criterion on the conservation of primary forests and forests with High Conservation Values but does not exclude deforestation of other forests or production on peat soils (<3 meter in depth). Because of the importance of GHG-savings of bioenergy this issue will also be addressed in more detail below.

Commission's advice

The Commission advises Essent to use RSPO as the basic and practical norm for sustainable palm oil production. Several critical subjects that are not covered (sufficiently) by RSPO are dealt with additionally, see next section.

The main arguments for this advice are:

1. The RSPO criteria show a large overlap with the Cramer criteria.
2. The RSPO criteria have been defined through a transparent, international multi-stakeholder process making it a credible norm for the various stakeholders.
3. Producers have been actively involved in the definition of the RSPO criteria and producers are therefore expected to more readily accept the RSPO criteria than the Cramer criteria on which they have had no or little influence.
4. The RSPO criteria are considered practical and workable by the Commission's experts.

Several sustainability issues are insufficiently covered by RSPO, mainly as it is not focussed on energy applications, and will be dealt with separately: with maximum use of the Cramer criteria on these issues, see next section.

2.2 Specific sustainability aspects

A. Greenhouse gas emission reduction

Greenhouse gas (GHG) emission reduction is one of the main goals of renewable energy policies. Any form of renewable energy should thus bring a significant reduction in GHG emissions to be in line with this policy goal. For this purpose Ecofys made an assessment

of the difference in GHG-emissions of using either Crude Palm Oil[3] or Heavy Fuel Oil or Natural Gas in a power station in The Netherlands. The results are shown in Figure 2-2 and Figure 2-3.

The main assumptions made in this analysis are:

- The GHG-emissions have been expressed in kg CO_2 –equivalent per MJ of fuel. The conversion step from fuel to electricity has not been included in the scope. Assuming that the differences in final conversion efficiency of the different fuels are small, this has little effect on the outcomes.
- Methodology: allocation of greenhouse gas emissions to different products is based on the economic value of the different products. Because Crude Palm Oil production generates few by-products, the majority of the emissions resulting from cultivation and milling are allocated to the Crude Palm Oil.
- Both direct and indirect emissions (such as from fertilizer production) have been included.
- Typical parameter values: the CPO Base Case is based on 'typical' values for parameters such as fertilizer application and yield, as they are realised today.
- Where effects of Land Use Change (LUC) have been included, the greenhouse gas emissions resulting from Land Use Change have been allocated to the total palm oil production of 50 years. 50 years coincides with two oil palm plantation cycles. Because oil palm trees need several years after planting to become productive we have assumed 44 productive years in these 50 calendar years.

More detailed information on the assumptions made in this analysis is given in Annex D.

From Figure 2-2 it can be seen that the use of Crude Palm Oil (CPO) leads to a significant reduction in GHG emissions if Land Use Change is not taken into account:

- ***CPO Base Case*** represents the typical palm oil production methodology in which emissions from Land Use Change have not been included. In this case CPO saves 59% of GHG emissions compared to Natural Gas and 73% compared to Heavy Fuel Oil. The main sources of GHG-emissions are from nitrogen fertilizers (green) and methane emissions from Palm Oil Mill Effluent (red). Transportation of CPO to the Netherlands has a negligible effect on GHG-emissions from CPO.
- ***CPO Methane Capture*** shows a case similar to the Base Case but where methane emissions from Palm Oil Mill Effluent ponds are captured and flared off (converted to CO_2). This further increases the GHG benefits of CPO compared to Heavy Fuel Oil and Natural Gas.

[3] The greenhouse gas emissions of Palm Fatty Acid Distillate have not been analysed within the scope of the Commission.

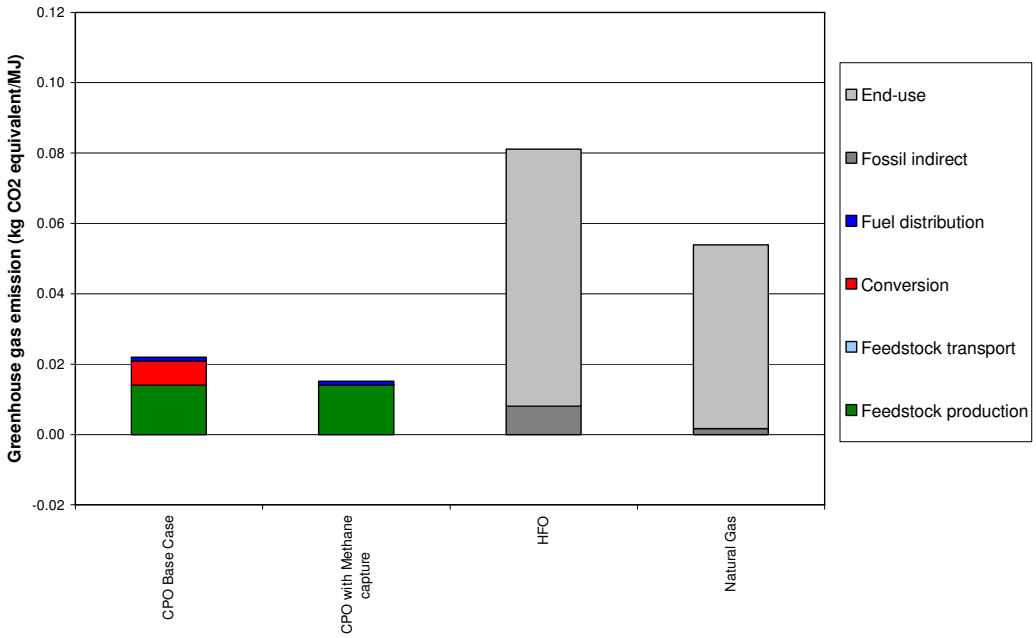

Figure 2-2 GHG emissions of Heavy Fuel Oil (HFO) and Natural Gas compared to several scenarios of Crude Palm Oil (CPO). LUC means land use change. Calculations by Ecofys (2007).

The above two cases, illustrated in Figure 2-2, do not include the effects of Land Use Change (LUC). The effects of LUC on the GHG-emission of CPO can be very large and have been captured in three scenarios, depicted in Figure 2-3 below. The description of these scenarios is primarily targeted at readers with experience in GHG-calculations. Other readers are referred to the conclusions.

- ***CPO converted Tropical Rainforest*** shows the effects of deforestation of tropical rainforest. Only changes in above ground carbon storage have been included in the analysis. Changes in soil carbon are more uncertain and have been left out of this scenario. It is furthermore assumed that all above ground biomass of the rainforest is emitted into the atmosphere in the form of CO_2. Allocating these emissions from LUC to the CPO produced in 50 years time, results in GHG emissions from CPO that are higher than those of Heavy Fuel Oil.
- ***CPO drained Peat Soils*** shows the effects of cultivation oil palm on drained peat soils. Because of the significant GHG-emissions from peat oxidation, the GHG emissions of CPO in this case are more than five times higher than those of Heavy Fuel Oil[4].
- ***CPO converted Imperata Grasslands*** is a scenario in which the oil palm plantation is established on Imperata Grasslands. Because oil palm plantations store more carbon than grasslands, this leads to a net increase in above ground carbon storage[5]. Distrib-

[4] Note that emissions from peat oxidation occur every year (until all peat is oxidised) and are therefore not annualised over 50 years.

[5] It is assumed that in multiple plantation cycles the average above ground biomass of oil palm plantations is 50% of the maximum biomass storage, see Annex D.

uting the additional carbon stored in oil palms over 50 years of palm oil production leads to very low GHG emissions per MJ of CPO.

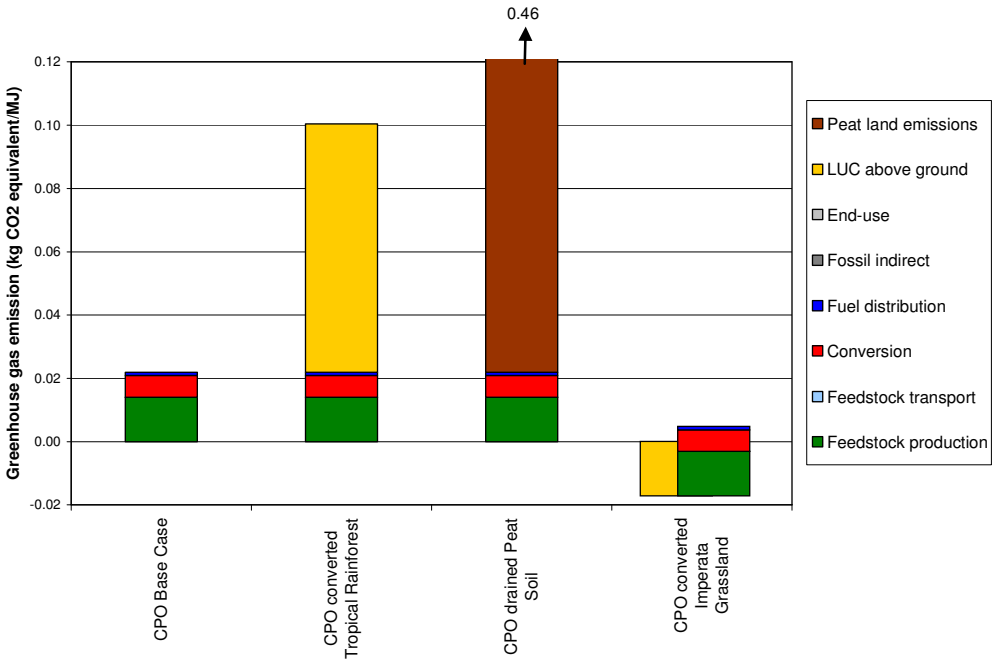

Figure 2-3 GHG emissions of Crude Palm Oil (CPO) Base Case Scenario without LUC compared with CPO scenarios with LUC. Calculations by Ecofys (2007).

The numerical results of all scenarios discussed above are included in Table 2-1 below.

Table 2-1 GHG emissions for different scenario's of Crude Palm Oil (CPO) compared to Heavy Fuel Oil (HFO) and Natural Gas (NG). The negative emission savings achieved in certain scenario's mean that in those specific scenarios the use of CPO emits more GHG-emissions than its fossil alternative.

Scenario	GHG emissions (Kg CO2-eq/MJ)	Emission savings compared to HFO	Emission savings compared to NG
Fossil reference cases			
HFO	0.0811	0%	-50%
Natural Gas	0.0539	34%	0%
CPO without LUC			
CPO Base Case	0.0220	73%	59%
CPO with Methane capture	0.0151	81%	72%
CPO with LUC			
CPO converted Tropical Rainforest	0.1004	-24%	-86%
CPO converted Imperata Grassland	0.0047	94%	91%
CPO drained Peat Soil	0.4560	-462%	-746%

Conclusions

Based on the GHG-analysis performed by Ecofys, the following conclusions can be drawn:

- When palm oil production does not lead to Land Use Change and does not take place on drained peat soils, the use of CPO leads to a significant reduction in GHG emissions compared to Heavy Fuel Oil and Natural Gas.
- When palm oil originates from plantations on drained peat soils, or other soils vulnerable to large GHG-emissions, the GHG emissions of CPO are significantly higher than those of Heavy Fuel Oil and Natural Gas. RSPO does not address this issue sufficiently as it only states that "plantings on extensive areas of peat soils (>3 m in depth) and other fragile soils should be avoided" (RSPO 2006a).
- The effects of changes in above ground carbon stocks from Land Use Change strongly depend on the original vegetation. The effects range from very positive to very negative. RSPO does not address this risk sufficiently as its main criterion on Land Use Change is focussed on the conservation of primary forests and areas with one or more High Conservation Values. RSPO does not address changes in (above ground) carbon stock resulting from Land Use Change.

Commission's advice

Based on the above described GHG analysis, and the lack of effective criteria in RSPO in this area, the Commission advises to incorporate two additional criteria on top of RSPO to guarantee a significant reduction in GHG emissions from the use of CPO compared to the use of Heavy Fuel Oil or Natural Gas. The two additional criteria are both found in the Cramer criteria:

1. *Production of palm oil should not take place on peat soils or other soils vulnerable to large GHG-emissions. For this purpose the Commission refers to criterion 2.2[6] of the Cramer Commission which should be complied with.*
2. *In case of deforestation, an analysis of the effects on carbon stock changes must be undertaken to avoid destruction of significant carbon stocks. For this purpose the Commission refers to criterion 2.1[7] of the Cramer Commission which should be complied with.*

B. Competition with food

The commission acknowledges the potential risk of competition with food in case of large scale use of palm oil for energy purposes. However:

---

[6] Cramer criterion 2.2 says: 'Conservation of below ground carbon stocks in the establishment of new plantations". The indicator for this is: "No establishment of new plantations in areas with a high risk of significant losses in soil carbon such as peat lands, certain grasslands, mangroves and wet areas. The reference date is the date of publication of this report unless a reference date exists for the particular crop from an existing or developing sustainability standard."

[7] Cramer Criterion 2.1 says: "Conservation of above ground carbon stocks in the establishment of new plantations". The indicator for this is: "The establishment of new plantations does not cause the destruction of above ground carbon stocks which have a carbon payback time of more than ten years. The reference date is the date of publication of this report unless a reference date exists for the particular crop from an existing or developing sustainability standard."". The carbon payback time is the number of years palm oil needs to be produced and used as a renewable energy source before the negative effects of Land Use Change in terms of GHG-emissions have been compensated.

1. Competition of energy applications of palm oil with food applications is a complex phenomenon which will have both winners and losers. The relationship between an individual buyer's actions and the global or local food security situation is equally complex. These issues are currently not understood well enough for Essent to be able to take specific measures in this regard.
2. The Commission wishes to stay as close as possible to the RSPO because additional criteria are expected to undermine acceptance by local producers.
3. Competition with food is best monitored at a macro level by national governments (as also suggested by Cramer).
4. Competition with food can be minimised by increasing production in a sustainable manner, see section on displacement effects.

Commission's advice

The Commission does not expect additional actions initiated by Essent with respect to competition with food on top of compliance with RSPO. The Commission does request Essent to cooperate with macro monitoring of competition with food by national governments: as outlined in Cramer criteria 3.1 and 3.2 (Cramer 2007).

C. Biodiversity

Deforestation of tropical rainforest forms one of the main concerns of large scale palm oil production. This is effectively addressed by the criteria of RSPO which forbid the destruction of primary forests or other areas with one or more High Conservation Values.

RSPO has no specific criterion for a minimum area of the plantation to be set-aside for nature conservation in order to prevent excessive monocultures. However:

1. The Commission believes the main threat to biodiversity, namely deforestation, is properly addressed in the RSPO (Principle 7 on new plantings). Furthermore, RSPO also requires the identification and management of High Conservation Values in and around the plantation (criterion 5.2).
2. The Commission wishes to stay as close as possible to the RSPO because additional criteria are expected to undermine acceptance by local producers.
3. In this early phase of sustainable biomass production the Commission wishes to focus on prevention of *additional* damage to the environment. Measures to improve biodiversity on existing plantations over and above those following from RSPO are not considered a minimum requirement to qualify for sustainable palm oil production at this point in time.

Commission's advice

At this moment, the Commission does not expect additional actions from Essent, on top of compliance with RSPO, with respect to land set-aside for nature conservation on plantations.

D. Displacement effects

The sustainability criteria of RSPO cover the sustainability of the production unit itself. However, this does not prevent negative displacement effects. Negative displacement effects may occur if the energy sector sources large quantities of palm oil from existing plantations which formerly supplied traditional markets. In this case the traditional markets will be faced with shortages which tend to trigger expansion in production. Whether this expansion takes place in a sustainable manner is uncertain and beyond control of the buyer. The principles of displacement effects are illustrated in Figure 2-4.

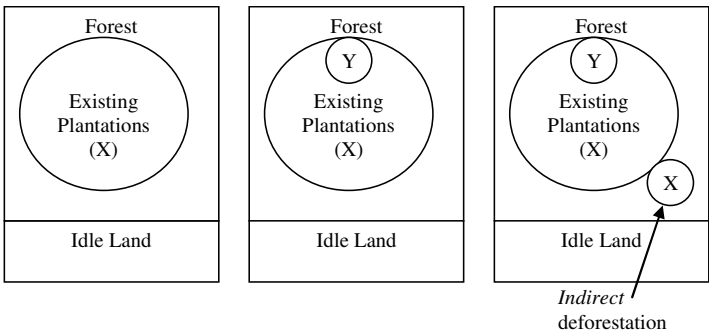

Figure 2-4 Example of displacement mechanism causing indirect deforestation. Y is new demand from the energy sector from existing plantations. X is expansion of existing plantations as a result of displacement effects. (Dehue 2006)

The Commission recognises displacement effects as a serious threat to the sustainability of palm oil production. The macro effects of displacement effects surpass the level of the individual company and will therefore be difficult to solve by an individual company. National and regional governments have an important role to play here through monitoring and land use planning.

Commission's advice

The Commission believes that also at the level of the company, good practices exist to minimise displacement effects. These good practices revolve around increasing production in a sustainable manner: this increased production can supply the increased demand from the energy sector without displacing existing activities. These good practices will generally take several years to materialise and will therefore not form a minimum requirement for sustainable palm oil production. Nonetheless, an active approach is expected of Essent to prevent negative displacement effects through any of the following good practices:

1. *Increasing palm oil yields on existing plantations.*
    a. *Essent can make agreements with producers to increase yields in which there is a clear input from Essent (for example in organizing expert knowledge input).*
    b. *Essent can reward frontrunners by sourcing palm oil from plantations with high yields achieved through good practices. This will create a clear signal to the market.*

2. *Establishment of new plantations on previously idle land. Such expansion must be subject to a proper environmental and social impact assessment, including local stakeholder consultation, to make sure the land is actually idle from both a biodiversity and a social perspective[8]. Furthermore, plantations on idle land should meet all RSPO criteria for new plantings (principle 7 of RSPO).*
    a. *Through long-term relations with producers and risk-sharing mechanisms Essent can make agreements on establishing plantations on idle land.*
3. *Avoiding or ending business relationships with companies that have part of their plantations RSPO certified, but that have proven to be responsible for one of the following unsustainable practices on any of their other plantations:*
    a. *Violation of relevant national laws and regulations*
    b. *Clearance of High Conservation Value Forests;*
    c. *Violation of the rights of local communities;*
    d. *Burning of forestland*

As the measures to combat displacement effects will not form minimum criteria for sustainable palm oil, Essent is advised to report its activities and policies to combat displacement effects to the Supervisory Committee (see next section). The report will be made publicly available.

[8] An interesting opportunity in this regard is formed by so called Imperata Grasslands which often form on degraded lands. The World Agroforestry Centre states on its website that it estimates that 21 – 34 Mha of such Imperata Grasslands are available in tropical Asia alone: this equals 2.5 – 4 times total global oil palm plantation area.

3 Verification and chain of custody in practice

The previous chapter described the sustainability criteria that together form the norm for sustainable palm oil production. Compliance with these criteria must be verified independently at the level of the plantation. In addition, a so-called chain of custody will be needed to link palm oil sourced by Essent to sustainable palm oil production. This Chapter describes both the verification of sustainability criteria and the chain of custody as recommended by the Commission. These recommendations are explicitly intended to be temporary: as soon as RSPO has operational procedures for verification and chain of custody, the RSPO procedures will overrule these recommendations.

3.1 Verification

General

Credible verification of the sustainability criteria is vital to any system claiming to provide sustainable palm oil. Because the RSPO is not yet operational there are no operational procedures for verification of the RSPO criteria. In order to enable Essent to credibly source sustainable palm oil in the transition period to an operational RSPO verification procedure, the Commission recommends specific requirements to be met with respect to:

- Auditors and verification bodies
- Assessment process
- Stakeholder consultation
- The installation of a Supervisory Committee, which will check upon the proper functioning of the verification process

In all of these recommendations the Commission makes maximum use of existing work of RSPO. Furthermore, the Commission encourages Essent to set up the here described systems in collaboration with other buyers of palm oil.

As soon as RSPO has operational procedures for verification, these shall overrule any of the recommendations made here and verification shall occur according to RSPO procedures.

Auditor and verification body requirements

While still a draft, the RSPO defined in general terms the requirements for future RSPO auditors and the verification bodies they work for. In summary the main requirements are:

1. Certification/verification bodies must be accredited by national or international accreditation authorities, such that their organisation, systems and procedures conform

to ISO/IEC Guide 65: 1996 'General requirements for bodies operating product certification systems'.

2. The accreditation authority itself must be operating in accordance with the requirements of ISO 17011:2004 Conformity assessment – general requirements for accreditation bodies accrediting conformity assessment bodies.
3. The verification body must define the minimum competencies of lead auditors. As a minimum, these must be consistent with ISO 19011: 2002 Guidelines for quality and/or environmental management systems auditing.
4. Audit teams must demonstrably include sufficient expertise to address the legal, technical, environmental (including ecological) and social issues relating to a specific assessment.
5. Audit teams must include members that are fluent in the main languages relevant to the location of the assessment. (RSPO 2006b)

For the transitional period the Commission recommends that all the draft RSPO verification requirements are met as defined in "RSPO Draft Verification Systems" (RSPO 2006b). Compliance will be checked by a Supervisory Committee, see below. For a more detailed interpretation of the RSPO guidelines reference is made to the FSC auditor requirements defined in the FSC Standard "Qualifications for FSC certification body auditors, FSC-STD-20-004 (Version 2-2)" (FSC 2004b), taking into account that little experience exists with verification of RSPO criteria.

Assessment process

The draft RSPO guidelines on verification also include guidelines on the assessment process. The main requirements being:

- (Monitoring) assessments take place at least annually.
- Conformance to the RSPO principles and criteria can not be claimed when one or more 'major nonconformities' are outstanding. (RSPO 2006b)

For the transitional period the Commission recommends that all the draft RSPO verification requirements are met as defined in "RSPO Draft Verification Systems" (RSPO 2006b). Compliance will be checked by a Supervisory Committee, see below. For a more detailed interpretation of minor and major nonconformities, reference is made to FSC guidelines in this respect, see Annex E.

Stakeholder consultation

Consultation of stakeholders forms a key aspect of verification of the RSPO criteria. Stakeholder consultation can take many forms and various degrees of credibility. Therefore the Commission requires several conditions to be met for stakeholder consultation to be judged credible. For these conditions the Commission refers to the draft procedures for public consultation issued by the RSPO. The main requirements being:

- Procedures for verification assessment must include consultation with external stakeholders, designed to ensure that all relevant issues concerning compliance with the RSPO Criteria are identified.

- Procedures must include public announcement of verification assessments through RSPO at least one month prior to (start of) verification, and direct consultation with stakeholders including statutory bodies, indigenous peoples, local communities, workers' organizations, smallholders and local or national environmental NGOs. (RSPO 2006b)

For the transitional period the Commission recommends that all the draft RSPO public consultation requirements are met as defined in "RSPO Draft Verification Systems" (RSPO 2006b). Compliance will be checked by a Supervisory Committee, see below. For a more detailed interpretation of the RSPO guidelines reference is made to the FSC Standard "Stakeholder consultation for forest evaluation, FSC-STD-20-006 (Version 2-1)" (FSC 2006), taking into account that little experience exists with verification of RSPO criteria.

Proposal for a Supervisory Committee

The Commission advises Essent to install a Supervisory Committee which will oversee any verification activities and outcomes and assess these against the requirements set out in this report.

The composition of the Supervisory Committee will largely determine its effectiveness and credibility. The Supervisory Committee should therefore consist of experts with the relevant knowledge and public credibility to perform its tasks, as described below.

The tasks of this Supervisory Committee will be:

1. Oversee Peer Review of Verifier Checklists designed by Certification Bodies wanting to verify against the RSPO criteria and approve Checklists if appropriate.
2. Review audit results and verify whether proper procedures, as outlined above, have been followed. This will be risk-based: i.e. not all verification reports will be reviewed.
3. Review audit conclusions on nonconformity issues: being either minor or major. Major nonconformities lead to a negative conclusion: i.e. management unit does not meet RSPO criteria.
4. See to it that summaries of the audit reports will be made publicly available.
5. Set up procedures for complaints and grievances concerning verified organisations and verification bodies.

Note that as soon as RSPO is operational it is expected to have the bodies in place to perform these tasks. The Supervisory Committee is thus a temporary body.

3.2 Chain of custody

Introduction

In order to make a claim with respect to the sustainability of sourcing palm oil, Essent must be able to demonstrate a link between her sourcing of palm oil on the one hand and sustainable palm oil production on the other hand. This is often referred to as the chain of

custody (COC). The Commission considered the following three options for a COC for palm oil:

1. physical segregation (example: non-genetically-modified soy)
2. mass-balance (example: FSC credit material)
3. book-and-claim (example: green electricity)

These three options will be briefly discussed below and lead to the conclusions of the Commission with respect to the COC.

The main alternatives

An example of a supply chain of palm oil for electricity generation is shown in the figure below. Note that mixing of products from various sources takes place in multiple stages of the supply chain.

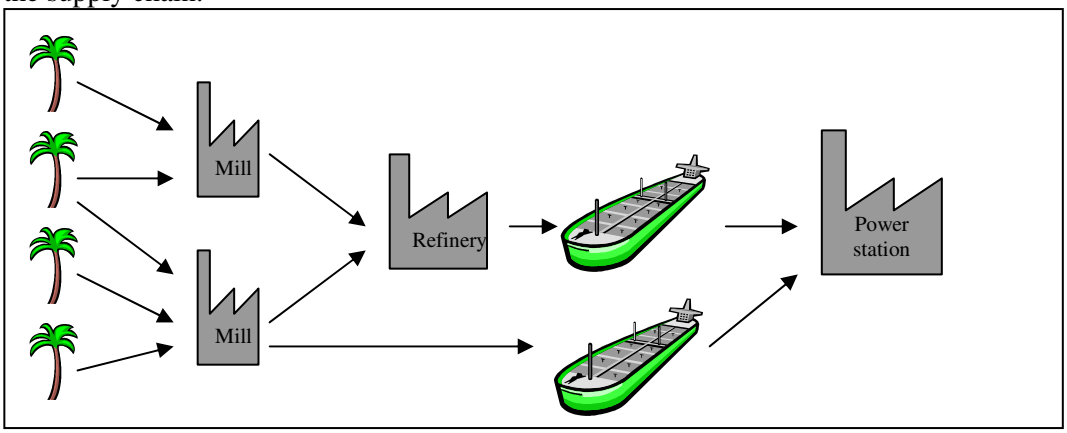

Figure 3-1 Example of palm oil supply chain. Plantations produce Fresh Fruit Bunches (FFB). FFB are transported to palm oil mills which expel the Crude Palm Oil (CPO). The CPO can be shipped directly and used for co-firing. The CPO can also be refined in several grades of refined palm oil. One of the refinery products is Palm Fatty Acid Distillate (PFAD) which can also be used for co-firing.

A. Physical segregation

A COC system with physical segregation is thought to be infeasible in the short term because:

1. Palm oil (intermediary) products from various sources are mixed in several stages of the supply chain:
    a. The palm oil mill processes Fresh Fruit Bunches (FFB) from several plantations. These have to be processed within a day which makes 'batch' processing with physical segregation difficult if not impossible.
    b. In case of PFAD, the palm oil from several mills is refined in one large refinery[9].
    c. CPO or PFAD of various sources may be mixed in one large sea tanker.

[9] CPO has not been refined and therefore does not go through the refining step.

2. Physical segregation is only economically feasible where large quantities of 'sustainable' palm oil are available such that dedicated mills and refineries for 'sustainable' palm oil are economically feasible. Physical segregation may be a good option for the future when more RSPO certified palm oil is available.

B. Book-and-claim

An example of a book-and-claim system in shown in Figure 3-2. The main characteristics of a book-and-claim system are:

1. There is no physical segregation of sustainable palm oil from palm oil from other sources.
2. A 'certificate' is generated for each unit of sustainable palm oil produced.
3. By buying a certificate for each unit of palm oil it sources, Essent can claim that "*an amount of sustainable palm oil has been added to the market which is equivalent to the amount Essent bought*". Essent can not claim that the physical palm oil it uses is indeed from a sustainable source: such a claim would require physical segregation.
4. Only the producers of the palm oil (derivates) and the final buyers of the palm oil take part in the book-and-claim system. Intermediary parties such as palm oil traders do not (need to) take part in the system.

The claim Essent can make with a book-and-claim system is deemed appropriate for the purpose sought after by the Commission because:

1. The goal is not the 'consumption' of sustainable palm oil but the 'production' of sustainable palm oil.
2. A book-and-claim system can guarantee the sustainable 'production' of palm oil and that this sustainable palm oil has been added to the market.
3. If Essent uses more palm oil and buys more certificates, this will create more sustainable palm oil production.

.

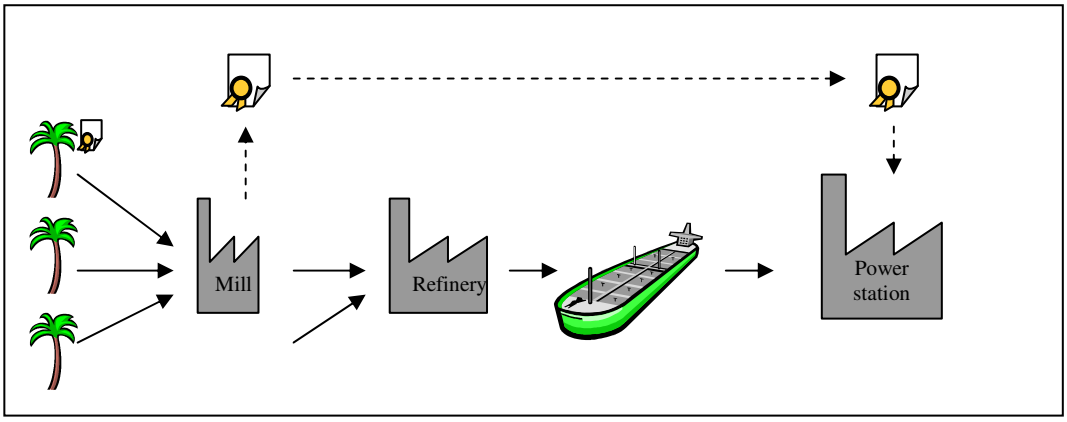

Figure 3-2 In a book-and-claim system the certificates are traded between the issuing party and the final buyer (e.g. the electricity producer).

Remarks

In a book-and-claim system for palm oil it would have to be decided whether a certificate is generated:

1. by the oil palm plantation for each unit of fresh fruit bunches, or
2. by the palm oil mill for each unit of crude palm oil. In this case, a different type of COC still needs to be maintained between the plantation and the mill: either physical segregation or a mass-balance approach.

In addition, certificates for CPO may be issued at the mill, while the buyer of that certificate may buy only PFAD. A book-and-claim system would have to cater for such intermediate conversion into product derivatives.

Mass-balance

An example of a mass-balance system is shown in Figure 3-3. The main characteristics of a mass-balance system are:

1. No physical segregation of sustainable products and products from other sources.
2. All 'legal owners' typically must take part in the COC. This excludes transporters and agents but includes traders.
3. Each party in the supply chain keeps account of the amount of sustainable products it bought and the amount of sustainable products it sold. Each company can sell no more 'sustainable' products than it bought (taking into account conversion factors).

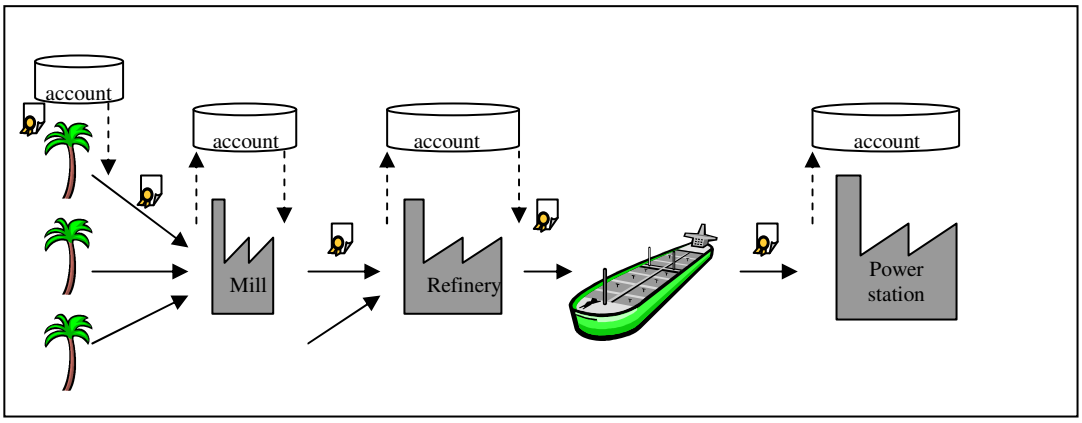

Figure 3-3 In a mass-balance system no physical segregation takes place but each company in the supply chain ensures that it sells no more 'sustainable' products than it sourced.

Two types of mass-balance systems

The mass-balance system is no strictly defined system and there are different ways in which a mass-balance system can be operated. Here, a difference is made between a mass-balance system with traceable transport and without traceable transport

1. Mass-balance system with traceable transport: in this system the physical product is sold with its sustainability claim and this sustainability claim is coupled to the physical freight which transports the product to the buyer. Because it is difficult to physically mark the palm oil as sustainable, the sustainability claim is typically mentioned

on the invoice with a reference to the shipping (or transport) document (which accompanies the physical freight). When the buyer receives the shipment, he cross-checks the freight documents with the reference on the invoice to ensure that it is the same freight after which he registers the sustainable palm oil in its account[10].

2. Mass-balance system without traceable transport: in this system the sustainability claim is again mentioned on the invoice (assuming the invoice does not travel with the physical product) but no reference is made to the shipping document (which accompanies the physical product).

The latter system creates a form of flexibility which is relevant to the trade in palm oil. It is common in palm oil trading that a lot (in a ship) changes ownership several times while it is at sea on its way to its destination. In the first system the sustainability claim is linked to the physical lot and if the lot changes ownership, so does the sustainability claim. If for example, Essent sources a lot of palm oil which meets the RSPO criteria and decides to sell it to a different buyer while buying a different lot of palm oil from somewhere else, Essent cannot keep the sustainability claim of its original buy. In the mass-balance system without traceable transport, Essent could keep the sustainability claim as long as it does not also sell the palm oil of its first buy with the sustainability claim as this would be double counting.

A few important remarks need to be made here:

- In both the book & claim and mass balance systems there is no guarantee that the physical palm oil, which Essent eventually uses in its power plants, is actually from a sustainable source. In both systems the only claim that can be made is that the sustainable palm oil has been added to the market.
- In the system with traceable transport, Essent could actually buy a ship of RSPO oil and a ship of non-RSPO palm oil, unload them, reload the non-RSPO palm oil and sell it as RSPO palm oil. The only difference with the system without traceable transport is that it would actually need to take in both physical loads first.
- The mass-balance system without traceable transport is still fundamentally different from a book-and-claim system because the sustainability claim can only be sold together with physical palm oil. In a book and claim system, Essent can buy sustainability certificates from a party from which it does not buy physical palm oil. In the mass-balance system without traceable transport Essent buys physical palm oil *with* a sustainability claim: it cannot buy a sustainability claim or certificate without the actual palm oil.

Pros and cons of mass balance versus book-and-claim

The main pros and cons identified are:

1. In a book and claim system chances are better that the added value of 'sustainable production' ends up with the plantation/mill in stead of large refiners/traders.

[10] Some systems go even further by taking a so-called fingerprint of the freight where it leaves the harbour as well as where it arrives, in order to determine whether the freight has not been swapped with a different freight during its trip over the ocean.

2. A mass-balance system may have a higher credibility with the wider public, especially with traceable transport.
3. In case of refined products, a mass-balance system requires the refinery to take part in the COC. Having refiners on board makes the scheme more influential as refiners have large buying power and can influence their producers. However, the volumes of Essent alone may be too small to get refiners on board.
4. A credible book-and-claim system will require a centralized certificate registration body. This in turn requires large volumes and thus multiple parties to participate in such a certificate trading scheme. Setting up such a trading scheme with multiple parties will take considerable time and effort. This makes a book-and-claim system less feasible as a short term alternative for Essent.
5. A book-and-claim system and a mass-balance system without traceable transport allow for more flexibility in palm oil trading and sourcing compared to a mass-balance system with traceable transport.

Advice of the Commission

Based on the above considerations the advice of the Commission with respect to the COC to Essent is as follows:

For the COC the Commission requires that 'for each unit of sustainable palm oil claimed by Essent, an equivalent unit must have been added to the market.' All discussed systems, physical segregation, book-and claim and mass-balance are chain of custody systems that can meet this requirement. Taking into account that Essent is looking for a short term solution to apply in the transitional period to an operational COC within RSPO, a Mass-Balance approach is deemed most feasible. A mass-balance system can be set up within the existing Essent Green Gold Label chain of custody Standard[11]. A system that does not require traceable transport would allow for more flexibility in trading while still driving sustainable palm oil production. Physical segregation as well as a Book-and-Claim system are interesting alternatives, with their own pros and cons, for the longer term.

[11] The Essent Green Gold Label is a certification standard that Essent uses to source biomass from sustainable sources.

4 Targets for Essent

4.1 Introduction

In the previous Chapters, the Commission set out the requirements for what it considers sourcing of sustainably produced palm oil. It encourages Essent to source as much as possible of its palm oil in line with these requirements. However, it is acknowledged that Essent is a frontrunner in this respect and that it may be difficult to source all its palm oil according to the Commissions' requirements from the start. Therefore a annual stepwise increase in the percentage of palm oil which meet the requirements of the Commission is given by the Commission as a minimum target to pursue for Essent.

4.2 Targets

In setting targets, the Commission took into account the following considerations:

1. Essent should commit itself to source 100% RSPO-certified palm oil as soon as the market supplies it in sufficient quantities.
2. There is currently no certified RSPO palm oil available on the market, making it difficult in the short term to source large quantities which verifiably meet the sustainability criteria as proposed in Chapter 2.
3. Many palm oil producers will need time to comply with all sustainability criteria.
4. Sustainable production of palm oil is primarily driven by a demand for such sustainably produced palm oil. It is therefore important to create this demand.
5. Essent should be an active buying party on the palm oil market, in order to be able to influence this market. It has a unique opportunity to play a pivotal role in creating a market for sustainable palm oil. Excluding Essent from the palm oil market is not considered to be in the interest of sustainable palm oil production.

Based on the above, and acknowledging that there is a large degree of uncertainty in setting realistic yet ambitious targets for sourcing sustainably produced palm oil, the Commission advises Essent to apply the following minimum targets for sourcing sustainable palm oil, see Table 4-1. The Commission expects Essent to maximise its efforts in stimulating supply for sustainable palm oil.

Table 4-1 Minimum targets for % of palm oil sourced from verified sustainable sources.

Year	% of palm oil sourced by Essent which originate from sustainable sources as defined in this report
2008	20%
2009	40%
2010	60%
2011	80%
2012	100%

In external communication on the sustainability of the palm oil it sources, Essent should specify what share of total palm oil sourced is from verified sustainable sources and be clear about its commitment to increase this share over time.

References

Cramer J, et al, 2007, Toetsingskader voor duurzaam geproduceerde biomassa. Eindrapport van de projectgroep "Duurzame productie van biomassa". Concept 2 februari 2007.

Dehue, 2006, Palm Oil and its By-products as a Renewable Energy Source, Wageningen University.

Elsayed MA, Matthews R and Mortimer ND, 2003, Carbon and energy balances for a range of biofuels options, Sheffield Hallam University/Resources Research Unit, Sheffield UK.

FAO, 2002, Fertilizer use by crop, Food and Agricultural Organisation, Rome.

FAO, 2007, Food and Agricultural Organisation of the United Nations. Statistical database available on http://faostat.fao.org/default.aspx.

FSC, 2004a, FSC-STD-01-002, FSC Glossary of terms

FSC, 2004b, Qualifications for FSC certification body auditors, FSC-STD-20-004 (Version 2-2).

FSC, 2006, Stakeholder consultation for forest evaluation, FSC-STD-20-006 (Version 2-1).

IPCC 1996, Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, Published by the Institute for Global Environmental Strategies (IGES), Hayama, Japan on behalf of the IPCC.

IPCC 2006, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Published by the Institute for Global Environmental Strategies (IGES), Hayama, Japan on behalf of the IPCC.

Oil World, 2007, Oil World Statistics, Oil World Hamburg.

RSPO, 2005, RSPO Principles and Criteria for Sustainable Palm Oil Production - Public release version, Roundtable on Sustainable Palm Oil, Kuala Lumpur Malaysia.

RSPO, 2006a, RSPO Principles and Criteria for Sustainable Palm Oil Production – Guidance Document, Roundtable on Sustainable Palm Oil, Kuala Lumpur Malaysia.

RSPO, 2006b, RSPO Draft Verification Systems – Final draft for Verification Working Group, Roundtable on Sustainable Palm Oil, Kuala Lumpur Malaysia.

Teoh CH, 2000, Oil Palm Industry and Land Use in Malaysia, WWF.

USDA FAS, 2007, World agricultural production, United States department of Agriculture, Foreign Agriculture Service.

Yacob S e.a, 2005, Baseline study of methane emissions from anaerobic ponds of palm oil mill effluent treatment, Science of the total environment 366 (2006), 187-196.

Wetlands International, 2006, Peatland degradation fuels climate change, Wageningen.

Annex A Commission members

The table below shows the Commission members, their organisation and their role in the Commission.

Name	Organisation	Role
Kornelis Blok	Ecofys and University of Utrecht	Chair
Miranda van Zomeren	Tri-P (Consultancy)	Member
Daan de Vries	AIDEnvironment	Member
Jacques Jongeneel	Jongeneel Agencies (palm industry)	Member
Zwier van Olst	Staatsbosbeheer	Member
Barbara van den Hoek	WWF	Observer
Helma Kip	Essent	Observer
Peter-Paul Schouwenberg	Essent	Observer/Secretariat
Bart Dehue	Ecofys	Editor

Annex B Benchmark of RSPO against Cramer criteria

The tables on the next pages show the results of the benchmark performed of RSPO against the Dutch Cramer criteria and indicators. Three scores have been assigned in the benchmark:

- Y: indicating that the Cramer criterion and its indicators are sufficiently met by RSPO.
- N: indicating that the Cramer criterion and its indicators are not or insufficiently met by RSPO
- P: indicating that the Cramer criterion and its indicators are partly met by RSPO. There can be two reasons for this:
    - Of the various indicators for one criterion several are met and several are not met.
    - The subject covered by an indicator of Cramer is addressed but less stringent.

Cramer criteria (Cramer, 2 februari 2007, draft)	Cramer Indicator / procedure		RSPO (March 2006, guidance document)
1 .De broeikasgasbalans van de productieketen en toepassing van de biomassa is positief			
1.1 Bij de toepassing van de biomassa, dient er over de gehele keten een netto emissiereductie van broeikasgasemissies op te treden; berekend ten opzichte van een fossiele referentie.	Indicator 1.1.1 (minimum eis) De reductie van broeikasgasemissies bedraagt minstens 70% voor elektriciteitsproductie en minstens 30% voor biobrandstoffen, berekend met de methodiek beschreven in hoofdstuk 4. Dit zijn minimum eisen. Daarbij dient het uitgangspunt te zijn dat beleidsinstrumenten een betere prestatie zullen bevorderen door sterk te differentiëren naar prestatie.	X	5.4 energy efficiency 5.6 reduce GHG emissions
2. Biomassa productie zal niet ten koste gaan van belangrijke koolstof reservoirs in de vegetatie en in de bodem.			
2.1 Behoud van bovengrondse (vegetatie) koolstof reservoirs bij aanleg van biomassa eenheden.	Indicator 2.1.1 (minimum eis) De aanleg van nieuwe biomassa productie-eenheden vindt niet plaats in gebieden waarbij het verlies aan bovengrondse koolstof opslag niet terug verdiend kan worden in een periode van 10 jaar biomassa productie. De referentiedatum is de publicatie datum van dit rapport, met uitzondering van die biomassastromen waarvoor al een referentiedatum geldt uit andere (in ontwikkeling zijnde) certificatiesystemen.	P	7.3 No replacement of primary forest or HCV areas after 2005
2.2 Behoud van ondergrondse (bodem) koolstof reservoirs bij aanleg van biomassa eenheden.	Indicator 2.2.1 (minimum eis) De aanleg van nieuwe biomassa productie-eenheden vindt niet plaats in gebieden met een groot risico van aanzienlijke koolstofverliezen uit de ondergrond, zoals bepaalde graslanden, veengebieden, mangroves en natte gebieden. De referentiedatum is de datum publicatie van dit rapport, met uitzondering van die biomassastromen waarvoor al een referentiedatum geldt uit andere (in ontwikkeling zijnde) certificatiesystemen.	P	7.4 Avoid plantation on peat soils >3 m depth
3. Concurrentie met voedsel, lokale energievoorziening, medicijnen en bouwmaterialen			
3.1 Inzicht in verandering van landgebruik in de regio van de biomassa productie eenheid	Rapportage 3.1.1 (alleen indien Nederlandse overheid hierom vraagt) Informatie over veranderingen landgebruik in de regio, incl. toekomstige ontwikkelingen (indien informatie beschikbaar is)	X	
4. Biomassa productie zal niet ten koste gaan van beschermde of kwetsbare biodiversiteit en zal waar mogelijk biodiversiteit versterken.			
4.1 Geen overtreding van nationale regels en wetten die op biomassa productie en het productiegebied van toepassing zijn.	Indicator 4.1.1 (minimum eis) Aan relevante nationale en lokale regels en wetten wordt voldaan, wat betreft: -landeigendom- en landgebruikrechten -bos- en plantagebeheer en –exploitatie -beschermde gebieden -wildbeheer -jacht -ruimtelijke ordening -nationale regels voortkomend uit ondertekening van internationale conventies CBD (Convention on Biological Diversity) en CITES (Convention on International Trade in Endangered Species.	✓	2.1 Compliance with local national and ratified international law and regulations
	Indicator 4.1.2 (minimum eis) Geen openstaande rechtszaken als gevolg van overtreding van bovenstaande regels en wetten.	X	
4.2 Bij nieuwe of recente aanleg, geen aantasting van biodiversiteit door biomassa productie in beschermde gebieden.	Indicator 4.2.1 (minimum eis) Biomassaproductie vindt niet plaats in recent ontgonnen gebieden die zich bevinden in door de overheid 'gazetted protected areas', of in een zone van 5 km rond deze gebieden. De referentiedatum is de datum publicatie van dit rapport, met uitzondering van die biomassastromen waarvoor al een referentiedatum geldt uit andere (in ontwikkeling zijnde) certificatiesystemen. Indien biomassaproductie wel plaats vindt in bovengenoemde gebieden, dan alleen als dit onderdeel is van het beheer om de biodiversiteitwaarden te beschermen.	✓	2.1 Compliance with national law 7.3 No conversion of primary forest or HCV areas after 2005 5.2 Identify and manage HCV on and near plantation

Cramer criteria	Indicator / procedure		RSPO
4.3 Bij nieuwe of recente aanleg, geen aantasting van biodiversiteit in overige gebieden met hoge biodiversiteitwaarde, kwetsbaarheid of hoge agrarische natuur- en/of cultuurwaarden.	Indicator 4.3.1 (minimum eis) Biomassaproductie vindt niet plaats in recent ontgonnen gebieden die door stakeholders zijn geclassificeerd als 'High Conservation Value' (HCV) gebieden, of in een zone van 5 km rond deze gebieden. De referentiedatum is de datum publicatie van dit rapport, met uitzondering van die biomassastromen waarvoor al een referentiedatum geldt uit andere (in ontwikkeling zijnde) certificatiesystemen. De volgende gebieden worden beschouwd als HCV gebieden: -gebieden met bedreigde of beschermde soorten of ecosystemen, op basis van de criteria van HCV categorieën 1, 2 en 3; -gebieden met hoge kwetsbaarheid (bijv. hellingen en natte gebieden), op basis van de criteria van HCV categorie 4; -gebieden met hoge natuur- en cultuurwaarden, op basis van de criteria van HCV categorieën 5 en 6 en criteria voor high nature value farmlands. Door middel van een dialoog met lokale stakeholders dient vastgesteld te worden waar de HCV gebieden zich bevinden. Indien biomassaproductie wel plaats vindt in bovengenoemde gebieden, dan alleen als dit onderdeel is van het beheer om de biodiversiteitwaarden te beschermen.	✓	7.3 No conversion of primary forest or HCV areas after 2005 5.2 Identify and manage HCV on and near plantation
4.4 Bij nieuwe of recente aanleg, behoud of herstel van biodiversiteit binnen biomassa productie eenheden	Indicator 4.4.1 (minimum eis) Indien biomassaproductie in recent ontgonnen gebieden (nà publicatie van dit rapport) plaatsvindt, wordt ruimte gegeven aan set-aside gebieden (minimaal 10%).	X	
	Rapportage 4.4.2 Indien biomassaproductie in recent ontgonnen gebieden (nà publicatie van dit rapport) plaatsvindt, dient aangeven te worden in welke landgebruikzones de biomassaproductie eenheid zich bevindt. Verder dient er aangegeven te worden of het hier gaat om herstel van gedegradeerde gebieden.	✓	7.1 Comprehensive and participatory independent social and environmental impact assessment.
4.5 Versterking van biodiversiteit waar dat mogelijk is, bij aanleg en middels beheer van bestaande productie eenheden.	Good practices worden toegepast op en rond de biomassa productie-eenheid ter versterking van de biodiversiteit. Daarnaast wordt rekening gehouden met ecologische corridors en wordt versnippering zo veel mogelijk tegengegaan.	✓	5.1 Environmental impact assessment and mitigation plan 5.2 HCV identified and conservation plan
5. Biodiversiteit:Het beheer van biomassa Bij de productie en verwerking van biomassa blijven de bodem en de kwaliteit van de bodem behouden of worden verbeterd.productie-eenheden zal bijdragen aan			
5.1 Geen overtreding van nationale regels en wetten die op bodembeheer van toepassing zijn.	Indicator 5.1.1 (minimum eis) Aan relevante nationale en lokale regels en wetten wordt voldaan, wat betreft: -afvalbeheer -gebruik van agro-chemicaliën (kunstmest en pesticiden) -mineralenhuishouding -voorkomen bodemerosie -milieueffect rapportage -bedrijfsaudits. Minimaal dient te worden voldaan aan de Stockholm conventie (12 schadelijkste pesticiden), ook waar nationale wetgeving ontbreekt.	✓	2.1 Compliance with local national and ratified international law and regulations
5.2 Bij de productie en verwerking van biomassa worden best practices toegepast om de bodem en bodemkwaliteit te behouden of te verbeteren.	Rapportage 5.2.1 Formulering en toepassing van een strategie gericht op duurzaam bodembeheer voor het: -voorkomen en bestrijding erosie, -behoud nutriëntenbalans, -behoud bodem organisch stof -voorkomen van bodemverzilting.	✓	4.2 Practices maintain soil fertility at, or where possible improve soil fertility to, a level that ensures optimal and sustained yield.
5.3 Het gebruik van restproducten is niet in strijd met andere lokale functies voor het behoud van de bodem.	Rapportage 5.3.1 Gebruik van agrarische restproducten gaat niet ten koste van andere essentiële functies voor het behoud van de bodem en de bodemkwaliteit (zoals organisch stof, mulch, stro voor behuizing, etc.). Restproducten van het biomassa productie- en verwerkingsproces worden optimaal gebruikt (dus bijvoorbeeld niet onnodig branden of afvoeren).	P	5.3 waste is reduced, reused, recycled

Cramer criteria	Indicator / procedure		RSPO
Principe 6: Bij de productie en verwerking van biomassa worden grond- en oppervlaktewater niet uitgeput en wordt de waterkwaliteit gehandhaafd of verbeterd.			
6.1 Geen overtreding van nationale regels en wetten die op waterbeheer van toepassing zijn	Indicator 6.1.1 (minimum eis) Aan relevante nationale en lokale regels en wetten wordt voldaan, wat betreft: -gebruik van water voor irrigatie, -gebruik van bodemwater, -gebruik van water voor agrarische doelen in stroomgebieden, -waterzuivering, -milieueffect rapportage, -bedrijfsaudits.	✓	2.1 Compliance with local national and ratified international law and regulations
	Indicator 6.1.2(minimum eis) Geen openstaande rechtszaken als gevolg van overtreding van bovenstaande regels en wetten.	X	
6.2 Bij de productie en verwerking van biomassa worden *best practices* toegepast om watergebruik te beperken en grond- en oppervlaktewaterkwaliteit te behouden of verbeteren.	Rapportage 6.2.1 Formulering en toepassing van een strategie gericht op duurzaam waterbeheer met betrekking tot: -efficiënt watergebruik, -verantwoord gebruik van agro-chemicaliën.	✓	4.4 maintain quality and availability of surface and ground water
6.3 Bij de productie van biomassa wordt geen gebruik gemaakt van water uit niet-hernieuwbare bronnen.	Documentatie waaruit blijkt dat voor irrigatie geen gebruik wordt gemaakt van water uit niet hernieuwbare bronnen.	✓	4.4 maintain quality and availability of surface and ground water
Principe 7. Bij de productie en verwerking van biomassa wordt luchtkwaliteit gehandhaafd of verbeterd.			
7.1 Geen overtreding van nationale regels en wetten die op waterbeheer van toepassing zijn	Indicator 7.1.1 (minimum eis) Aan relevante nationale en lokale regels en wetten wordt voldaan, wat betreft: -lucht emissies, -afvalbeheer, -milieueffect rapportage, -bedrijfsaudits.	✓	2.1 Compliance with local national and ratified international law and regulations
	Indicator 7.1.2 (minimum eis) Geen openstaande rechtszaken als gevolg van overtreding van bovenstaande regels en wetten.	X	
7.2 Bij de productie en verwerking van biomassa worden best practices toegepast om emissies en luchtvervuiling te beperken.	Rapportage 7.2.1 Formulering en toepassing van een strategie gericht op minimale luchtemissies, met betrekking tot: -productie en verwerking -afvalbeheer	✓	5.4 efficient energy use 5.5 No fire for waste disposal and clearance except ASEAN 5.5 reduce pollution and emission
7.3 Geen branden als onderdeel van aanleggen of beheer van biomassa productie-eenheden.	Indicator 7.3.1 Branden wordt niet toegepast bij de aanleggen of het beheren van biomassa productie-eenheden, tenzij in specifieke situaties zoals beschreven in ASEAN richtlijnen of andere regionale good practices.	✓	5.5 No fire for waste disposal and clearance except ASEAN
Principe 8: Productie van biomassa draagt bij aan de lokale welvaart			
8.1 Positieve bijdrage van eigen bedrijfsactiviteiten aan de lokale economie en aan lokale bedrijvigheid.	Rapportage 8.1.1 Beschrijving van: -directe economische waarde die wordt gecreëerd. -beleid, praktijk en hoeveelheid geld uitgegeven aan lokale toeleveranciers. -procedures voor aanstelling van lokaal personeel en aandeel lokaal senior management. Gebaseerd op de Economic Performance Indicators EC 1, 6 & 7 van GRI (Global Reporting Initiative).	P	6.11 Contribute to local sustainable development

Cramer criteria	Indicator / procedure		RSPO
Principe 9: Productie van biomassa draagt bij aan het welzijn van de werknemers en de lokale bevolking			
9.1 Geen negatieve effecten op arbeidsomstandigheden van werknemers	Indicator 9.1.1 (minimum eis) Voldoen aan de Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy (opgesteld door de International Labour Organisation).	P	Broadly covered by criteria 6.1/6.11 although not the full Tripartite Declaration.
9.2 Geen negatieve effecten op mensenrechten	Indicator 9.2.1 (minimum eis) Voldoen aan de U.N. Universal Declaration of Human Rights betreffende: non-discriminatie; vrijheid van vakvereniging, kinderarbeid; gedwongen en verplichte arbeid; disciplinaire praktijken, veiligheidspraktijken en rechten van inheemse volkeren.	P	Broadly covered by criteria 6.1/6.11 although not the full Universal Declaration
9.3 Het gebruik van land leidt niet tot schending van officieel eigendom en gebruik, en gewoonterecht zonder vrije en voorafgaande instemming van voldoende geïnformeerde lokale bevolking	Indicator 9.3.1 (minimum eis) Voldoen aan de volgende eisen: - Geen landgebruik zonder instemming van voldoende geïnformeerde oorspronkelijke gebruikers. - Landgebruik is nauwkeurig omschreven en officieel vastgelegd. - Officieel eigendom en gebruik, en gewoonterecht van inheemse bevolking wordt erkend en gerespecteerd.	✓	7.5 No new plantings are established on local peoples' land without their free, prior and informed consent, dealt with through a documented system that enables indigenous peoples, local communities and other stakeholders to express their views through their own representative institutions. Also 6.4 and 7.6
9.4 Positieve bijdrage aan het welzijn van lokale bevolking	Rapportage 9.4.1 Beschrijving van: -programma's en praktijken om de effecten van bedrijfsactiviteiten op lokale bevolking te bepalen en beheren Gebaseerd op de Social Performance Indicator SO1 van GRI (Global Reporting Initiative)	P	6.11 Contribute to local sustainable development
9.5 Inzicht in mogelijke schendingen van de integriteit van het bedrijf	Rapportage 9.5.1 Beschrijving van: -mate van training en risico analyse om corruptie te voorkomen -ondernomen acties in antwoord op gevallen van corruptie Gebaseerd op de Social Performance Indicator SO2, SO3 en SO4van GRI (Global Reporting Initiative).	X	1.1 / 1.2 Transparency

Annex C Draft RSPO principles and criteria

The draft principles and criteria of the RSPO are included below.

Annex D GHG analysis of CPO

D.1 Introduction

This Annex describes the main assumptions and parameters for the Greenhouse gas (GHG) analysis performed by Ecofys on co-firing Crude Palm Oil (CPO) versus Heavy Fuel Oil and Natural Gas. It must be noted that the outcomes of any GHG analysis depends on choices made in methodology and parameter values. The analysis is based on 'economic allocation' and uses 'typical' parameter values unless stated otherwise. The analysis includes both direct and indirect emissions (e.g. from fertilizer production).

D.2 Input parameter values GHG analysis

The main input parameters used for the GHG analysis are summarized in the tables below.

Table 1 Production of palm oil fruit in Asia.

Yields[1)]	
Fresh Fruit Bunches	19.2 tonne/ha/yr
No co-product	
Energy and materials	
Energy[2)]	500 MJ/ha/yr
Fertiliser[3)]	98 kg N/ha/yr
	38 kg P2O5/ha/yr
	146 kg K2O/ha/yr

1) A Fresh Fruit Bunch (FFB) can contain from 1,000 to 3,000 individual fruits, together weighing 10 to 20 kilograms. Every mature oil palm tree produces several bunches per year. The fruit bunches yield per hectare is 10 to 35 tonnes per hectare (van Gelder 2004). FAO reports that the average yield for palm oil in Asia is 19.2 tonne/ha/yr (FAO 2007).

2) 0.5 GJ/ha/yr (Dehue 2006). The Malaysian Palm Oil Board mentions a total energy input of 6.14 GJ/ha/year for machinery, based on a study of 1991. Dehue cites FAO that the energy input should rather be 500 MJ/ha/yr. This is significantly lower than soy or rape which seems plausible since palm oil is harvested and fertilized by hand.

3) Palm oil production requires less fertiliser per unit of output than other oilseed crops (WWF 2005). On average, every hectare of mature oil palm plantation needs 1.6 tonne of fertiliser per year (Metro Spectrum 2006), part of this is in the form of empty fruit bunches. Young oil palms require 5.2 to 14 kg N/rai/yr, adult oil palms require 18 to 25.6 kg N/rai/yr, old oil palms require > 32.6 kg N/rai/yr (2.5 rai = 1 acre = 0.4047 ha) (GTZ 1997). We apply the average fertiliser use for palm oil in Asia as reported by FAO (FAO 2002).

Table 2 Conversion of Fresh Fruit Bunches to Crude Palm Oil.

Milling, pressing and kernel crushing	
Yield[1)]	
Crude palm oil	0.1790 kg/kg FFB
Palm kernel oil	0.0219 kg/kg FFB
Palm kernel meal	0.0260 kg/kg FFB
Energy and Materials[2)]	
Methane emission from POME	1.906 kg/tonne FFB

1) Related to a FFB yield of 19.2 tonne/ha (FAO 2006a) and a CPO yield of 3.44 ton/ha (FAO 2006a) an oil extraction rate of 17.9% is obtained. Palm kernel oil yield and palm kernel meal yield are from (Dehue, 2006 citing FAO and USDA).

2) The electrical and steam requirements of the palm oil production are 20-25 kWh and 0.73 tonne steam per tonne of FFB. The boilers are fuelled with shells and fibre, and thus no net energy input is required (Dehue 2006). The palm oil mill effluent is drained to lagoons and leads to emission of biogas. The emissions from POME are based on (Yacob, 2005). The methane emission could be avoided rather easily and used for extra energy generation. Note that Methane emissions prevent CO_2 emissions and that the net effect of methane emissions is not 21 but 21 – 44/16 = 18.25 (molecular weight of methane is 16 and that of CO_2 is 44).

Table 3 Price information used for economic allocation. Prices give are average prices for 2006 c.i.f. Rotterdam (Oil World 2007)

Product	**Price (US$/tonne c.i.f. Rotterdam)**
Crude palm oil	505
Crude palm kernel oil	615
Palm kernel meal	95

Table 4 Emissions from natural gas and heavy fuel oil (Elsayed 2003)

Fuel	**GHG emissions (kg $CO_{2\ equivalent}$/MJ)**
Natural Gas	
Direct emissions	0.0522
Indirect emissions	0.0017
Heavy Fuel Oil	
Direct emissions	0.0730
Indirect emissions	0.0081

Table 5 Transport distances

Product	**From**	**To**	**Transport mode**	**Distance (km)**
FFB	Plantation	Mill	Truck	5
CPO	Mill Malaysia Rotterdam	Harbour Rotterdam Final destination (Essent)	Truck Ship Barge	200 15,500 200

Table 6 Above ground biomass of various vegetation types in insular Asia (IPCC 2006). In line with the IPCC guidelines we use an average carbon fraction of 50% of above ground biomass.

Vegetation type	**Above ground biomass (tonnes dm/ha)**
Tropical rainforest	350
Oil Palm plantation	136[1]
Grassland	6.2

1) Oil palm plantations stand for an average of 25 years after which they are re-planted. We assume that in multiple cycles average above ground biomass of oil palm plantations is 50% of the maximum biomass storage of 136 = 68 tonnes dm/ha. This is considered a conservative estimate.

Table 7 Emissions from drained peat soils (Wetlands International 2006)

CO_2 emissions/ha/y	65[1]

Annex E FSC guidelines for nonconformities

The following guidelines are provided by FSC in distinguishing between major and minor Corrective Action Requirements (FSC 2004a). In the absence of more detailed RSPO guidelines in this respect, the FSC guidelines will be used in distinguishing major and minor nonconformities with RSPO principles and criteria.

Major Corrective Action Requests

Major Corrective Action Requests are issued in response to non-compliances which either alone or in combination with non-compliances of other indicators, result (or are likely to result) in a fundamental failure to achieve the objectives of the relevant FSC criterion.

Such fundamental failures are indicated by non-conformance(s) which:

- continue over a long period of time, *or*
- are repeated or systematic, *or*
- affect a wide area, *or*
- are not corrected or adequately responded to once they have been identified *or*
- fail a "major failure" or "fatal flaw" indicator/criterion

Minor Corrective Action Requests:

Minor Corrective Action Requests are stipulated in response to any minor non-conformance observed by the audit(or) (team).

A non-conformance may be considered minor if:

- it is a temporary lapse, *or*
- it is unusual / non-systematic, *or*
- the impacts of the non-compliance are limited in their temporal and spatial scale, *and*
- prompt corrective action has been taken to ensure that it will not be repeated, *and*
- it does not result in a fundamental failure to achieve the objective of the relevant FSC criterion